Proceedings of the 10th Conference of the
Japanese Association of Digital Humanities

JADH2020

"A New Decade in Digital Scholarship:
Microcosms and Hubs"

November 20-22, 2020

JADH2020

Proceedings of JADH Conference, vol. 2020
"A New Decade in Digital Scholarship: Microcosms and Hubs"

`https://jadh2020.lang.osaka-u.ac.jp`
November 20-22, 2020

Contents

The Poetics of Scale in Microcosmic/Macrocosmic World Literature

Perspective, Method, and Logic in Zooming-in and Zooming out of World Literature

Youngmin Kim[1]

[1]Distinguished Research Professor Emeritus, Dongguk University
(youngm@dongguk.edu)
[2]Jack Ma Chair Professor, Hangzhou Normal University
(youngm@hznu.edu.cn)

Bio

Youngmin Kim is currently Distinguished Research Professor Emeritus at Dongguk University, Jack Ma Chair Professor of Ma Yun Education Fund at Hangzhou Normal University, Editor-in-Chief of *Journal of English Language and Literature,* Vice-President of International Association of Ethical Literary Criticism, Executive Council Member of International Comparative Literature Association, Director of Digital Humanities Lab of Dongguk University. He is the founding Director of Institute of Trans Media World Literature, Dongguk University. He was Director and Dean of International Relations, Dean of College of the Humanities at Dongguk University, Visiting Professor at Cornell University and Sapporo Gakuin University in Japan, Visiting Scholar and faculty affiliate of East Asia Center at the University of Virginia at Charlottesville. He served as Advisory Committee Member of Institute of World Literature of Harvard University (2013-16), President of English Language and Literature Association, Jacques Lacan and Contemporary Psychoanalysis Society, Yeats Society of Korea, Vice President of International Association of the Study of Irish Literatures. He is currently the Principal Investigator of "Trans Media, Digital Humanities, and World Literature" (2017-2020) Project. He wrote articles and books on modern and contemporary poetries in English, critical theory, transnationalism, translation studies, psychoanalysis, comparative literature and world literature, and Digital Humanities.

Abstract

Maryanne Wolf in her *Proust and the Squid* (2007) posits reading as a human invention, and elaborates the human brain's plastic ability in relation to the act of reading: "Underlying the brain's ability to learn reading lies its protean capacity to make new connections among structures and circuits originally devoted to other more basic brain processes that have enjoyed a longer existence in human evolution, such as vision and spoken language. We now know that groups of neurons create new connections and pathways among every time we acquire a new skill" (5). Wolf's understanding of the brain's "plastic design" to "make new connections among structures and circuits" is based upon the process of recollection which is activated in the reading brain in milli-second. The human reading brain, designed to store and retrieve words, can "elicit an entire history of myriad connections, associations, and long-stored emotions" in human evolution such as vision and spoken language. Wolf claims that the two dimensions of the reading brain's development and evolution are the intellectual and the biological, using French novelist Marcel Proust as metaphor for the intellectual and the squid as analogy for the biological. Proust saw reading as "a kind of intellectual sanctuary" where human beings could provoke their intelligence and desires to experience the Real out of their transformed imagination. Scientists in the 1950s used the squid to illustrate "how neurons fire and transmit to each other, and in some cases to see how neurons repair and compensate when something goes awry" (6).

The fact that the biological and cognitive function of the human brain in connecting and integrating at rapid-fire speeds without a single moment of consciousness brings the question of the automation. The "unconscious" autonomy of the human agent is now confronted with the automation which loses its human autonomy and transforms itself into the system of automatism, and the matter is sublimated into the digital. Wolf's models of Proust and the Squid in terms of the intellectual and the biological is closely related to the linguistic and the neurocognitive aspects of the Artificial Intelligence. The complementary examples of human brain's reading processes have analogically elaborated how various neuro-cognitive processes will work algorithmically in the data-processing of the AI. Both cases of reading by Wolf refer to human intelligence's information processing in terms of the human brain's automatic learning, reminding us of machine learning and deep learning algorithms.

The development of the AI in tandem with that of human intelligence may be the last great challenge of humanism and the first great endeavor of posthumanism. Cognitive neuroscience and artificial intelligence have undergone revolutionary changes in the past decades, and they foreground the embodied and environmentally embedded nature of intelligent action. The augmentation and absorption of human agents by the digital now seems inevitable, leaving the question of man and technology initiated by Heidegger still incomplete. What is at stake is the ethical articulation of intelligence (both human and

artificial) in this "second machine age." One may recall Heidegger's essay, "The Question-ing Concerning the Technology," in which two possible directions for ethical articulation concerning technology are presented. On the one hand, Enframing (Gestell) challenges forth into the frenziedness of ordering that blocks every view into the propriative event of revealing and so radically endangers the relation to the essence of truth. On the other hand, Enframing (Gestell) propriates for its part in the granting that lets man endure–as yet inexperienced, but perhaps more experienced in the future–that he may be. the one who is needed and used for the safekeeping of the essence of truth. Thus, the rising of the saving power appears (314). Whichever route they may choose, humans are struggling with the "existential threats" of facing posthumanism which initiates the retreat of the human agent into the background of a larger eco-technological environment. What is at stake is the ethical articulation of intelligence (both human and artificial), tools, machines, and forms of life in this "second machine age," described by Erik Brynjolfsson and Andrew McAfee. If we turn to the other side of the coin, the new environment of the unlimited possibilities of hyper-connectivity and convergence in this age of what Klaus Schwab called "The Fourth Wave of the Industrial Revolution" emerges, revealing "emerging technology breakthroughs" across the physical, digital, and biological worlds: neural network struc-tured artificial intelligence research, big data driven social media, the rapid adoption of 5G small screen device computer technology, reality augmenting software, and what not.

In this context of posthumanism and second machine age, we are confronting the epochal crisis. When we zoom out from the global scene of the pandemic coronavirus, human beings seem to be confronting an imagined threatening geological Anthropocene in the biosphere. When the globe is zoomed in among humans even down to the cells, genes and chromosomes of the human body, we can reach the challenging disruptive transformation of our everyday lives, covering our inner lives, work, education, social activities. How to balance between zooming-in and zooming-out properly is what is at stake in our daily lives. The small touch screen of the multiple electronic devices we use in time will provide the platforms for us to find, read, think, feel, care, and even survive.

This talk will attempt a poetics of scale in world literature in terms of the perspective, method, and logic in dealing with the database of the world literature.

The Regional Turn in Digital Humanities in India

Decolonizing Digital Knowledge Infrastructures

Nirmala Menon[1]

[1]School of Humanities and Social Sciences, Indian Institute of Technology (IIT)

[2]Digital Humanities and Publishing Research Group, Indian Institute of Technology (IIT)

Bio

Nirmala Menon leads the Digital Humanities and Publishing Research Group at the Indian Institute of Technology (IIT), Indore, India. She is a faculty member of the School of Humanities and Social Sciences (HSS), Discipline of English, IIT Indore. She is the author of *Migrant Identities of Creole Cosmopolitans: Transcultural Narratives of Contemporary Postcoloniality (Peter Lang Publishing, Germany, 2014)* and *Remapping the Postcolonial Canon: Remap, Reimagine, Retranslate (Palgrave Macmillan, UK 2017)*. She has published in numerous international journals and speaks, writes and publishes about postcolonial studies, digital humanities and scholarly publishing. She directs Ph.D. students is in their projects and runs DH projects from the research lab at IIT Indore. Her primary area of research is Postcolonial Literature and Theory. Her focus is on the comparative study of twentieth century postcolonial literatures in English, Hindi and other languages. Digital Humanities, Gender studies, Globalization and Translation studies are additional areas of research. Her interests are multilingual but also interdisciplinary; her research examines the ways in which literatures from different non-Western languages influence and can redefine and reframe postcolonial theoretical concepts. She is also on the Advisory Board of the Open Library of Humanities (OLH) , Advisory Board member of Ubiquity Press, UK and Advisory Board Member, Open Access India and Chair, (2016-17) CLCS Global South Forum, Modern Language Association (MLA), Prof. Menon is one the founder members and current President of Digital Humanities Alliance in Research and Teaching Innovation (DHARTI)

Abstract

This talk will examine the emerging areas of research in Digital Humanities in India by an examination of the term "Digital Humanities" and its uneven and uncertain trajectory in the Indian research ecosystem. As with other systems around the world, DH in India is complex and contextual and each of us involved in the disciplinary practice encounter resistance and skepticism. Resistance to what is perceived as a deliberate distancing from the larger Humanities queries, skepticism about appropriating the rhetoric of STEM disciplines merely as a tool for greater legitimacy and validation. But of course DH is far more than a sum of its criticisms and skepticisms I will address why it is imperative that the digital be harnessed, critiqued, deconstructed and dissected precisely so that the issues that Humanities scholars have been invested in continue to be at the centre of the development, deployment and dissemination of technology. Using the example of Decolonizing Knowledge Systems through Scholarly Publishing I underscore the need to make knowledge productions multilingual and accessible to students and researchers in different parts of the country and the role of Open Access India in making education access a little less unequal than it is now. I will discuss IIT Indore's Project KSHIP and some of the continuing challenges in launching the project.

Digital Humanities pedagogy in India is a journey–a data point that is part of a cosmic, but networked chaos. As scholars who work in the intersectional identities of the digital and humanities, those data points are marked with a lot of support, mentoring, learning and unlearning. A survey of university courses across various small and big universities (forthcoming by Shanmugapriya and Menon) suggest that many small universities are also recognizing the need to introduce Digital Humanities courses as a primer for their under-graduate students. The ubiquity of computational resources and techniques as an essential part of Humanities inquiry is increasingly recognized across liberal arts departments but the willingness, resources and institutional support to translate these into pedagogical tools and curriculum is still nascent and emerging. I consider some of the reasons for the resistance to institutionalizing digital humanities within the larger university systems in India and conclude that the causes are historical but also perhaps the embedded rigidity and regimentation of university-curricula across disciplines. Digital Humanities, as defined by its purported inter- or transdisciplinary character, becomes a tough sell within Indian university ecosystems, often constrained by their colonial origins and the limitations of a postcolonial social imaginary. By highlighting key issues regarding digital affordances in postcolonial contexts and exemplifying digital humanities projects that were presented at the DHAI 2018 conference, along with representative digital interventions beyond the conference's ambit, we conduct what we may term a 'distant reading' of the digital humanities in India. In conclusion, I underline the need for a postcolonial digital humanity that is deeply invested in cross-disciplinary exchanges and pedagogical innovation: one that interrogates

hegemonic assumptions about both "Postcolonialism" and "Digital Humanities."

Tracing playful media practice: Challenges for Theory, Methodology, and Infrastructure

Martin Roth (Panel Chair)[1,2], Kazufumi Fukuda[1], Zoltan Kacsuk[2], and Akito Inoue[1]

[1]Ritsumeikan University
[2]Stuttgart Media University

1   Panel Outline

Media practice today is not confined to a specific medium, platform, topic or language. In times of intense "media convergence" (Jenkins 2006), of the "meta-medium" computer (Manovich 2013), and of ubiquitous digital networks, digital culture appears to happen everywhere at the same time. Videogames are streamed on Twitch.tv, with the support of donations by "patrons" on respective crowdfunding platforms, next to streams of the U.S. congress, which are commented on in the same manner as game play scenes (see Figure 1 and 2).

Media practice appears more dispersed and transgressive of media boundaries, of national boundaries, and of language boundaries. Platforms can be regarded as attempts at providing clarity. At the same time, they restrain, channel and control information and user practices (Stalder 2016; Itō [伊藤] 2016). In this sense, contemporary media practice is both unbound and highly controlled. On this basis, one of the future challenges for digital humanities is how to theorize, capture and analyze such media practice adequately. This is a challenge for media theory and methodology, and one that requires new research infrastructures and tools. Focusing on digital games and Japanese visual media, this panel aims to discuss these challenges and suggest avenues for solving them. The panelists present their own approaches to making sense of contemporary digital media culture, and of making use of various available technologies and tools from the field of data science. Paper 1 discusses the possibility of modeling the heterogeneous data resources and using linked data technologies for making them accessible to human and computer-aided analyses. Paper 2 analyzes large sets of fan-created data for revisiting Hiroki Azuma's assumptions about
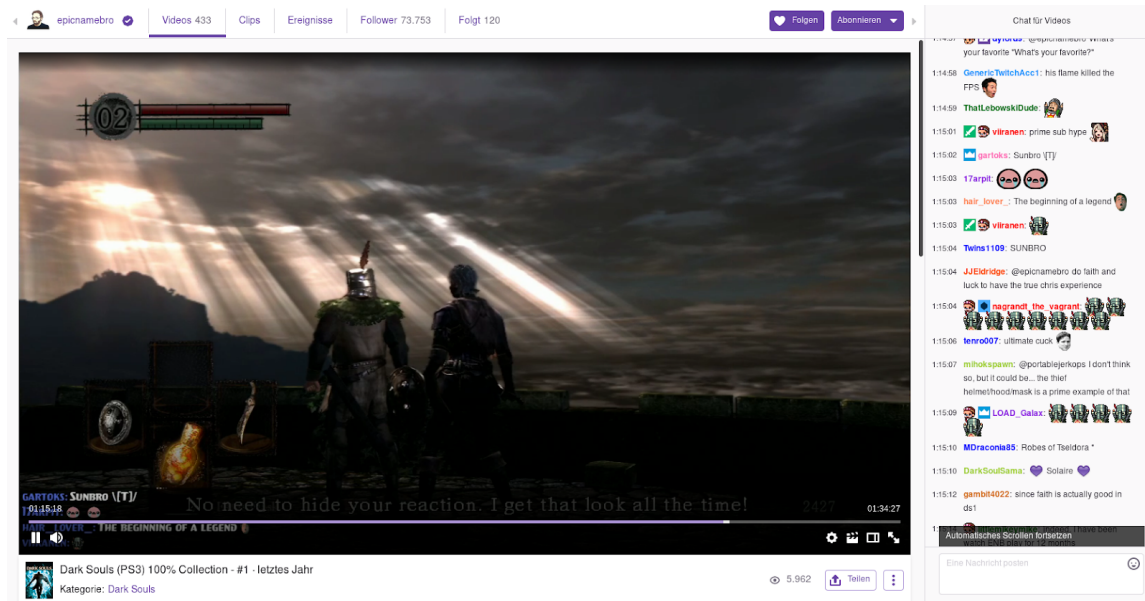
Fig. 1: Iconic Scene from the videogame Dark Souls (FromSoftware, 2011) played on Twitch.tv
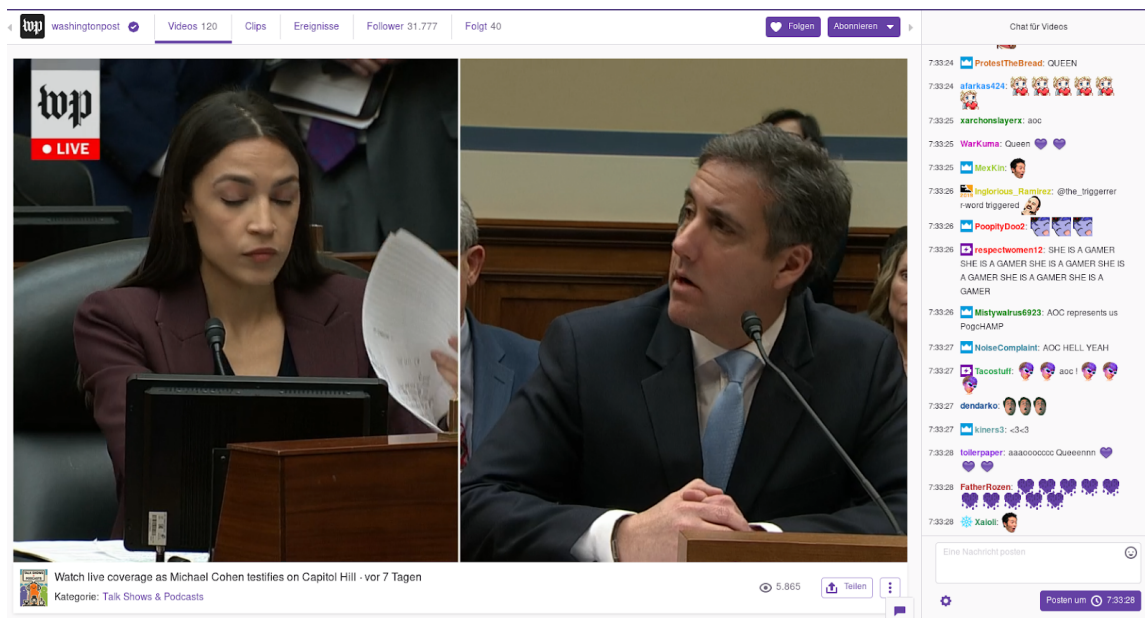
Fig. 2: Washington Post congress live stream of Michael Cohen's testimony from Feb. 27, 2019, on Twitch.tv

the creation of otaku characters in Japanese anime, manga and games. Paper 3 explores possibilities for understanding language-based differences in game culture, comparing text data from a wide range of game cultural data resources.

In combination, these contributions can hopefully present a crucial problem that contemporary media research is facing, and relate our search for solutions to the work of other areas of digital humanities that face similar issues.

Bibliography

Itō, Mamoru. 2016. "Dejitaru Media Jidai Ni Okeru Genronkūkan: Rironteki Tankyū No Taishō Toshite No Segyō, Jōdō, Jikan." *Journal of Mass Communication Studies*, no. 89: 21–43.

Jenkins, Henry. 2006. *Convergence Culture: Where Old and New Media Collide*. New York and London: New York University Press.

Manovich, Lev. 2013. *Software Takes Command*. New York: Bloomsbury.

Stalder, Felix. 2016. *Kultur Der Digitalität*. Frankfurt (Main): Suhrkamp.

2 *(Kazufumi Fukuda)* For the Development of a Data Model for Tracing "Play" with Video Games and the Media Culture

In considering the current video game culture, it is hard to ignore the existence of other related media. One of the great examples is the case of "Dark Souls 3" (FromSoftware, 2016). Given the game's difficulty, large game world, and the variety of gameplay it offers, arguably, few players have never seen the YouTube video of the game. At the same time, players will often open strategy books and browse strategy sites as well. Interestingly, this game has an online competitive play element. Therefore, some players may send information and communicate with other players via SNS such as Twitter. Thus, it can be said that the current video game play experience exists among video games and related media. These are topics that have been discussed with keywords such as media mix (Steinberg 2012) and convergence culture (Jenkins 2008). We think that various resources can be linked by constructing a data model that defines multiple media via video game works. Numerous instances of them already exist on the Internet, either as user-generated contents or as metadata for materials held by institutions around the world. By connecting these resources, it becomes possible to analyze a wide range of play traces occurring in video

games and related media. The purpose of this study is to discuss future directions for constructing such a data model and a research platform based on it.

Data models for describing video game materials and works have been discussed by many scholars since the beginning of the 2010s (i.e., McDounogh et al. 2010, Jett et al. 2016, Author et al. 2018, Hoffmann 2019). Besides, some researchers (Aarseth 2014, Juul 2016) examine possible ontologies to define game characteristics. However, the existing works take different approaches. The former adopts a model construction approach that assumes the creation of bibliographic data and its adaptation. On the other hand, the latter is a discussion about the "character of the game" and the "mode of existence" based on the framework of the existing philosophy, and does not take data creation into consideration. Based on this difference, it is clear that a future subject for game studies with data models is the inclusive connection between a bibliographic data and the philosophical framework the author mentioned above.

Prior work has also been focusing on creating metadata for an entity/relational data model. These data are published in the online catalog "RCGS Collection (Fig 1)" owned by Ritsumeikan Center for Game Studies. Moreover, the data were contributed to "Media Arts Database (Fig 2)" known as a comprehensive catalog service of media arts provided by the Agency for Cultural Affairs. In the RCGS Collection, linked data are published as dump data. In addition, SPARQL endpoints are provided, enabling data retrieval and analysis using a query language. Also, this dataset gets some of the authoritative data of the work from Wikidata (Author 2019). Wikidata is characterized in that it is connected to many external sources. Thus, it can be also said that their meta data contribute to the connection with external related resources.

Finally, we would like to discuss the problems and methodologies necessary to build a data model to properly describe the game-centric media culture mentioned at the outset. As a major premise, it is necessary to establish a scope in order to select resources to be modeled, because there is a huge amount of media related to games. To take shape in our research, the case study approach may be most effective, because it allows us to collect various materials related to the playing experience from a selected game work. By analyzing these materials, we can extract requirements and develop models. It is preferable that multiple cases be selected, and that they cover as much "ground" of what we perceive as game culture as possible.

In conjunction with the case studies, a more specific designation may occur when discussing the relationship with the game. Therefore, it is also necessary to consider a model for designating the part of the content that constitutes the game work itself.

In this paper, we suggest solutions for these challenges and point at further work to be
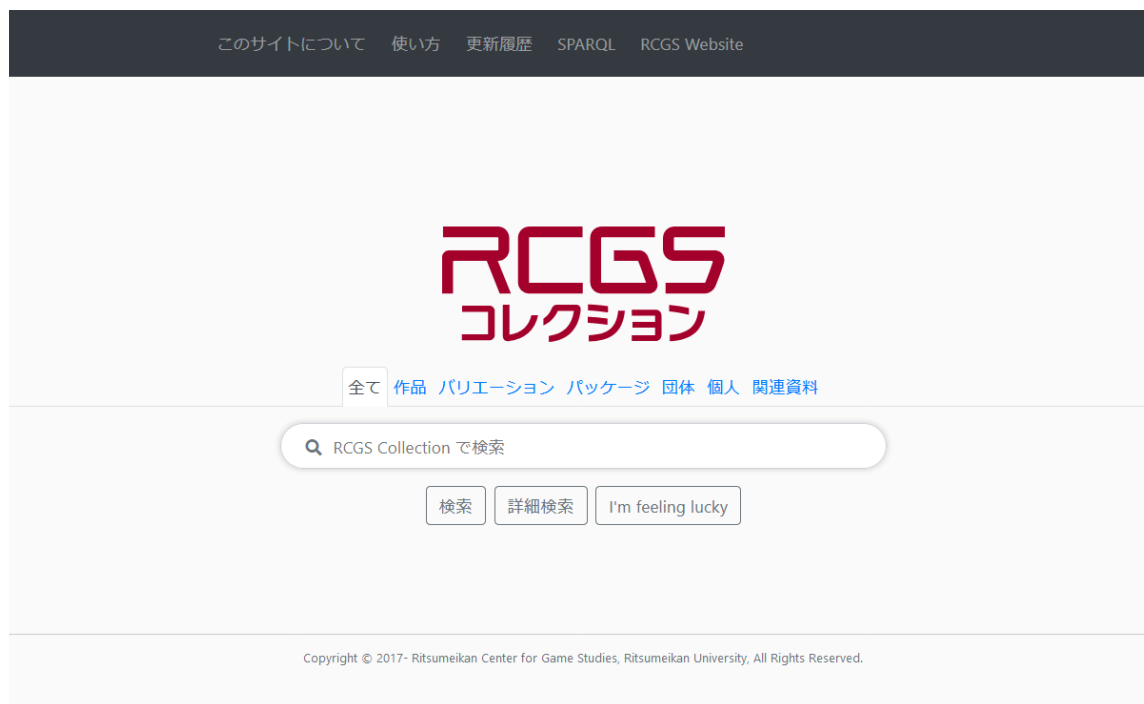
Fig. 1: RCGS Collection Top Page

Fig. 2: Media Arts Database Top Page
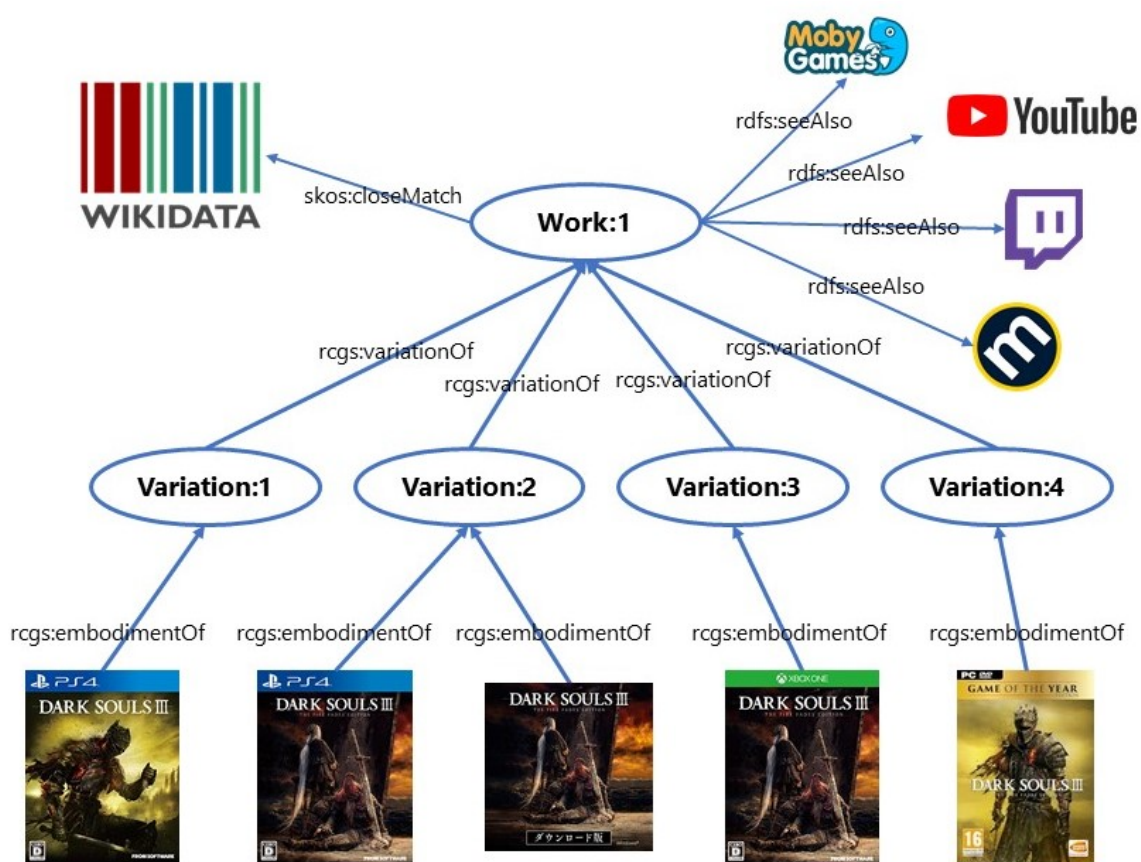
Fig. 3: Applying "DARK SOULS 3" on the metadata model

done in the future.

Bibliography

Aarseth, Espen. 2014. "Ontology." In The Routledge Companion to Video Game Studies, edited by Mark J. P. Wolf and Bernard Perron, 683–95. Routledge.

Author. 2019.

Author et al. 2018.

Hoffmann, Tracy. 2019. "Developing a Mediated Vocabulary for Video Game Research." In *Proceedings of the Doctoral Symposium on Research on Online Databases in History 2019*, 11p. http://ceur-ws.org/Vol-2532/paper8.pdf.

Jenkins, Henry, and Mark Deuze. 2008. "Convergence Culture." Sage Publications Sage UK: London, England.

Jett, Jacob, Simone Sacchi, Jin Ha Lee, and Rachel Ivy Clarke. 2016. "A Conceptual Model for Video Games and Interactive Media." *Journal of the Association for Information Science and Technology* 67 (3): 505–17. https://doi.org/10.1002/asi.23409.

Juul, Jesper. 2016. "Sailing the Endless River of Games: The Case for Historical Design Patterns." In *1st International Joint Conference of DiGRA and FDG 2016*. Dundee. http://www.jesperjuul.net/text/endlessriverofgames/.

McDonough, Jerome, Matthew Kirschenbaum, Doug Reside, Neil Fraistat, and Dennis Jerz. 2010. "Twisty Little Passages Almost All Alike: Applying the FRBR Model to a Classic Computer Game." Digital Humanities Quarterly 4 (2). http://www.digitalhumanities.org/dhq/vol/4/2/000089/000089.html.

Steinberg, Mark. 2012. Anime's Media Mix: Franchising Toys and Characters in Japan. Univ of Minnesota Pr.

3 *(Zoltan Kacsuk)* Revisiting "Otaku: Japan's Database Animals" twenty years on: Can we use fan created databases to test one of Hiroki Azuma's central arguments?

Media fans have been compiling data on their favorite works long before the internet became the most important channel for communication (Jenkins, 1992; Okada, 1996; Yoshimoto,

2009). Naturally, with the advent of the internet this process of collecting and cataloging information by individual fans and enthusiast communities has only become easier and amplified in its scale. The level of detail afforded by these fan compiled data sources has also not gone unnoticed in academic research (cf. Hills, 2002). Although various online databases created by enthusiast communities have become the go to resource for checking information on hard to find media texts and artifacts, their use for large-scale quantitative research has yet to become widespread.

Harnessing the power of fan created databases for academic research is precisely the aim of the Japanese Visual Media Graph (JVMG) project, funded by the German Research Foundation's (Deutsche Forschungsgemeinschaft, DFG) e-Research Technologies program. By learning from and building on the experiences and content produced and aggregated by enthusiast communities, the project aims to create a database and query tool primarily for academic researchers working on Japanese visual media. Furthermore, the JVMG project employs a linked data framework for processing the various data sources and for creating links between them. This approach not only allows for a great level of flexibility in data processing, but also facilitates the linking of the data to even further sources, especially linked open data. Although the project is still in its development phase it has already proven to be a powerful resource for approaching both new and long-standing questions in research on Japanese anime, manga, light novels and video games. To demonstrate the possibilities opened up by such an integrated database as well as the challenges entailed in working with data compiled by enthusiast communities this presentation will focus on examining one of Hiroki Azuma's most well-known works through the lens of data on visual novels (a unique kind of narrative centered video game genre) and other types of Japanese visual media, such as anime and manga.

Hiroki Azuma's Dōbutsu ka suru posutomodan: otaku kara mita Nihon shakai (Animalizing postmodern: Japanese society as seen from otaku), published in 2001, has been one of the most influential treatises on not only Japanese otaku, but also on the production and consumption paradigm defining Japanese anime, manga, light novels and video games in late modernity. The book's impact on the discourse around otaku and the just enumerated domains is truly international thanks in part to the English translation, which was published in 2009 as Otaku: Japan's Database Animals. With almost twenty years since the original publication in Japanese and more than ten years since the English translation was released, the concepts and fra to the lack of these types of quantitative research approaches in the concerned fields, however, the lack of available data that is both large and granular enough to use for such an analysis has also not been conducive to the emergence of quantitative examinations of this sort.

This presentation will thus both introduce the wider JVMG project, and provide an example

use case showcasing the JVMG database's affordances and limitations by examining one of the central points from Azuma's above cited work – namely that "many of the otaku characters created in recent years are connected to many characters across individual works, rather than emerging from a single author or a work" (2009 [2001]: 49) – with the help of the database. The use case will serve to illustrate certain inherent limitations of databases compiled by enthusiast communities, and will also highlight how the JVMG database with its incorporation of multiple such databases can serve to help mitigate some of those shortcomings.

Bibliography

Azuma, H. (2009 [2001]). *Otaku: Japan's database animals* (introduction and translation by J. E. Abel & S. Kono). Minneapolis, MN: University Of Minnesota Press.

Hills, M. (2002). *Fan Cultures*. London: Routledge.

Itō, G. (2005). *Tezuka izu deddo: Hirakareta manga hyōgenron e* [Tezuka is Dead: Opening up theoretical approaches to manga representation]. Tokyo: NTT Publishing.

Jenkins, H. (1992). *Textual Poachers: Television Fans & Participatory Culture*. London: Routledge.

Lamarre, T. (2009). *The Anime Machine: A Media Theory of Animation*. Minneapolis, MN: University Of Minnesota Press.

Okada, T. (1996). *Otakugaku nyūmon* [Introduction to otakuology]. Tokyo: Ōta.

Suan, S. (2017). "Anime's Performativity: Diversity through Conventionality in a Global Media-Form." *animation: an interdisciplinary journal*, 12(1): 62–79.

Yoshimoto, T. (2009). *Otaku no kigen* [The origin of otaku]. Tokyo: NTT.

4   *(Akito Inoue)* Can we measure cultural differences in video games? *Awareness of the problem from previous research*

The relation between human consciousness and "language" has been a major point of dispute in social and human science. In what sense can we say that human consciousness also bound by the "games" it plays?

As a human behavioral environment, "playing video games" has several interesting characteristics. Compared to linguistic behavior, video games may be less affected by the

"vocabulary" or "range of meaning" formed by a specific region. For example, if playing the same game, both African and Japanese children may have similar experiences. There are probably quite a few cases where the game is played in an identical way.

Based on this assumption, can we also say that the is game completely free from social-cultural differences? Most often, the answer can be "NO", for the following two reasons. Firstly, games are localized and the content slightly differs from country to country (O'Hagan, M., & Mangiron, C., 2013). Secondly, even when playing the same game, research (i.e., Feng.at al, 2007) shows that there are usually social differences between players that affect the gameplay. For example, when men and women were asked to play the same game, a difference in gameplay tendencies was found in many studies (i.e., Linda Hughes, 1983, Feng.at al, ibid).

Although there is not yet much research on differences in gameplay by region, the RPG Studies suggest that there may be a significant difference in the strategies of raising the game character level (Endoh, 2019) based on different social environments. Cultural differences in gameplay can be presumed to exist because of the following three approaches that have been applied to measuring cultural differences concerning games:

(1) Differences in different versions of the same work (O'Hagan, M., & Mangiron, C., 2013)

(2) Differences in gameplay in different play environments of the same work (Pelletier-Gangon, 2019)

(3) Differences in the same version and environment of the game (Feng.at al, 2007)

Based on the above, our study aims to further develop awareness of the problem of (3). Particularly, we would like to clarify the cultural differences in games, especially those found in different language areas.

Research methods

In this study, we are gathering text data from game play walking through, strategy information about specific games, game preview releases, review, YouTube comments and other sources to see the differences between Japanese and English-speaking countries. On top of this, we are examining the blurring of language characteristics in categories of textual data (strategy information, evaluation information, etc.).

As a preliminary result, we have found that the variation in the language used is less varied for previews and strategy information. And we suspect that the variance in reviews and YouTube comments may be larger.

In relation to this prediction, we also suspect that the texts' tendency describing behaviors

strongly linked to the video game play environment are less scattered than those describing behaviors not strongly linked to the video game play environment.

In this presentation, we discuss the results of our pre-survey, and suggest next steps for the analysis.

Bibliography

Linda Hughes (1983) "Beyond the Rules of the Game : Why Are Rooie Rules nice?", The World of Play: Proceedings of the 7th Annual Meeting of The Association for the Anthropological Study of Play

Feng, J., Spence, I., & Pratt, J. (2007). Playing an action video game reduces gender Differences in spatial cognition. Psychological science, 18(10), 850-855.

O'Hagan, M., & Mangiron, C. (2013). Game localization. Amsterdam and Philadelphia: John Benjamins Publishing Company.

ENDOH Masanobu, Koji MIKAMI (2019), Gamedo: A Face of Ludology to understand Japanese Game Culture

Jérémie Pelletier-Gagnon (2019), Players, Cabinets, and the Space In-Between : Case Studies of Non-Ludic Negotiation of Video Game Cabinet Spaces in Japanese Game Centers, Replaying 2019

Reviewing Digital Literature through Digital Literature

David Thomas Henry Wright[1]

[1]Nagoya University

Electronic or digital literature refers to literary works that are 'native to the digital environment' (Rettberg 2019: 6). In a simpler sense, electronic or digital literature is defined by its 'unprintability' and its reliance on computer code to exist. Additionally, Bell et al (2010) pose that electronic literature can be defined as works that are 'written for and read on a computer screen that pursues its verbal, discursive and/or conceptual complexity through the digital medium, and would lose something of its aesthetic and semiotic function if it were removed from that medium.'

On June 11, 2020, the inaugural issue of *The Digital Review* was released (it should be noted that I, the author of this paper, am a co-editor of this publication). This journal, a sibling publication to the *electronic book review*, is dedicated to the 'preservation and publication of innovative, born-digital essays'. This issue included two reviews of two separate works of electronic literature: a review of *The Pleasure of the Coast* by J.R. Carpenter, titled *The Pleasure of the Infinite: An (In)finite Review of* The Pleasure of the Coast *by JR Carpenter* by DTH Wright (myself); and a review of *Blocked In* by Anastasia Salter and John Murray, titled *Playing the Hard Questions: A Twine Review of* Blocked In *by Anastasia Salter and John Murray* by Caleb Andrew Milligan. These reviews are not simply text reviews. Rather, they are works that engage with the works' digital formats, interfaces, and code as part of their critique. In the same way filmmaker Jean-Luc Godard implemented the 'essay film', so too do these works implement a born-digital critique.

J.R. Carpenter's *The Pleasure of the Coast* (2019), offered in both English and French, appropriates, exaggerates, détournes, corrects, and corrupts text from Roland Barthes' *The Pleasure of the Text* (1973), Beautemps-Beaupré's *Introduction to the Practice of Nautical Surveying and the Construction of Sea-Charts* (1808), and Jean Giraudoux's *Suzanne et le Pacific* (1921). The work is presented in five sections: 'the infinite coast', 'the technical coast', 'the incremental coast', 'the grammatical coast', and 'the route of La Recherche'. The review of Carpenter's work, *The Pleasure of the Infinite*, adopts the code used by Car-

penter for the section 'the infinite coast'. Within this scrolling, 'infinite', decentred form, the review is positioned. In so doing, the review explores and reflects not only on the work, but engages with the work on the its own terms.

Blocked In (2019) by Anastasia Salter and John Murray, explores in the language and artistic value of video games by representing this 'debate through the fusion of two competing aesthetic genres: the hypertextual Twine game, and the traditional arcade platformer.' The work ends with a challenge to the reader to not only be an active participant in the work, but to create their own. In his review of Salter and Murray's 'game essay', Milligan also engages with *Twine*, a free open-source software for making interactive fiction. He concludes that to fully appreciate and critique the work, one must engage with the formats and interfaces.

Using these two digital reviews as examples, this paper proposes a model for reviewing and engaging with works of born-digital literature. Unlike typical reviews or papers, it poses that it is not enough to merely reflect and theorise the work without also engaging with its form and code makeup. This academic process is understood as a form of 'practice-led research' as defined by Smith and Dean (2009). Additionally, the method of engaging with and remaking the code and form of the work in question is regarded as an example of 'third generation electronic literature' as defined by Flores (2019). This paper also addresses the potential problems with doing so: notably, copyright issues.

Works Cited

Bell, Alice, et al. 2010 'A [S]creed for Digital Fiction', *Electronic Book Review*, 7 March, at https://electronicbookreview.com/essay/a-screed-for-digital-fiction/ (accessed 6 July 2020).

Carpenter, J.R. 2019 'The Pleasure of the Coast', *Luckysoap*, at http://luckysoap.com/plea surecoast/en/technicalcoast.html (accessed 6 July 2020).

Flores, Leonardo 2019 'Third Generation Electronic Literature', *Electronic Book Review*, 7 April, at https://electronicbookreview.com/essay/third-generation-electronic-literature/ (accessed 6 July 2020).

Milligan, Caleb Andrew 2020 'Playing the Hard Questions: A Twine Review of *Blocked In* by Anastasia Salter and John Murray', *The Digital Review*, 11 June, at https://thedigitalreview .com/issue00/hard-questions/index.html (accessed 6 July 2020).

Rettberg, Scott 2019 *Electronic Literature*, Cambridge: Polity Press.

Salter, Anastasia and Murray, John 2019 'Blocked In', *Hyperrhiz*, 21, at http://hyperrhiz.io/h

yperrhiz21/games/5-blocked-in.html (accessed 6 July 2020).

Smith, Hazel and Dean, Roger 2009 *Practice-led Research, Research-led Practice in the Creative Arts*, Edinburgh: Edinburgh University Press.

Luers, Will [Ed] 2020 *The Digital Review*, at https://thedigitalreview.com/about.html (accessed 6 July 2020).

Wright, David Thomas Henry 2020 'The Pleasure of the Infinite: An (In)finite Review of *The Pleasure of the Coast* by JR Carpenter', *The Digital Review*, 11 June, at https://thedigitalreview.com/issue00/pleasure-of-the-infinite/index.html (accessed 6 July 2020).

"He triumphs; *maybe*, we shall stand alone"

Using Correspondence Analysis to Investigate Modal Adverbs in Tennyson's Poems

Iku Fujita[1]

[1]Graduate School of Language and Culture, Osaka University

This research aims to investigate the characteristic use of modal adverbs in Alfred Tennyson's works. A number of studies on Tennyson's poems have paid critical attention to stylistic similarities between Tennyson and other poets (Jordan, 1988; Ricks, 1987; Shaw, 1976; Ricks, 1969; to name but a few). As Leech (1969: 13) states, "[L]iterary archaism is often inspired by the wish to follow the model of a particular writer or school of writers of the past," it can readily be imagined that authors follow the way that remarkable forerunners had written, namely, their styles. However, having stylistic similarities does not necessarily mean reflecting literary artistry/quality.

Currently, the digital humanities approach is contributing to literary studies. (e.g. Hori, 2019; Tabata, 2016; Mahlberg and McIntyre, 2011). Poetry is no exception and this process is now bringing new, additional knowledge to previous poetry studies from different aspects (e.g. Tartakovsky and Shen, 2019; Nakao and Jimura, 2016).

The study identifies characteristic modal adverbs in Tennyson's works in comparison to the Augustan, Romantic, and Victorian poetry composed by Pope, Byron, Keats, Shelley, Browning, Coleridge, Wordsworth, Swinburne, D. Rossetti, Arnold, and Southey. Words under investigation include *belike*, *haply*, *maybe*, *mayhap*, *peradventure*, *perchance*, *perhaps*, and *possibly* as modal adverbs, which mainly express epistemic possibility or uncertainty (Quirk et al., 1985; Greenbaum, 1969; Poutsma, 1928). The adoption of these poets is based on Shaw (1976), which indicates that there are resemblances in the styles between Tennyson and these authors. Four authors have been added to obtain more comprehensive results. The frequencies of eight modal adverbs are listed below in Table 1.

Table 1. Frequencies of eight modal adverbs for the 12 authors[1]

	Tennyson	Pope	Wordsworth	Coleridge	Southey	Byron	Shelley	Keats	Browning	Arnold	Rossetti	Swinburne
maybe	31.65	0	0	0	0	0	0	0	9.78	0	0	4.69
mayhap	11.51	0	0	0	2.2	0	0	0	11.4	0	0	0
belike	25.9	0	40.26	49.51	44.02	5.16	0	0	40.73	0	0	0
perchance	109.34	11.02	123.31	158.42	90.25	208.9	33.42	29.88	114.05	0	85.3	103.13
haply	5.75	8.82	158.54	227.73	110.06	18.05	16.71	139.45	105.9	102.67	159.94	168.76
possibly	2.88	6.61	5.03	0	0	7.74	12.53	0	50.51	0	10.66	0
peradventure	11.51	0	7.55	0	6.6	0	0	0	37.47	0	10.66	7.03
perhaps	94.95	218.28	213.9	158.42	134.27	479.69	87.74	209.18	276.97	174.54	85.3	28.13

Correspondence analysis (CA) is useful in visualizing hidden relationships between variables, namely the authors and modal adverbs in this paper. As Tabata (2004: 112) demonstrates, CA is an effective method, in the case when data contains low-frequency content words as variables for stylistic investigation. Tabata (2005) is one such study that sheds light on the advantages of CA: "CA is one of the techniques for data-reduction alongside PCA and FA. Unlike PCA and FA, however, CA does not require the intervening steps of calculating a correlation matrix or a covariance matrix, and can, therefore, process the data directly to obtain a solution" (Tabata, 2005: 68).

A result of CA shows Tennyson as an outliner in Fig 1. While the other 11 authors are located between -0.5 and 0.5 along the vertical axis, Tennyson locates alone at the bottom of the plot. In this plot, relative distance between data points reflects similarity or contrast.

The column plot indicates that the variables *maybe* and *mayhap* are outliners (Fig 2). Again, their proximity explains the similarity of their frequency patterns between variables: the closer data points are located each other, the greater similarity they have between them in the frequency patterns of modal adverbs. Additionally, the radius of the circle indicates the relative frequency of the word. Although the circle of *maybe* and *mayhap* are not larger than any other variables, these two adverbs deviate from the other six adverbs.

In addition to the result of CA, the Mann-Whitney's U test (MW test) was conducted to find significant frequency differences between Tennyson and the control authors. The MW test is a nonparametric method which tests the variance of the medians. The test needs two independent groups as samples; therefore, in this study, Tennyson is set as the target group (64 works), and the others are set as the control group (926 works). Table 2 shows the result of MW test. The MW test result shows that *haply*, *mayhap*, and *maybe* are statistically significant (*p*-value < 0.01). The effect sizes are all quite small, and thus there is a room for improvement, this paper will consider the reason(s) of why these two adverbs stand out in Tennyson's works. Given the result of CA and MW test, *mayhap* and *maybe* can be listed as characteristic modal adverbs in Tennyson.
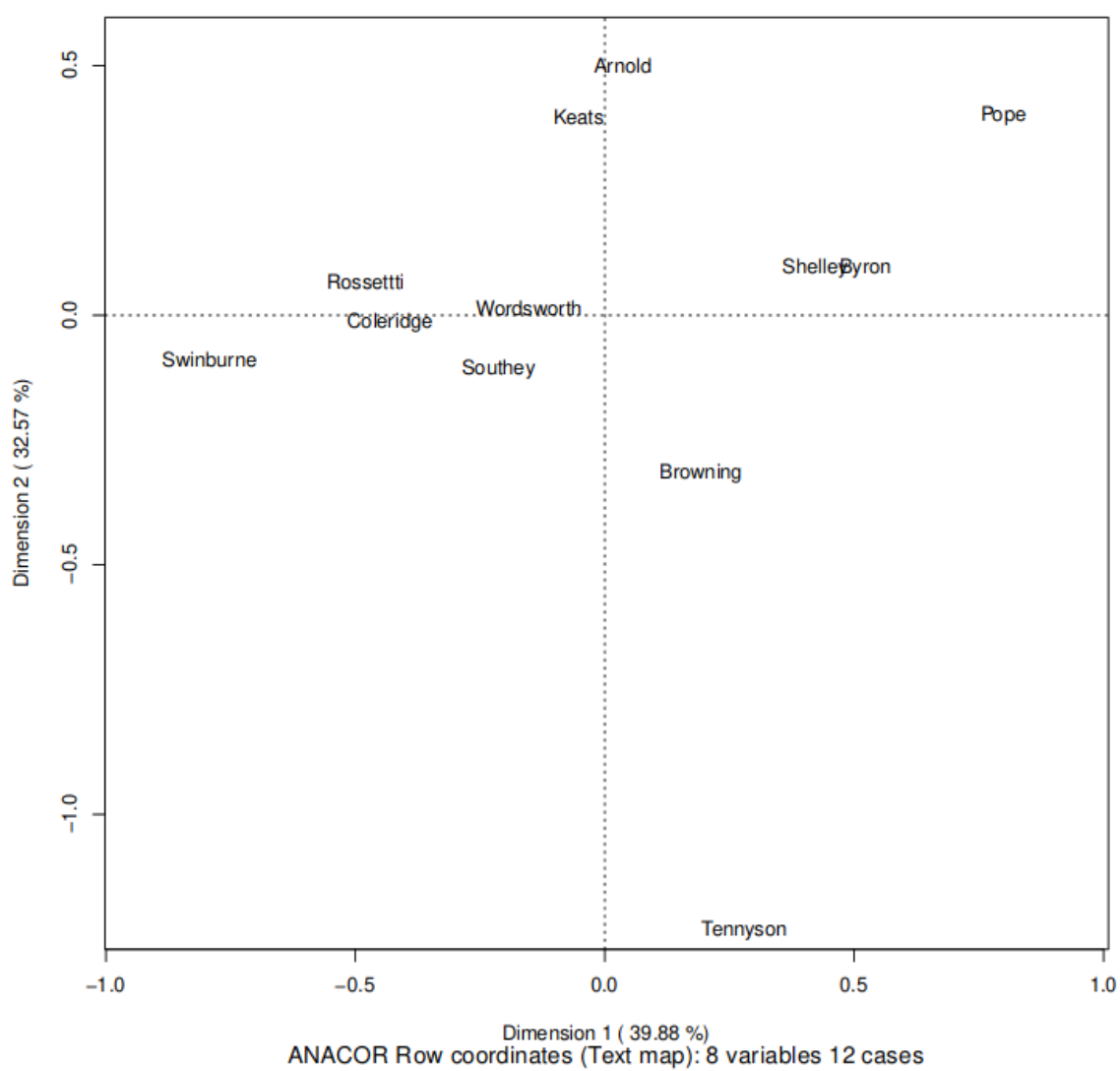
---

[1]Frequencies are normalized per million words
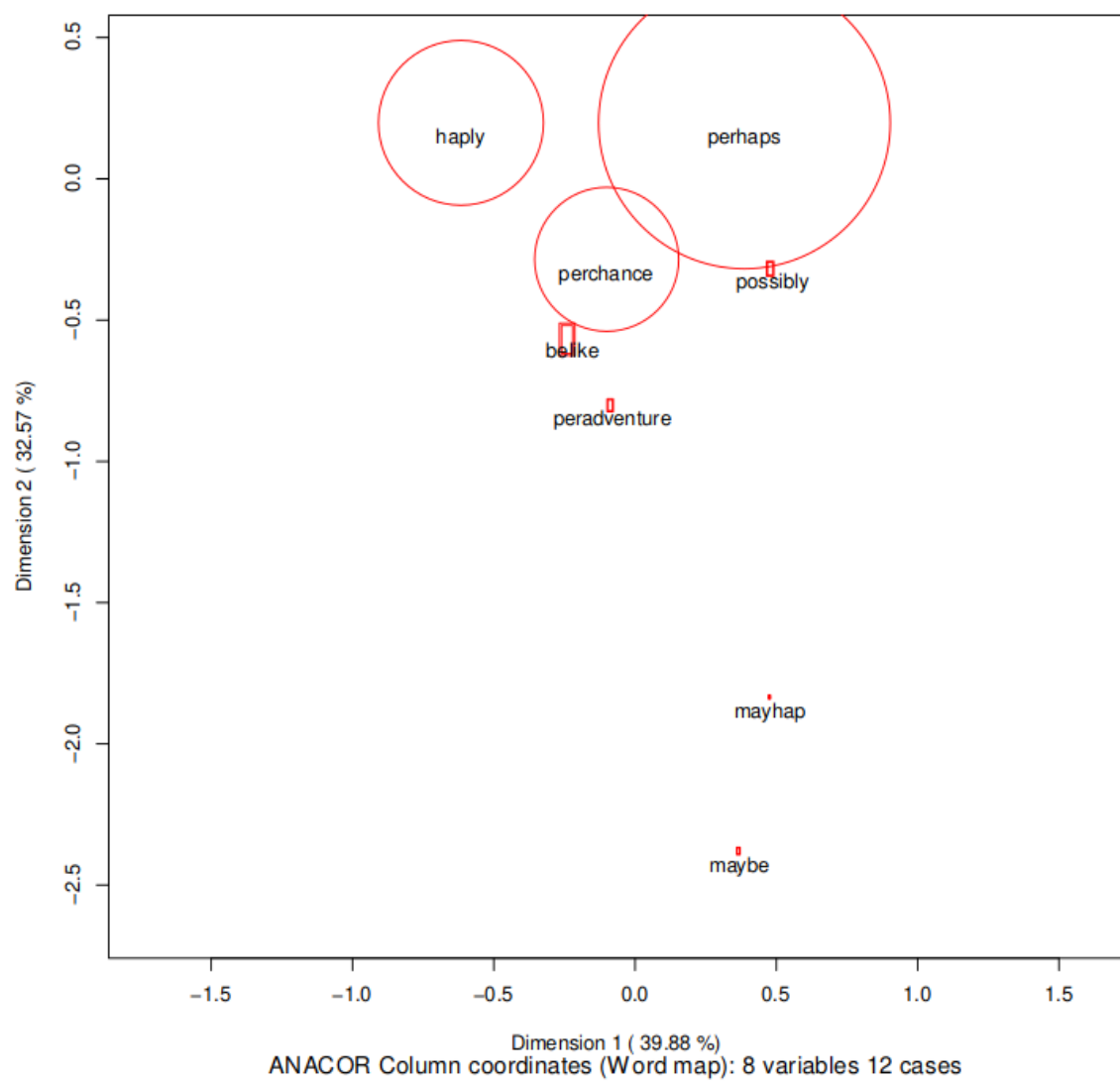
Fig. 1: The row plot of CA (12 authors)

Fig. 2: The column plot of CA (eight modal adverbs)

Table 2. The result of MW test

Word	*p*-value	Effect Size (r)	
perhaps	0.28	0.03	Control>Target
haply*	0.00	0.13	Control>Target
possibly	0.38	0.03	Control>Target
perchance	0.03	0.07	
belike	0.86	0.01	Control>Target
peradventure	0.15	0.05	Control>Target
mayhap*	0.00	0.09	
maybe*	0.00	0.20	

*: $p < 0.01$

Turning our attention to each work of authors, *mayhap* appears in Browning, Southey and Tennyson's works. In Tennyson, however, *mayhap* is used only his Lincolnshire dialectal poetry so that *mayhap* can make the sound of his dialect in his poetry.

The *OED* (online) records first quotation of *maybe* dated in 1400. It mentions that *maybe* was popularly used by writers in the seventeenth century; but, was not a standard word before the mid-nineteenth century (s.v. maybe, *adv.*, *n.*, and *adj.*). In the case of Tennyson, the first *maybe* appeared in 1842. The duration of time when Tennyson started to use *maybe* and the time when the *OED* refers to *maybe* is quite short. Among the 12 authors, only three Victorian poets used *maybe*, and none of the Augustan nor Romantic poets used the word. This is in keeping with the description of the *OED*. One of the motives of its usage is presumably the aforementioned "literature archaism" (Leech, 1969: 13). Moreover, *maybe* and *mayhap* behave differently, compared to the other six modal adverbs. These do not collocate with other modal auxiliaries such as *may*, *might*, or *can*. That could be a repercussion of authors' lexical choices as it led to differences in their prosody.

This study limits its discussion to eight modal adverbs in Tennyson's poems; however, we can also see some of the poet's stylistic features. This paper investigates the use of modal adverbs through quantitative analysis, yet qualitative analysis will be essential in future research.

Acknowledgement

References

Greenbaum, S. (1969). *Studies in English Adverbial Usage*. Florida: University of Miami Press.

Hori, M. (2019). "Itsudatsu-shita Collocation-to Idiom: Dickens-no *The Pickwick Papers*-no Baai (Deviation of Collocations and Idioms: In case of Dickens's *The Pickwick Papers*)." *Gengo Bunseki-no Frontier*, 2019. pp. 308-321.

Jordan, E. (1988). *Alfred Tennyson*. Cambridge: Cambridge University Press.

Leech, N. G. (1969). *A Linguistic Guide to English Poetry*. London and New York: Longman.

Mahlberg, M. and McIntyre, D. (2011). "A case for corpus stylistics: Ian Fleming's Casino Royale." *English Text Construction* 4:2. pp. 204-227.

Nakao, Y. and Jimura, A. (2016). *The Canterbury Tales-no Shahon-to Kanhon-ni okeru Gengo-to Buntai-ni tsuite (The language and style of the manuscripts and printed books of the Canterbury Tales.)* Hori, Masahiro. (ed.) Tokyo: Hituzi Syobou. pp. 21-52.

Poutsma, H. (1928). *A Grammar of Late Modern English*. 2nd ed. Groningen: P. Noordhoff.

Quirk, R., Greenbaum, S., Leech, G. and Starvik, J. (1985). *A Comprehensive Grammar of the English Language*. London and New York: Longman.

Ricks, C. (1969). *The Poems of Tennyson*. (ed.) London: Longman.

_____. (1987). *The Poems of Tennyson in Three Volumes*. (ed.) London: Longman.

Shaw, W. D. (1976). *Tennyson's Style*. Ithaca and London: Cornell University Press.

Tabata, T. (2004). "—ly fukushi-no Seikihinndo Kaiseki-niyoru Bunntai Shikibetu: Kore-supondensu Bunnseki-to Syuseibunn Bunnseki -niyoru Hikaku Kennkyuu (Style Identification of -ly adverbs by the occurrence frequencies: Comparing the correspondence analysis and principal component analysis." *Denshika Gengo Shiryou Bunseki Kenkyu*, 2003. pp. 97-114.

_____. (2005). "Stylistics of –ly adverbs in Dickens and Smollet: A quantitative study by means of correspondence" *Denshika Gengo Shiryou Bunseki Kenkyu*, 2004-2005. pp. 65-78.

_____. (2016). *Kyoucho Sakuhin-ni okeru Dickens-no Buntai (The Style of Dickens in Cowritten Works.)* Hori, Masahiro. (ed.) Tokyo: Hituzi Syobou. pp. 53-71.

Tartakovsky, R. and Yehsyahu, S. (2019). "Meek as milk and large as logic: A corpus study of the non-standard poetic simile." Language and Literature, 2019, vol.28, No. 3. pp. 203-220.

The Oxford English Dictionary (online): https://www.oed.com/ (the last access date: 2020-9-28)

Linked-Potter: an example of ontology for the study of the evolution of literature and reading communities

Federico Pianzola[1,2]

[1]University of Milano-Bicocca, Italy
[2]Sogang University, South Korea

In the case of libraries and other book archives, ontologies and linked data are mostly used for metadata describing the materiality of books or paratextual information. I present here an example of how an ontology can be used for the distant reading of literary texts, to study literary history, the cultural evolution of fiction, or as a selection mechanism to identify themes of interest. I created a knowledge base using the tags of the fanfiction website Archive of Our Own (AO3) (Organization for Transformative Works, 2009), which has implemented an excellent system of tags management (Dalton, 2012; McCulloch, 2019).

When publishing on AO3, authors can specify tags for characters, relationships, and additional freeform tags for any use they may think of. Autocompleting typing suggest canonical forms for the tags, so that uniformity is guaranteed across the all archive. Moreover, specialized volunteers, called "wranglers," aggregate synonym tags: e.g. "harrypotter" and "Harry Potter" (AO3 Admin, 2012). The goal of AO3 is to help readers find exactly the kind of stories they are looking for, but researcher can exploit the well-maintained and accurate tags database to draw insights about the history and evolution of a specific genre of literature (fanfiction) and its readership. In particular, freeform tags offer authors the possibility to make explicit in the metadata any relevant aspect of the story, like a psychological trait of a character (e.g. "Morally grey Harry Potter"), a narrative strategy (e.g. "point of view of Draco"), a setting (e.g. "Diagon Alley"), a timeframe (e.g. "post first war with Voldemort"), etc. A distant reading of fanfiction through the lens of tags has benefits that go beyond the understanding of a widespread – and growing – cultural phenomenon. Data driven insights from research on AO3 can be used to formulate better hypotheses regarding the evolution of other cultural systems – like literary classics or genre fiction – and to more strategically plan labour-intensive and time-consuming tasks like manual annotation of textual corpora.

A current limitation of AO3 is that, when tags are aggregated, the "canonical tag" is linked to the synonym tag in the backend database but in the frontend only the user-generated synonym tag is displayed. Therefore, readers can retrieve all stories linked to a canonical tag thanks to the built-in search engine, but the link is lot when content is scraped from the website. In order to benefit from AO3 tags aggregation, but also to improve it for research purposes, I used the software Protégé (Musen, 2015) and the Web Ontology Language (OWL) to replicate AO3-generated ontology for the Harry Potter fandom, adding further subclasses and properties. These are the steps I followed:

1. create classes for the four main categories (FandomTag, CharacterTag, Relation-shipTag, and FreeformTag) and relevant subclasses: LoveTag, FriendshipTag, FreeformCharacterTag, FreeformRelationshipTag, FreeformPlotTag, FreeformPlac-eTag, FreeformTimeTag;

2. copy all the tags from the main page of the fandom tag "Harry Potter - J. K. Rowling" (Anon, n.d.), create objects of the type owl:NamedIndividual for each of them, and assign them to the respective classes;

3. define which tags are considered canonical in the AO3 database;

4. copy the synonyms of every canonical tag from the tag's page, e.g. for "Hermione Granger" (Anon, n.d.); create objects of the type owl:NamedIndividual for each of them; link them to the respective canonical tag through the property owl:SameAs;

5. link CharacterTags to the RelationshipTags through the property "participatesIn" and define "hasParticipant" as the inverse property;

6. link FreeformTags to the CharacterTags and RelationshipTags through the property "isTagOf" and define "isTaggedAs" as the inverse property;

7. to complete the whole knowledge base, run the reasoner (Sirin et al., 2007) to resolve coreferences and infer axioms.

An example of how data are linked is shown in Fig. 1.

The resulting knowledge base has around 33,000 individuals (tags) linked between them. It is complete with respect to all the data retrievable scraping AO3 frontend website for the Harry Potter fandom. Using the knowledge base with a dataset retrieved in March 2020 (217,772 stories), the number of synonyms tags found for each class are: 247 CharacterTags (31,785 occurrences, 3.3% of the total occurrences for this class), 317 FreeformTags (54,517 occurrences, 4.6% of the total), 48 for RelationshipTags (13,833 occurrences, 4.5% of the total). Using aggregated tags allows to perform more complete analysis on the selected dataset.
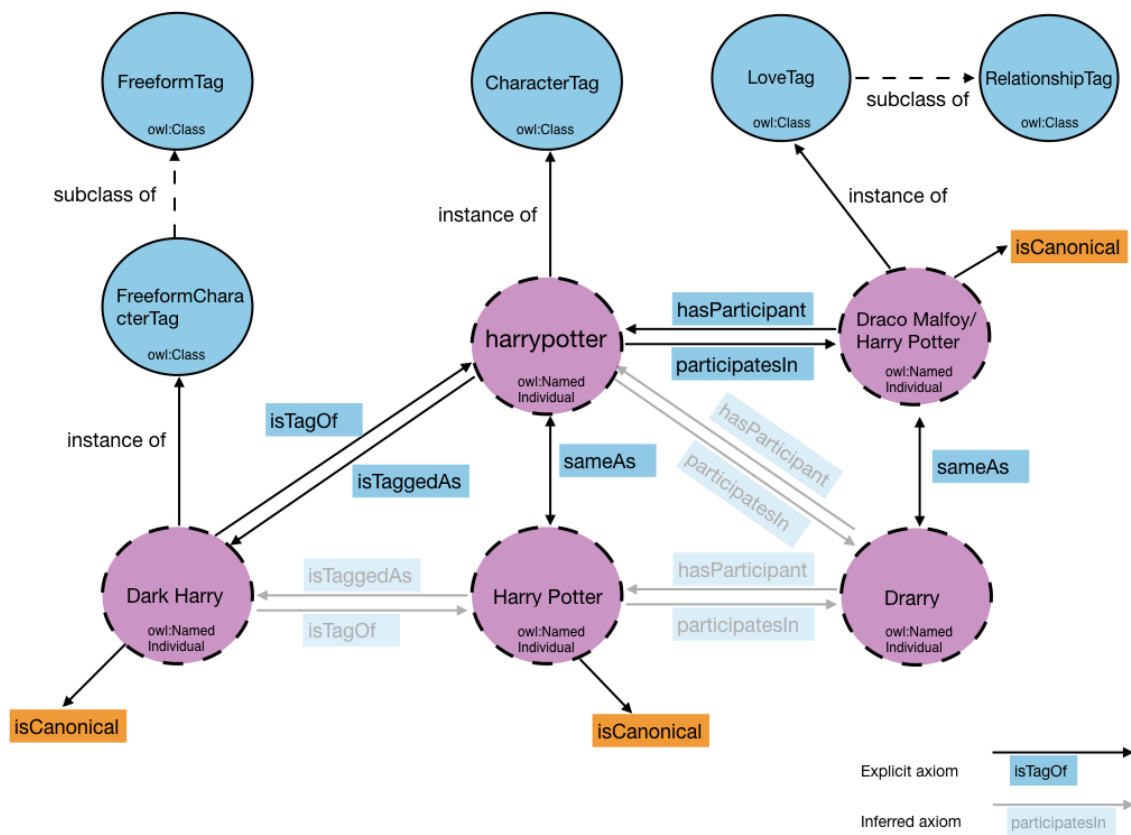
Fig. 1: Example from the knowledge base of the Harry Potter fandom on AO3

Moreover, specific information regarding various topics can be extracted from the knowledge base and used to analyze the metadata of the stories published on AO3 or to find subset of stories with specific features. For instance, we can aggregate all synonyms of the FreeformTags associated to the CharacterTag "Harry Potter" and count the number of stories written every year about a certain character version of the young wizard. The themes that attracts the most interest are female versions of Harry, his profession after graduating (Auror), the last stage of mastery of wizardry reached in the official novels (Master of Death), and a "dark" version which drastically changes the plot of the official novels (Slytherin Harry Potter) (Fig. 2).
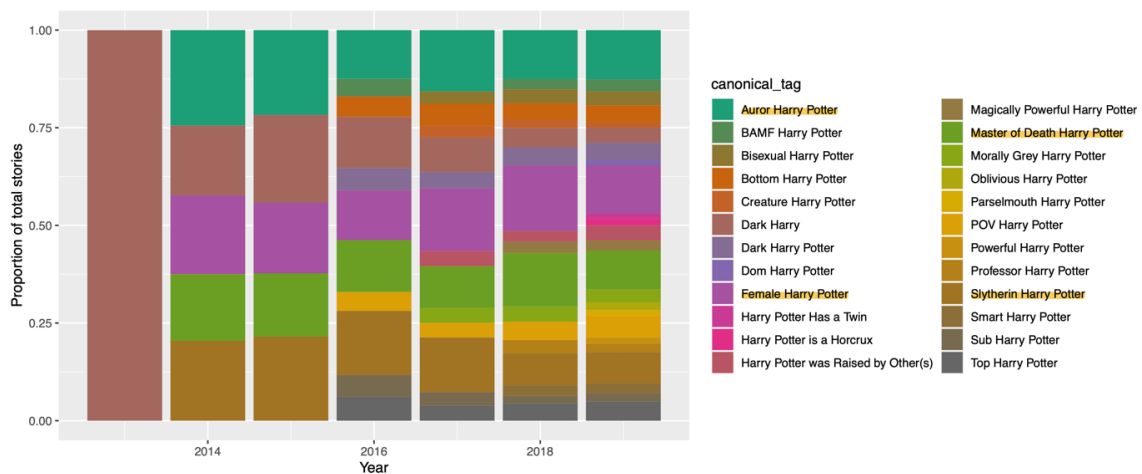
Fig. 2: FreeformTags associated to the character "Harry Potter" in different years. The four most frequent tags are highlighted in yellow

A broader study taking advantage of the Harry Potter ontology is Pianzola et al. (2020), which studied the cultural evolution and growing diversification of Harry Potter fanfiction.

Compared to other archives of online fiction, like fanfiction.net and wattpad.com, AO3 has metadata that can be very useful for the study of literature in a digital age. However, since their database structure is not publicly available, knowledge bases like Linked-Potter have to be created, with the advantage that additional information can be classified to explore specific aspect of plot or style.

References

AO3 Admin. (2012). *The Past, Present, and Hopeful Future for Tags and Tag Wrangling on the AO3*. *Archive of Our Own*. https://archiveofourown.org/admin_posts/267 (accessed 25 February 2020).

Dalton, K. L. (2012). *Searching the Archive of Our Own: The Usefulness of the Tagging*

Structure. University of Wisconsin-Milwaukee. http://dc.uwm.edu/etd/26/ (accessed 24 June 2013).

Harry Potter - J. K. Rowling. *Archive of Our Own*. https://archiveofourown.org/tags/Harry%20Potter%20-%20J*d*%20K*d*%20Rowling (accessed 5 May 2020a).

Hermione Granger. *Archive of Our Own*. https://archiveofourown.org/tags/Hermione%20Granger (accessed 5 May 2020b).

McCulloch, G. (2019). *Fans Are Better Than Tech at Organizing Information Online | WIRED*. *Wired*. https://www.wired.com/story/archive-of-our-own-fans-better-than-tech-organizing-information/ (accessed 25 February 2020).

Musen, M. A. (2015). The Protégé Project: A Look Back and a Look Forward. *AI Matters*, **1**(4), pp. 4–12. 10.1145/2757001.2757003.

Organization for Transformative Works. (2009). *Archive of Our Own*. https://archiveofourown.org/ (accessed 5 May 2020).

Pianzola, F., Acerbi, A. and Rebora, S. (2020). Cultural Accumulation and Improvement in Online Fan Fiction. *OSF Preprint*. 10.31219/osf.io/4wjnm.

Sirin, E. et al. (2007). Pellet: A Practical OWL-DL Reasoner. *Journal of Web Semantics*, **5**(2), pp. 51–3. 10.1016/j.websem.2007.03.004.

Multinomial Mixed-Effects Models and Linguistic Variation

Competitions among Japanese Subject-Honorific Constructions

Akitaka Yamada[1]

[1]Osaka University

1   Introduction

When examining linguistic variation, it is important to detect the factors affecting selection tendencies. For example, selection tendencies may change per verb (a linguistic factor) or per register (a social factor), while some are attributed to sentence-level factors, and other idiosyncrasies are ascribed to no clear factors at all. Thus, when only personal introspection is used, proofs concerning how far each of these many factors contributes to a selection become less convincing and objective.

To separate lexical idiosyncrasies from general tendencies, this research promotes a corpus study employing an underused statistical model: the Multinomial Mixed-Effects Model (MMEM) (Leshvina, 2016). Applying this model to variations among Japanese subject-honorifics, this study shows how scrutinizing random effects reveals lexical idiosyncrasies and contributes to the discussion in theoretical linguistics.

2   Background

Japanese has several subject-honorifics, as illustrated in (1), and how they differ in use is of great concern.

> (1) a. *sensei-ga **go**- tootyaku-**ni nat**-ta.*
> teacher-NOM HON-arriving-ni become-PST
> b. *sensei-ga tootyaku-**nasat**-ta.*
> teacher-NOM arrive-hons-PST
> c. *sensei-ga **go**- tootyaku-**nasat**-ta.*

teacher-NOM HON-arrive-hons-PST

'The teacher arrived.'

Previous studies have revealed that (HYP 1) a verb of one mora cannot be used with the honorific prefix, and (HYP 2) a verb of Chinese origin favors the *nasar*-construction when compared to the *go…ni nar*-construction. Our goal is to examine to what extent these well-accepted conclusions are supported by the real corpus data.

3   Data, Model, and Estimation

The data set is a sample from the BCCWJ. Among the 20,864 hits, we concentrate on verbs used at least more than 24 times, because it is not easy to detect the distributional profile of a verb with a lower frequency. Based on these 11,223 cases, the study builds the following MMEM model by developing the model proposed in Yamada (2019a):

(2) $\qquad y_{i(jk)} \sim \mathrm{Categorical}\left(\vec{\pi}_{i(jk)}\right)$

$$\vec{\pi}_{i(jk)} = \mathrm{inv\_logit}\left(\vec{\eta}_{i(jk)}\right)$$

$$\vec{\eta}_{i(jk)} = \begin{pmatrix} 0 \\ \gamma_{00}^{(2)} + \gamma_{01}^{(2)} x_{ORIGIN,j} + \gamma_{02}^{(2)} x_{MORA,j} + \gamma_{03}^{(2)} x_{SUPPL,j} \\ +\beta_{01}^{(2)} x_{AUX,i(j)} + \beta_{02}^{(2)} x_{IMP_s,i(j)} + \beta_{03}^{(2)} x_{IMP_w,i(j)} + u_j^{(2)} + v_k^{(2)} \\ \\ \gamma_{00}^{(3)} + \gamma_{01}^{(3)} x_{ORIGIN,j} + \gamma_{02}^{(3)} x_{MORA,j} + \gamma_{03}^{(3)} x_{SUPPL,j} \\ +\beta_{01}^{(3)} x_{AUX,i(j)} + \beta_{02}^{(3)} x_{IMP_s,i(j)} + \beta_{03}^{(3)} x_{IMP_w,i(j)} + u_j^{(3)} + v_k^{(3)} \end{pmatrix}$$

The outcome variable is the choice of subject-honorific constructions in (1); the *go…ni nar* construction is set as the baseline category; $\vec{\gamma}^{(2)}$ and $\vec{\beta}^{(2)}$ represent the construction in (1b), and $\vec{\gamma}^{(3)}$ and $\vec{\beta}^{(3)}$ represent the construction in (1c). The considered predictors are as follows:

(3) Group-level fixed effects:

    a. SUPPL: 1 when the main verb has a suppletive form; 0 otherwise

    b. MORA: 1 when the main verb is formed by one mora; 0 otherwise

    c. ORIGIN: 1 when the main verb is a word of Chinese origin; 0 otherwise

(4) Population-level fixed effects:

a. IMP$_s$: 1 when the sentence is a strong imperative; 0 otherwise

b. IMP$_w$: 1 when the sentence is a weak imperative; 0 otherwise

c. AUX: 1 when the subject-honorific marker appears on an auxiliary; 0 otherwise

(5) Group-level random effects:

a. LEXEME: a grouping variable indicating the predicate to which the subject-honorific marking is attached

b. REG: a grouping variable indicating the register from which the sentence is taken.

To avoid the problem of complete separation, we assume weakly informative priors $N(0, 3)$ for fixed effect parameters, and Half-t distribution for the variance of random effects Half-$t_4(0, .5)$.

The Hamiltonian Markov Chain Monte Carlo algorithm is adopted to estimate the parameters of the Bayesian MMEM. Stan is employed on R, allowing allows us the No U-Turn Sampler. After confirming the convergence in estimation (with the R-hats of the estimated parameters being < 1.01), the posterior distribution is interpreted for each parameter.
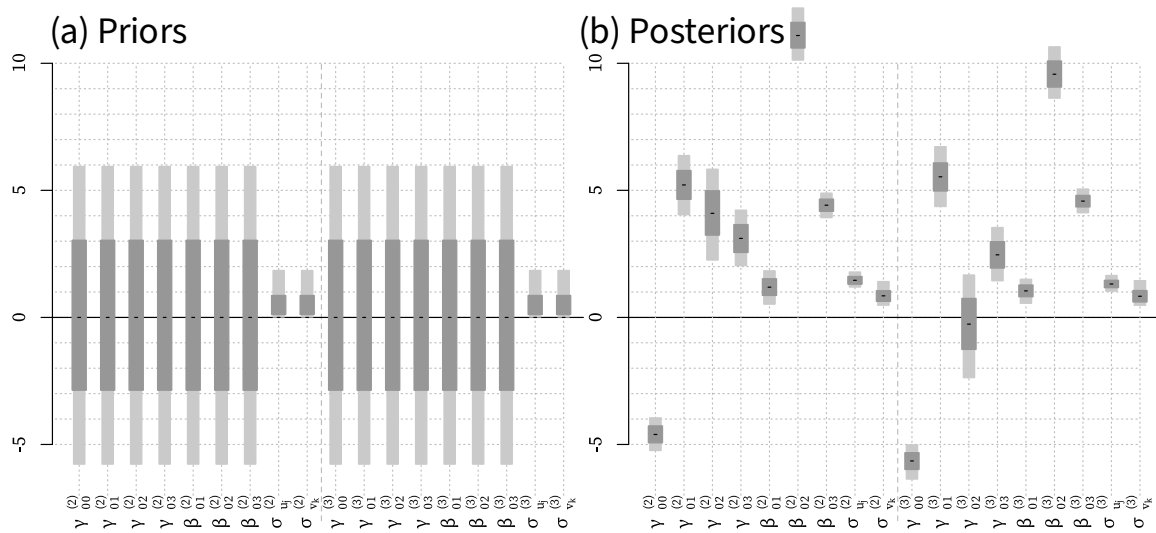
4 Results

Fig. 1.

Figure 1 illustrates the priors (left panel) and the corresponding posterior distributions (right panel); the light and dark gray regions represent the 95% and the 66% credible intervals,

respectively. In general, the posterior means of the fixed parameters do not substantially differ between $\vec{\gamma}^{(2)}$ and $\vec{\gamma}^{(3)}$, or between $\vec{\beta}^{(2)}$ and $\vec{\beta}^{(3)}$, except for $\gamma_{02}^{(2)}$ and $\gamma_{02}^{(3)}$, in agreement with the view of (HYP 1). The $\gamma_{01}^{(2)}$ and $\gamma_{01}^{(3)}$ are also in line with (HYP 2). The IMP_s shows the largest effect size; (1a) rarely takes the strong imperative form, while (1b/c) have no such restrictions (Yamada, 2019b). The positive value for AUX means that the construction in (1a) is not as easily used as an auxiliary as those in (1b/c) (Yamada, 2019a).

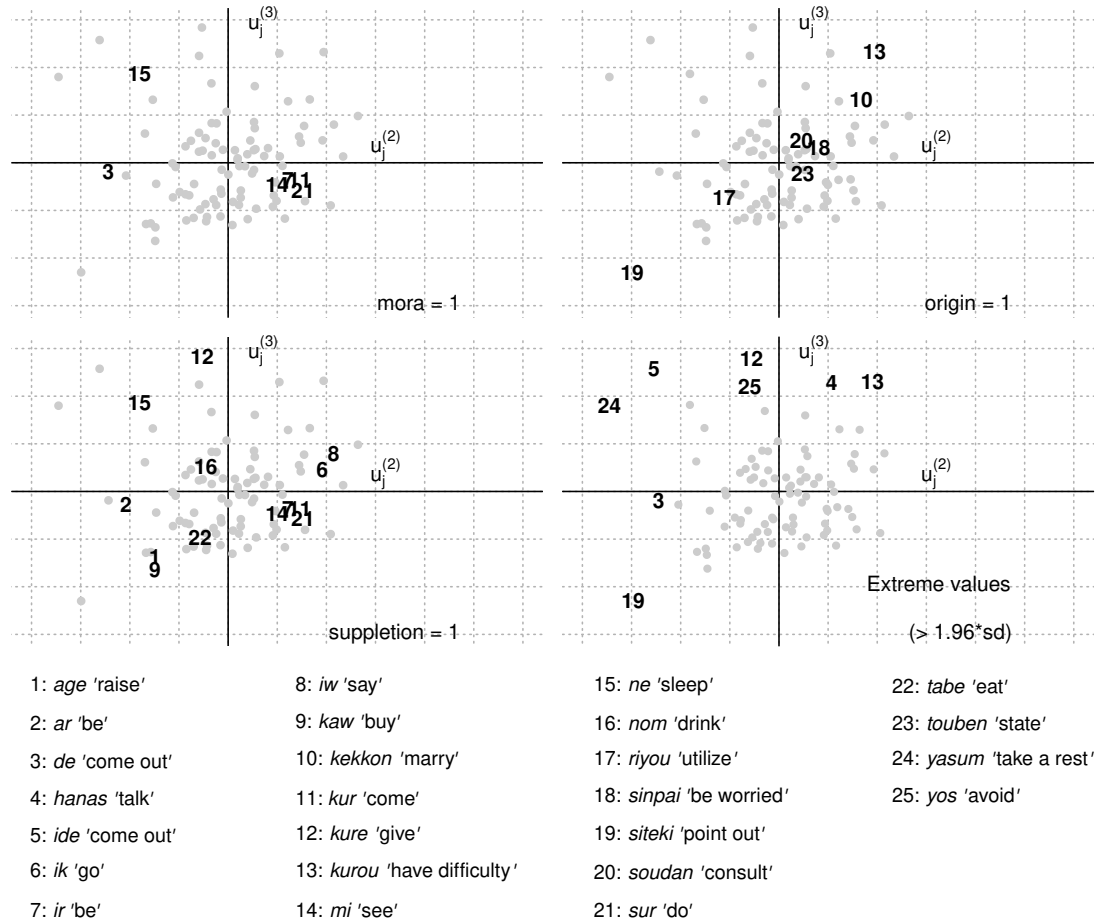|			
1: *age* 'raise'	8: *iw* 'say'	15: *ne* 'sleep'	22: *tabe* 'eat'
2: *ar* 'be'	9: *kaw* 'buy'	16: *nom* 'drink'	23: *touben* 'state'
3: *de* 'come out'	10: *kekkon* 'marry'	17: *riyou* 'utilize'	24: *yasum* 'take a rest'
4: *hanas* 'talk'	11: *kur* 'come'	18: *sinpai* 'be worried'	25: *yos* 'avoid'
5: *ide* 'come out'	12: *kure* 'give'	19: *siteki* 'point out'	
6: *ik* 'go'	13: *kurou* 'have difficulty'	20: *soudan* 'consult'	
7: *ir* 'be'	14: *mi* 'see'	21: *sur* 'do'	

Fig. 2.

While the results of the fixed effects essentially coincide with the findings of previous literature, MMEMs also allow us to examine idiosyncrasies not attributed to the aforementioned structural/general tendencies. Observe the scatterplots in Figure 2, which show how each lexeme has its own lexical idiosyncrasy. The following findings are worth attention.

- Despite the general tendency, some Shino-verbs do not favor the construction in (1a) (*kuroo* and *kekkon*).
- Despite the general tendency, the verb *de-* can appear in the construction in (1a).

5   Implications for Future Study

These findings show that the generalizations in (HYP 1) and (HYP 2) are not absolute rules, and can be overwritten by lexical idiosyncrasies. Although due to space limitations, this research refrains from providing an analysis, it will be important for future study to examine why these "outliers" exist. The fixed effects findings also require further investigation. For example, the interaction with an imperative is a legitimate concern, which would be better discussed from pragmatic perspectives (Yamada, 2019b). The issue of auxiliary status can also be approached via the grammaticalization theory. Whatever theoretical framework is adopted, analysis must be based on empirical facts. This topic cannot be approached without data analysis, such as that completed in this study, which provides descriptive desiderata and, thus, serves as a necessary departure point for theoretical investigations.

Acknowledgements

References

Levshina, N. (2016) "When variables align: a Bayesian multinomial mixed-effects model of English permissive constructions." *Cognitive Linguistics*, 27(2): 235-268.

Yamada, A. (2019a). "Competing subject-honorific constructions with predicates of Yamato origin [Wago kigen no doosi to kyoogoosuru sonkeigo koobun]." *Proceeding of the 168th Meeting of the Mathematical Linguistic Society of Japan*, pp. 66-71.

Yamada, A. (2019b). "An OT-driven dynamic pragmatics: high-applicatives, subject-honorific markers and imperatives in Japanese." *Proceedings of Logic and Engineering of Natural Language Semantics 16*, pp. 172-185.

Digital Editing of Japanese Buddhist Texts from the Manuscript to TEI and Database Building

Gaétan Rappo[1]

[1]Institute for Research in Humanities, Kyoto University

This presentation is a direct continuation of my previous work on n-gram frequency analysis applied to assessing the authorship of a series of medieval Japanese Buddhist texts, published in the 2018 in the *Japanese Journal of the Association for Digital Humanities*. It aims to develop better tools and workflows by tackling both the problem of digital editions, and their insertion into a working database.

This series of Buddhist texts—called *shōgyō* ("sacred teachings")—was largely ignored by historians for a long time, but the situation is gradually changing. These texts were mostly composed in Japanese *kanbun* (classical Chinese read using the Japanese word order), and their writing style is extremely fragmentary, almost cryptic at times. In fact, they are not designed to be comprehended by the non-initiated, and often require oral transmission of knowledge from a master in order to be truly understood. In order to determine their contents and to utilize them as proper historical sources, one has to reconstruct the vast knowledge network upon which they were built. Previous work by both Japanese and Western scholars has demonstrated that computer-assisted analysis of this massive corpus of texts, spanning an extremely long period, serves as a valuable tool to accomplish this task.

Building on this work, this presentation is divided into two main parts. The first, "edition," starts with the manuscript (or in some cases printed editions), focusing on the actual process of typing the text and editing it into a workable format. I will mention a few encoding issues, especially with rare Siddham characters. Great progress has been made in the creation on a unicode font, including ligatures and characters created in Japan, so this section will both deal with temporary workarounds and more permanent solutions that will hopefully be attainable in the near future.

However, the main focus will be on what can be done with the text once it is digitized. In order to achieve a better understanding of this extremely nuanced genre of literature, a

slightly custom TEI framework will be applied to the texts. In this context, I will expand and apply to the TEI framework a system of speaking voices that I proposed in a previous article (2018). The idea is to distinguish passages written by the author, quotes from either previous masters or canonical texts, notes and commentary outside of the main text, and reading indications, in order to better isolate the most meaningful parts of a given text. By tagging parts of the texts according to their level of discourse, my aim is to refine the data and to easily divide quotations of previous sources from original content. This, in turn, will help better define the originality of each text as well as its intertextual relationship to each other.

The second step is a direct continuation of the first, and will propose a few ways to integrate these texts—and their particularities—within a working database. My work will be based on my ongoing collaboration with Professor Christian Wittern, especially regarding his Kanseki repository. I will provide a few examples whose implementation could pose problems, such as the existence of multiple manuscripts, differences in the Japanese readings (*kundoku*) found in each copy of the text, and assess a few possible solutions, taking into account the next possibilities given by my editing workflow.

In the context of both creating a digital edition and implementing a database, the form of the document itself, and especially the treatment of marginal indications (such as notes in the upper and lower parts of the page and characters written on the backside as well as *kundoku* markers) will be crucial. These elements are closely related to the text, but they were not necessarily generated by its author and may have been added at any point during the transmission process of a given manuscript. To give a concrete example, there are several different extant manuscripts of the *Goyuigō daiji*, a text first composed by the Shingon monk Monkan (1278-1357) in 1328. Close inspection of the colophons, characters written on the backside, and reading indications, show that there are at least three different lineages of manuscripts of this text. Such variations are not limited to subtle discrepancies in the contents. In fact, the presence of different reading indications can lead to a distinct way of reading and understanding the text itself. This will lead me to stress the need for a manner to visualize such genealogies in a database, and question the ways we define what a text or a work actually is.

In my conclusion, I will also assess the value of my findings not only as tools, but also within a broader philological context. My focus will be on the problem of the authorship of these texts, building on the pioneering book published by Raji C. Steineck and Christian Schwermann. In fact, this presentation will allow me to question further the very notion of work in such composite, and even cumulative works, building on and expanding previous research on the subject with new data.

Between óneiros and pragma: the social context of video game humor

Artur Skweres[1,2]

[1]English department, Faculty of Pedagogy and Fine Arts in Kalisz, Poland
[2]Adam Mickiewicz University in Poznan, Poland

Short bio:

Artur Skweres, PhD, is an Assistant Professor at the English Department of the Faculty of Pedagogy and Fine Arts, Adam Mickiewicz University in Poznań. His academic interests include American culture (especially literature and film), as well as theories of comedy and humor. In 2017 he published a monograph on the play principle in comedy titled *Homo Ludens as a Comic Character in Selected American Films*, followed by the monographs *McLuhan's Galaxies: Science Fiction Film Aesthetics in Light of Marshall McLuhan's Thought* (2019) and *The relationship between oneiric and pragmatic play in Mark Twain's works* (2019).

Abstract

Despite the apparent relation between play and comedy, relatively few publications have been written about the relation between video games and the concept of humor (e.g. see Dormann and Biddle, 2009 or Kallio and Masoodian, 2019). To fill this apparent lack, the paper will consider the use of humor and comedy in video games, with special attention given to their social context, since games are inherently a social phenomenon. Although the new medium of games borrows from the older media, incorporating many of their forms and functions, it also allows for new applications of humor. The vast majority of video games, although they can be classified as belonging to different genres, are commonly centered around conflict. One of the strategies game designers employ in averting the perception of games as causing primarily negative emotions (such as hostility or aggression) is the use of humor. For instance, the developer of one of the games which are going to be discussed, Toshihiro Nagoshi, argued that the humor underlying the deeply dramatic and serious narrative of his games is inserted for pragmatic reasons. Without the touch of comedy, which he considers necessary, the storylines in his successful *Yakuza* series would

be imbalanced and lack variation (Espinelli, 2017). Comical elements, therefore, not only serve to ease the tension of the more serious moments, but serve as one of the underlying pillars of the game's ludo-narrative construction, ensuring its proper balance, which would meet the player's expectations. Such strategies also common outside of games, in real-life context. For instance, Maemura (2014: p. 104) analyzes how humor is used in negotiation practices by Japanese people who are aware of the existence of the social concept of *kuuki* 空気, which signifies the atmosphere or the feeling one gets in the company of other people at a given time. The examples given by Maemura (2014: p. 117) reveal that the conflict-avoidance and desire to avert the possibility of hostility is resolved through the use of humor and laughter, but also through conforming to behavior that is expected, thereby relieving the possible tensions.

Hence, it will argued that the use of humor in video games should be analyzed as part of a larger, social context. Building on the experiences from previous publications concerning the use of ludic strategies in humor (Skweres, 2017 and Skweres, 2019), the paper will argue that social context is an important common quality in both games and humor. Consequently, the instances of comedic appeal should be reconsidered with the focus on the social context of the player, the game environment (including the avatar, non-playable characters), as well as the environment not directly related to the game (including the non-player audience). Furthermore, expanding on the ludic categories of play and games proposed by Roger Caillois, the paper will consider how the new categories of *óneiros* and *pragma* (introduced by the author in Skweres, 2017) lead to a deeper understanding of the attitudes of both the player and his or her audience. Finally, since the focus of the paper is on the social context, one of the examples of video game humor will consider the new genre of videogame streaming in which the player acts as the comedian for members of his usual audience.

References

Dormann, C. and Biddle, R. (2009) "A Review of Humor for Computer Games: Play, Laugh and More." *Simulation & Gaming,* 2 August 2009

Espineli, M. (2017) "Yakuza Creator Talks 007 Inspirations, Wacky Humor, And What's Next." https://www.gamespot.com/articles/yakuza-creator-talks-007-inspirations-wacky-humor-/1100-6451146/

Maemura, Y. (2014) "Humor and laughter in Japanese groups: The kuuki of negotiations." *Humor* 2014; 27(1): 103–119

Oskari K. and Masood M. (2019). "Featuring comedy through ludonarrative elements of video games." *Entertainment Computing* 31 (2019). DOI: 10.1177/1046878109341390

Skweres, A. (2017) *Homo Ludens as a Comic Character in Selected American Films.* Cham, Switzerland: Springer.

Skweres, A. (2019) *The relationship between oneiric and pragmatic play in Mark Twain's works.* Cham, Switzerland: Springer.

Big Data as Archive: Data Centers and Digital Traces as Future Historical Artifacts

Yennie Jun[1] and Javier Cha[1]

[1]Seoul National University

Future humanists will potentially have access to around 40 zettabytes (about 40 trillion gigabytes) of data from 2020, data generated from smart devices, sensors, social media platforms, and content delivery services (Reinsel, Gantz, and Rynding 2017). This immense amount of information takes the form of unstructured, constantly changing, and highly mutable activity streams, which are stored, processed, and cached in server farms, data centers, and content delivery networks worldwide. What are the implications of the big data paradigm to researchers and archivists?

The challenges of archiving mutable data sources are not new. Book historian Robert Darnton compares the fragmentary nature of early modern French "anecdotes" to present-day blogging systems and social media platforms, claiming that "information comes in fragments and embeds itself in whatever niches are provided by the surrounding environment" (2013). Librarian David McKitterick explains that textual variance was common among early printed books, within and without versions; "the mutable and malleable nature of the printed word" is not unique to big data (Howsam 2006, 68).

On the other hand, big data is unlike anything seen in previous information regimes and media landscapes. Its sheer size and scale defy imagination. According to TechJury, "it would take a person approximately 181 million years to download all the data from the internet" (Petrov 2019). In 2019, 30,000 years of video content were uploaded to YouTube. A typical data center with hundreds of thousands of stacked servers requires power stations and backup generators nearby. In Ireland, 54 data centers, including Facebook's Clonee site, have access to 642 megawatts of power capacity, enough to serve 300,000 average US households (Pollock 2019). In 2017, the US Library of Congress stopped their project of archiving Twitter because "conducting one search of the 2006 to 2010 tweet archive would take 24 hours" (Wamsley 2017).

The social web's drive to generate dynamic and highly personalized content makes it phys-

ically impossible to create a separate archive of what exists only in the specious present that technologists call "real-time". One of the main characteristics of Web 2.0 is its unprecedented pace of change. According to a report by the International Data Corporation (IDC), "consumers … expect to access products and services wherever they are, over whatever connection they have, and on any device. They want data in the moment, on the go, and personalized" (Reinsel, Gantz, and Rynding 2017). Technologies such as personalization platforms are designed specifically to provide unique experiences for each user. Social media platforms and streaming services depend on "real-time" updates. Existing web archives, such as the Internet Archive, are unable to do more than capture versions of static pages and are not well equipped to deal with big data's variability or volume.

Additionally, an increasing amount of this data is being stored in public or private cloud services, rather than on personal hard drives. Therefore, we must consider post-custodial, decentralized technological solutions and protocols rather than having a central location for a digital archive. For example, solutions involving emulation, Universal Virtual Computer (UVC), and blockchain have been suggested, but each has their limitations (Lorie 2014). This effort will involve immense technological and legal cooperation among national governments, private companies, scholars, and many other actors.

This leads to the necessity of preserving not just the content, but the context and culture of our current big data society. Merely preserving the raw data (content) cannot tell the stories of how the data is used; capturing the diversity of user experiences (context) is crucial for conveying a more complete picture of the Age of Big Data. Archiving the context requires emulating the user experiences of interacting and creating data within the larger information ecosystems and determining what kind of surrogates would best represent these experiences. Director of Coalition of Networked Information (CNI) Clifford Lynch suggests using robotic witnesses to create and capture fabricated experiences of different social media platforms to document a broad set of experiences (Lynch 2017). Other solutions include video-recording users' physical interactions with technology, capturing the actual output of the technologies, and creating a snapshot in time of the database.

There is no such thing as a perfect archive; historian Ian Milligan mentions that "no archive is a true reflection of the world" (Milligan 17). As with books ("even if their texts can come down to us unchanged - a virtual impossibility … our relation to those texts cannot be the same as that of readers in the past"), we cannot perfectly and accurately capture the entirety of Web 2.0 (Darnton 1990). What, then, is the goal of big data as an archive? Lynch suggests that it is to"preserve a reasonably accurate sense of the present for the future" (2017). I argue similarly, that such an archive must preserve, capture, and convey big data in meaningful ways for future generations to best understand our present culture. It is imperative that we preserve both the physical data and the user experiences to best

represent our present-day relationships with big data.

Works Cited

Darnton, Robert. 1990. "First Steps Toward a History of Reading." In *The Kiss of Lamourette: Reflections in Cultural History*, 154–87. New York: W.W. Norton. http://robertdarnton.org/sites/default/files/First%20Steps%20Toward%20a%20History%20of%20Reading.pdf.

———. 2013. "Blogging, Now and Then (250 Years Ago)." *European Romantic Review* 24 (3): 255–70. https://doi.org/10.1080/10509585.2013.789694.

Howsam, Leslie. 2006. *Old Books and New Histories: An Orientation to Studies in Book and Print Culture*. Toronto: University of Toronto Press.

Lorie, Raymond. 2014. "Long Term Preservation of Digital Information." *IBM Almaden Research Center*. https://zoo.cs.yale.edu/classes/cs426/2014/bib/lorie01long.pdf.

Lynch, Clifford. 2017. "Stewardship in the Age of Abundance." *First Monday* 22 (12–4). https://firstmonday.org/ojs/index.php/fm/article/view/8097/6583.

Milligan, Ian. 2019. *History in the Age of Abundance? How the Web Is Transforming Historical Research*. Montreal: McGill-Queen's University Press.

Petrov, Christo. 2019. "Big Data Statistics 2020." TechJury. https://techjury.net/stats-about/big-data-statistics/#gref.

Pollock, Sean. 2019. "Hundreds of Millions' to Be Invested in Data Centre in Meath." Independent.Ie. 2019. https://www.independent.ie/business/irish/hundreds-of-millions-to-be-invested-in-data-centre-in-meath-38720181.html.

Reinsel, David, John Gantz, and John Rynding. 2017. "The Digitization of the World From Edge to Core." *International Data Corporation*. https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf.

Wamsley, Laurel. 2017. "Library of Congress Will No Longer Archive Every Tweet." NPR. 2017. https://www.npr.org/sections/thetwo-way/2017/12/26/573609499/library-of-congress-will-no-longer-archive-every-tweet.

Digital Public History during the COVID-19 Pandemic: Discussion on the Corona Archive @ Kansai University

Nobuhiko Kikuchi[1], Keiichi Uchida[1], Tadakatsu Okada[1], Takefumi Hayashi[1], Takao Fujita[1], Satoshi Ninomiya[1], and So Miyagawa[1]

[1]Kansai University

1   Purpose of the Study

Toward the end of 2019, the coronavirus disease (COVID-19) quickly spread from China to the world. As of May 2020, Japan is under a state of emergency and, seemingly, undergoing a complete change from how it was before the COVID-19 outbreak. In this crisis situation, one of the aims of public history is to enable the recording of the rapid worldwide change that is being experienced by people and pass on memories of life under pandemic conditions to the next generation.

This study discusses the Corona Archive @ Kansai University [Figure 1], which was initiated on April 17, 2020 in response to the COVID-19 pandemic by the Kansai University Open Research Center for Asian Studies (KU-ORCAS), from the digital public historical perspective.

2   Significance of the Study

The Corona Archive @ Kansai University is a community-based digital archive project that collects records and memories from the students, faculties, staffs, and their families of the Kansai University during the COVID-19 pandemic. The International Federation for Public History (IFPH) is mapping the COVID-19 archival activities taking place in various countries and, according to the IFPH, 308 cases have been registered as of May 1, 2020 (Cauvin, 2020). However, there are few examples of such an initiative in Japan other than the Corona Archive @ Kansai University. Hence, the significance of this study is that the Corona Archive @ Kansai University can be a model case for the community archival projects for pandemic in Japan.

Fig. 1: Screenshot of the Corona Archive @ Kansai University

3   Construction of the Corona Archive @ Kansai University

In this study, we particularly examined the following four topics associated with the Corona Archive @ Kansai University construction.

(1) Eligibility for submission

Targeting the entire nation or all the people living in Osaka Prefecture, where our university is located, does not conform to KU-ORCAS's aim of branding Kansai University's research. In addition, we are concerned that the management of increasing numbers of posts will be difficult from the server specification and manpower perspective. Hence, we decided to allow submissions from Kansai University members alone.

(2) System construction and material collection

To ensure that even a single person could easily and quickly build a system that enables users to register materials by themselves, we adapted the open source software Omeka Classic. Using some plugins, the Corona Archive @ Kansai University enables users to register text data, images, videos, and audio files and maps these materials on the Open

Street Map. In addition, the metadata conform to the DCMI Metadata Terms.

(3) Treatment of rights

For data release, we have requested contributors in advance to release their data under the CC BY-NC 4.0. In addition, we have considered the portrait and privacy rights of individuals depicted in photographs. Therefore, the Corona Archive @ Kansai University asks users to confirm the license and whether they have received permissions from the photographed individuals to archive the data. Further, before publishing the materials, we check the data to ensure that they do not violate the privacy of individuals. The users themselves can indicate their intention to keep their posted data private.

(4) Long-term storage

KU-ORCAS is a time-limited project, and the long-term preservation of the collected data cannot be carried out by KU-ORCAS alone. Accordingly, we have developed a data preservation system in cooperation with the university museum and archive.

4   Situation after the Project Implementation

As of May 1, 2020, at the time of writing this paper, it is about two weeks since the start of the project; hence, I can describe only the situation immediately after project implementation. Two weeks have passed since I started, so I can only describe the situation immediately after the start.

As of May 1, there have been 22 registrations. Among them, two were kept private: one case was set as private by the contributor himself, and the other was made private because it contained sensitive personal information.

As described earlier, any members of Kansai University can contribute to our digital archive, although the contributors are almost always only KU-ORCAS members. Therefore, most of the posts are centered on the university's Senriyama Campus (Suita City, Osaka Prefecture), where KU-ORCAS is located, although Kansai University has several campuses. In addition to text data, images, videos, and audio files can be attached to posts; however, currently, only image files are accepted as attachments to posts.

5   Future Issues

There are many challenges ahead. Many challenges exist in the maintenance of the Corona Archive @ Kansai University. In particular, significant issues are involved in material collection. The KU-ORCAS does not have a high level of visibility on campus because it is a

time-limited organization. In addition, because of the restrictions imposed in response to the COVID-19 outbreak, the university's public relations tools (official Twitter and Facebook accounts, and press releases provided by the university's Public Relations Division) were allowed to consider only topics related to educational affairs. In addition, due to the widespread need for social distancing, it is impossible to hold events that bring people together. Therefore, requests to contribute records and memories have been limited to the SNS and website of the KU-ORCAS, which further limit the collection of stories.

Another challenge pertains to the use of the collected data. The records and memories of Kansai University members should be available for use by not only the university's constituents themselves but also future researchers. Hence, it is necessary to promote the construction of similar COVID-19 archives in Japan and strengthen the ties among domestic and international archives.

Bibliography

Corona Archive @ Kansai University. https://www.annex.ku-orcas.kansai-u.ac.jp/covid19archive, accessed 2020-09-22.

Kikuchi, Nobuhiko. "Branding East Asian Cultural Studies By"Opening" Access to Research Resources, Research Groups, and Know-Hows". *DH2019*. https://dev.clariah.nl/files/dh2019/boa/0182.html, accessed 2020-09-22.

Cauvin, Thomas. "Mapping Public History Projects about COVID 19." International Federation for Public History. https://ifph.hypotheses.org/3225, accessed 2020-09-22.

Re-interpreting the Paintings and Poems of the Lotus Sutra through a Co-occurrence Network

Religion and Life of the Aristocratic during the Japanese Medieval Ages

Aiko Aida[1]

[1] Japan Society for the Promotion of Science (JSPS)

The Lotus Sutra has for long been regarded as the most popular scripture in the Tripitaka, which was followed by Japanese emperors and aristocrats from the eleventh to fourteenth centuries. (1). The most important version of the Lotus Sutra contains twenty-eight chapters in eight fascicles that were copied as eight or twenty-eight scrolls by the nobles at the time. According to one study (2), there exist approximately five hundred handscroll copies made between the eleventh and fourteenth centuries, which contain the frontispieces of the Lotus Sutra (Sanskrit-Saddharma Pundarika Sutra). Some of these frontispieces are depicted in gold and silver inks on indigo-dyed papers, while others are drawn by richly colored mineral paints on scattered gold or silver foils over papers. It is said that the latter were sometimes based on Waka poems of the Lotus Sutra, called Hokekyo-ka (Japanese-法華経歌).

Thus, this paper intends to re-interpret the correlation between Waka poems or the Buddhist paintings and the chapter's themes of the Lotus Sutra in Medieval Japan, as derived from a co-occurrence network between the two; this was achieved by using extracted vocabularies of Waka poems by applying KH Coder, a free software for quantitative content analysis (3). The KH Coder was utilized by applying MeCab (4), a morpheme analysis system, and 中古和文 Unidic (5), an electrical dictionary for morphological analysis of classical Japanese. Furthermore, in this process, about two hundred and thirty Waka poems were analyzed, which could be identified as ten chapters each other (6). It is said that those Waka poems might be the source of the paintings on the back of Chapter 11 of the Heike Nōkyō scroll donated to the Itsukushima shrine around 1164.

The paper attempts to reveal that, for this research, motifs or symbols were extracted not from the Lotus Sutra but from the Waka poems based on it. This research also reveals that most of the extracted words could be correlated with the chapters of the Lotus Sutra, although there are common motifs in many of its chapters, such as Buddha, father, children,

the moon, law, heart, and mountains. For example, Hana (花: flowers or cherry blossoms) relates to Chapter 1, Ushi (牛／憂し: cow or distressed) to Chapter 3, Mi (実／身: nut or body) to Chapter 12, Ama (尼／雨: nun or rain) to Chapter 13, Sumu (住む／澄む: live or clean) to Chapter 16, Uki (浮き／憂き: float or unhappy) to Chapter 27, and Yama-no-ha (山の端: ridgeline) to Chapter 28.
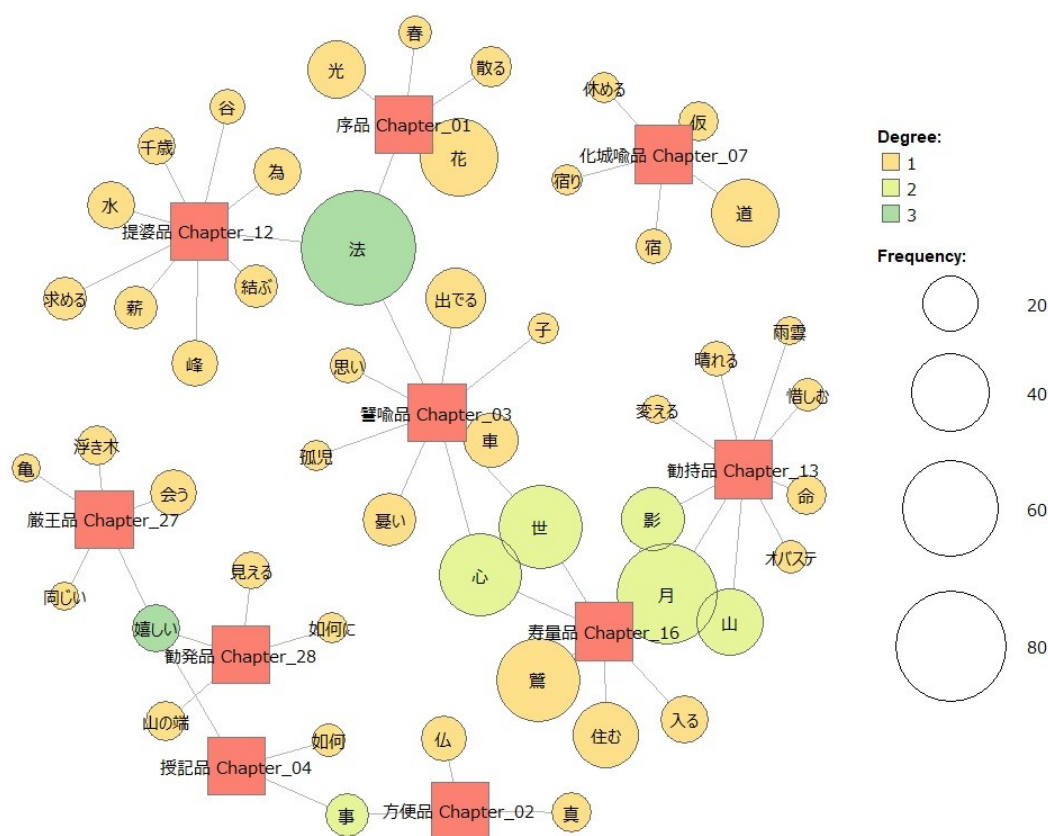

Fig. 1: A Co-occurrence Network in the Hokekyo-ka

Moreover, the paper points out that the above keywords are essentially based on the Lotus Sutra, and that some demonstrate paronomasia as pivot words (Japanese-掛詞). The number of pivot words extracted from the Lotus Sutra was larger than expected. This possibly indicates that the extracted words in Hokekyo-ka poetries developed not with the colored paintings on decorated papers, but rather with the Lotus Sutra paintings in gold and silver inks on indigo-dyed papers that were made under the Tang and Song dynasties in China.

Bibliography

(1) W. J. Tanabe, *Paintings of the Lotus Sutra*, John Weatherhill New York and Tokyo, 1988.

(2) Nara National Museum, *Lotus Sutra -Its Calligraphy and Decotation-*, Nara National Museum, 1987.

(3) http://khcoder.net/en/

(4) https://taku910.github.io/mecab/

(5) Toshinobu Ogiso, Mamoru Komachi, Yasuharu Den and Yuji Matsumoto. UniDic for Early Middle Japanese: a Dictionary for Morphological Analysis of Classical Japanese, In Proceedings of the 8th International Conference on Language Resources and Evaluation (LREC 2012), pp.911-915 (2012). https://unidic.ninjal.ac.jp/download_all/#unidic_wabun

(6) Aiko Hashimura (Aida), The ideological and decorative program of Heike Nokyo: on the relationship between the images of the four seasons on the back of the "Jeweled Stupa" scroll and the pictorial schema for the twenty-eight chapters of the Lotus Sutra, *Bijutsushi: a Journal of the Japan Art History Society* (166), 2009-3. A. Hashimura, The Lotus Sutra in the Kagawa Museum: an extant example of Japanese painting in 12th century East Asia, *The Kokka: a monthly journal of oriental art* (1377), 2010-7.

Computer Vision-based Comparison of Woodblock-printed Books and its Application to Japanese Pre-modern Text, Bukan

Thomas Leyh[1,3] and Asanobu Kitamoto[2,3]

[1]University of Freiburg
[2]ROIS-DS Center for Open Data in the Humanities
[3]National Institute of Informatics

1   Introduction

Digital Humanities have potential to reduce the complexity of bibliographical study by developing technical tools to support comparison of books. So far, the effort has been mainly put into text-based methods on large corpora of literary text. However, the emergence of large image datasets, along with the recent progress in computer vision, opens up new possibilities for bibliographical study without text transcriptions. This paper describes the technical development of such an approach to Japanese pre-modern text, and in particular to Bukan, which is a special type of Japanese woodblock-printed book.

The authors have been approaching this problem in the past (KITAMOTO et al. 2018). They proposed the concept of "differential reading" for visual comparison. Furthermore, (Invernizzi 2019) proposed "visual named-entity recognition" for identifying family crests, using them for a page-by-page matching across different versions. This paper is a follow-up of these works and proposes a keypoint-based method for the page-by-page matching, additionally yielding an option for highlighting differences.

2   Dataset

This work is mainly concerned with extracting information from a specific type of book: 武鑑—Bukan. These are historic Japanese books from the Edo period (1603-1868). Serving as unofficial directories of people in Tokugawa Bakufu (the ruling government in Japan), they

include a wealth of information about regional characteristics such as persons, families and other key factors. See figure 1 for an example. These books were created with woodblock-printing. Because the same woodblock has been reused for many versions of the book—sometimes with minor modifications—visual comparison can reveal which part of the woodblock was modified or has degraded.
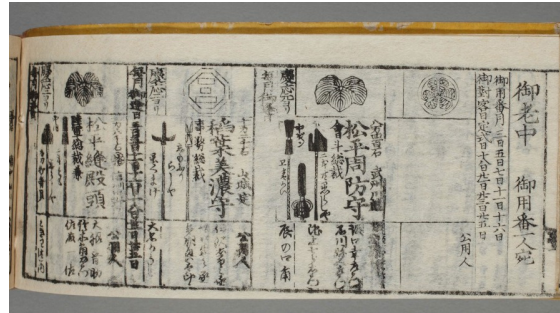

Fig. 1: Shūgyoku Bukan (袖玉武鑑) from 1867, page 6; showing names, descriptions, family crests and procession items. Especially interesting are the blank areas on the right, because in other edition they contain text.

ROIS-DS Center for Open Data in the Humanities and the National Institute of Japanese Literature are offering 381 of these Bukan as open data (Center for Open Data in the Humanities 2018). The original images have a width of 5616 and height of 3744 pixels. From the open data we created a derived dataset using the following preprocessing methods. Under the assumption that this task (1) does not require this level of detail, (2) does not require information about color and (3) only compares the actual pages, not the surrounding area, all scans are resized by 25%, converted to grayscale and finally cropped, resulting in an image shape of 990×660 pixels. If there are two book pages per scan, they are split at their horizontal center, yielding a shape of 495×660 pixels per page.

3   Method

Using an approach based on Computer Vision, two techniques were applied:

1. *Keypoint Detection and Matching* for finding the same features in different images.

2. *Projective Transformations* for comparing two different images regardless of their original orientation.

We used the *OpenCV* software library (Bradski 2000).

Fig. 2: Evaluation of the performance of four keypoint detection algorithms. AKAZE UP-RIGHT *performs best.*
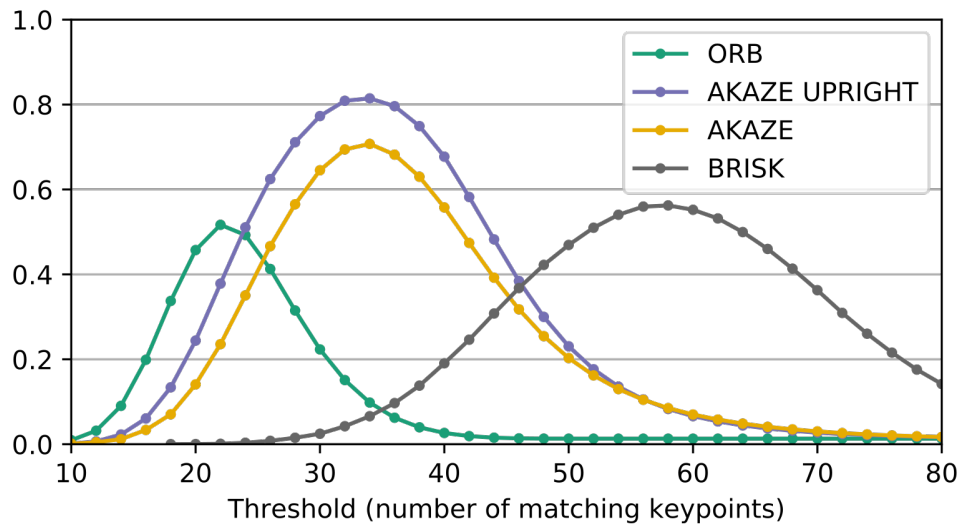
(a) F1 score over a range of threshold values, which is the harmonic mean of precision and recall, thus *peaking* where both underlying metrics are high.
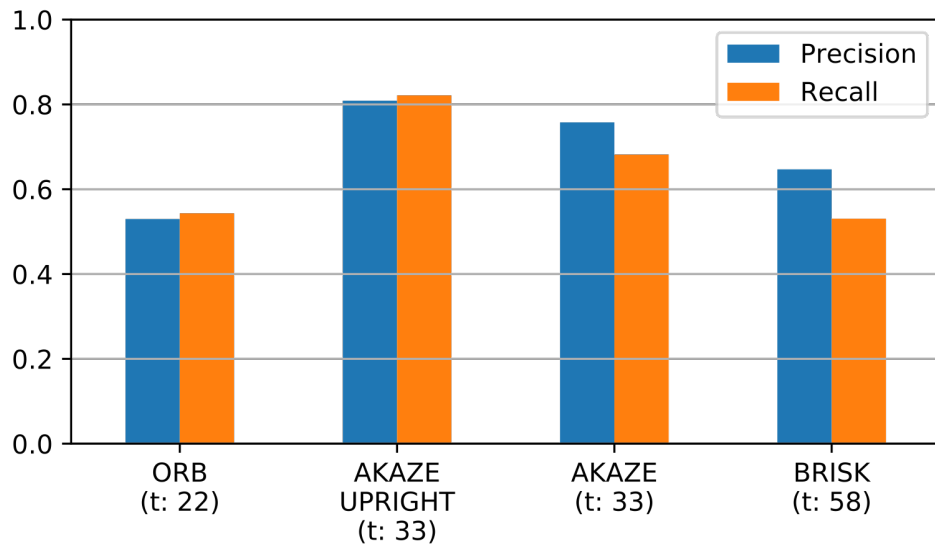
(b) Precision and recall, assuming an optimal threshold t was chosen. This is an upper bound on the performance of keypoint detection for this dataset.

3.1   Keypoint Matching

Keypoint Detection (Szeliski 2010, Ch.4) is about finding points of interest in an image that are most noticeable and give a unique description of the local area surrounding them. Computer Vision research produced various kinds of keypoints, most prominently SIFT (Lowe 2004). For evaluating the performance of these algorithms, 12 prints of the Shūchin Bukan (袖珍武鑑) were manually annotated, in total around 1800 pages, holding information about pairs of matching pages.

Using these annotations, six keypoint algorithms were empirically evaluated[1] by trying to match over all possible page combinations. This produces a list of similar keypoint pairs for each combination. The number of these pairs is interpreted as score for the similarity of two pages. Two pages are matched if the score is above a given threshold. On the one hand, a low threshold results in more matches (higher recall), but a larger part is judged incorrectly. On the other hand, a high threshold yields a larger percentage of correct matches (higher precision), misclassifying actual matches at the same time. Using the annotations, precision and recall were calculated for a range of thresholds. At this point, AKAZE UPRIGHT has the best performance with both metrics around 0.8 for an optimal threshold value. See figure 2 for further details.

3.2   Projective Transformations

Projective Transformation (or Homography) for images is defined as a matrix $H \in R^{3 \times 3}$ for transforming homogeneous coordinates $H\vec{x} = \vec{y}$ ($\vec{x}$ and $\vec{y}$ are interpolated pixel coordinates). This operation results in linear transformations like translation and rotation, but also changes in perspective (Marschner and Shirley 2015). For finding such a transformation from matching keypoints, the heuristic *Random Sample Consensus* (RANSAC) algorithm is commonly used (Fischler and Bolles 1981). Basically, a random subset of matching keypoints is chosen, using this to compute a transformation and calculating an error metric. By iteratively using different random subsets, eventually the transformation with the smallest error is picked.

The benefit is twofold: First, the algorithm implicitly uses spatial information of the matching image candidates to filter out false positives, thus greatly boosting the matching performance. Precision and recall are close to their maximum of 1.0, see figure 3. Secondly, it directly yields the transformation matrix H, enabling the creation of image overlays for visualizing the differences. Looking at the perspective components of H, additional filtering is done[2], removing even more of the remaining false positives.

---

[1]ORB (Rublee et al. 2011), AKAZE (Alcantarilla and Solutions 2011), AKAZE without rotational invariance (UPRIGHT), BRISK (Leutenegger, Chli, and Siegwart 2011), SIFT, SURF (Bay, Tuytelaars, and Van Gool 2006)

[2]By asserting that $\left|H_{3,1}\right| \le 0.001$ and $\left|H_{3,2}\right| \le 0.001$.
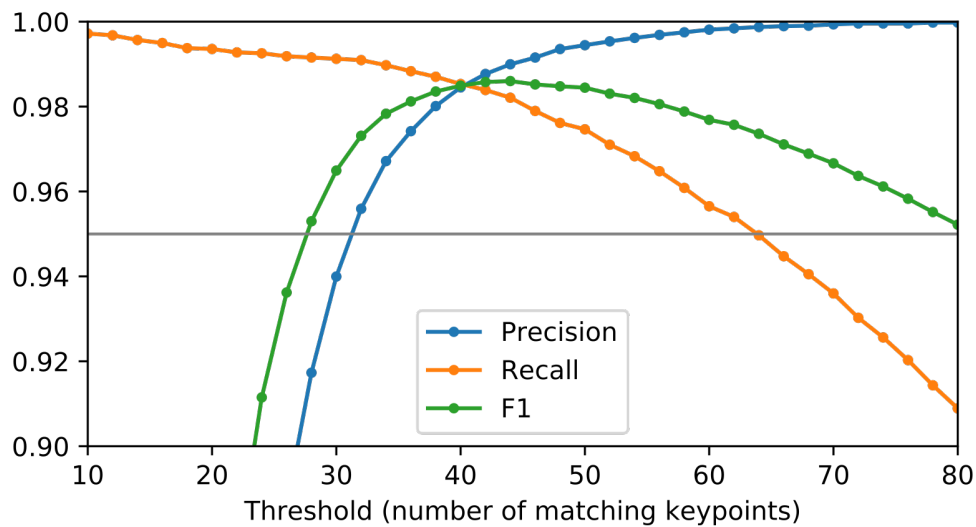
Fig. 3: Applying RANSAC on the keypoint matches from AKAZE UPRIGHT results in better *matching* results: *The F1 score—see figure 2 (a)—is above 0.95 for a wide range of thresholds up to 80, indicated by the grey horizontal line.*

4   Discussion

This two-step-pipeline archives high precision and recall when looking for similar pages of different book editions. Performance seems to be robust with respect to most parameters. For matching two actual pages, the number of matching keypoints is important since it is acting as a score. Storing this value allows a ranking of page pairs by visual similarity. Furthermore, a threshold can be set dynamically, even after the computation of keypoint pairs. Assuming semi-automatic application with a human assessing the results, recall is of higher importance, thus a low threshold of around 40 is recommended, but can be adjusted any time. See again figure 3 for the slope of the recall curve.

This was the basis for building a web-based prototype of a comparison browser: A scholar in the humanities can browse a book while getting information about similar pages. Differences between pages can be visualized at any time, similar to figure 4. As a next step, we are designing a web-based tool that is easy to use and works for IIIF images.

Prof. Kumiko Fujizane, who is a Japanese humanities scholar specialized in this particular type of books and collaborates with us, says that the major strength of our method is in identifying differences which are hard to discern by human eye, while its weakness is in errors caused by the distortion of pages by the book binding. Her request for future work is to identify region-based difference in addition to page-based difference.
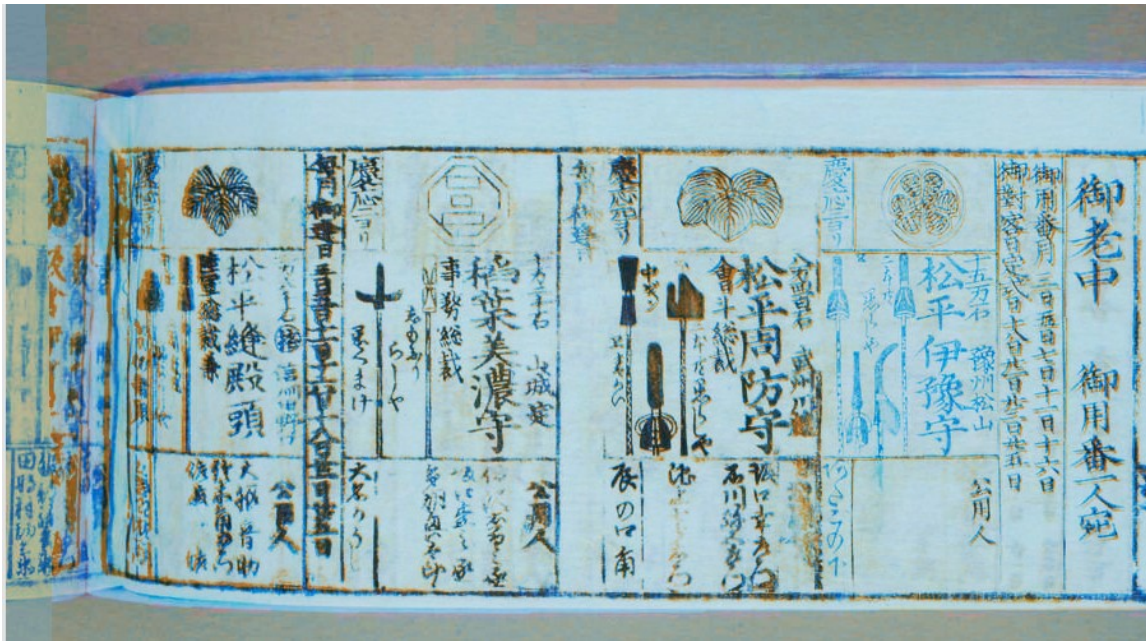
Fig. 4: Visualizing page differences between two prints of the Shūchin Bukan (袖珍武鑑) from 1867. Differences are indicated by blueish and reddish coloring.

5   Conclusion

The proposed method has wide applicability in woodblock-printed books, because the method uses only visual characteristics obtained from computer vision, and does not depend on the content nor the text of books. Although image alignment is a mature research area we also see recent developments, such as RANSAC-Flow (Shen et al. 2020), with potential to improve our results.

References

Alcantarilla, Pablo F, and T Solutions. 2011. "Fast Explicit Diffusion for Accelerated Features in Nonlinear Scale Spaces." *IEEE Trans. Patt. Anal. Mach. Intell* 34 (7): 1281–98. https://doi.org/10.5244/C.27.13.

Bay, Herbert, Tinne Tuytelaars, and Luc Van Gool. 2006. "Surf: Speeded up Robust Features." In *European Conference on Computer Vision*, 404–17. Springer. https://doi.org/10.1007/11744023_32.

Bradski, G. 2000. "The OpenCV Library." *Dr. Dobb's Journal of Software Tools*.

Center for Open Data in the Humanities. 2018. "武鑑全集とは？." July 28, 2018. http://codh.rois.ac.jp/bukan/about/.

Fischler, Martin A, and Robert C Bolles. 1981. "Random Sample Consensus: A Paradigm for Model Fitting with Applications to Image Analysis and Automated Cartography." *Communications of the ACM* 24 (6): 381–95. https://doi.org/10.1145/358669.358692.

Invernizzi, Hakim. 2019. "An Iconography-Based Approach to Named Entities Indexing in Digitized Book Collections." Master's thesis, École polytechnique fédérale de Lausanne.

KITAMOTO, Asanobu, Hiroshi HORII, Misato HORII, Chikahiko SUZUKI, Kazuaki YAMAMOTO, and Kumiko FUJIZANE. 2018. "Differential Reading by Image-Based Change Detection and Prospect for Human-Machine Collaboration for Differential Transcription." In *Digital Humanities 2018*.

Leutenegger, Stefan, Margarita Chli, and Roland Y Siegwart. 2011. "BRISK: Binary Robust Invariant Scalable Keypoints." In *2011 International Conference on Computer Vision*, 2548–55. Ieee. https://doi.org/10.1109/ICCV.2011.6126542.

Lowe, David G. 2004. "Distinctive Image Features from Scale-Invariant Keypoints." *International Journal of Computer Vision* 60 (2): 91–110. https://doi.org/10.1023/B: VISI.0000029664.99615.94.

Marschner, Steve, and Peter Shirley. 2015. *Fundamentals of Computer Graphics*. CRC Press.

Rublee, E., V. Rabaud, K. Konolige, and G. Bradski. 2011. "ORB: An Efficient Alternative to Sift or Surf." In *2011 International Conference on Computer Vision*, 2564–71. https://doi.org/10.1109/ICCV.2011.6126544.

Shen, Xi, Francois Darmon, Alexei A Efros, and Mathieu Aubry. 2020. "RANSAC-Flow: Generic Two-Stage Image Alignment." In *ArXiv*.

Szeliski, R. 2010. *Computer Vision: Algorithms and Applications*. Texts in Computer Science. Springer London.

Clarification of boundaries and criteria for periodisation in Beethoven's career

Daisuke Miki[1] and Akihiro Kawase[1]

[1] Faculty of Culture and Information Science, Doshisha University

1   Introduction

The compositional style of Ludwig van Beethoven (1770-1827) has conventionally been divided into three periods. According to Lenz (1855), who divided Beethoven's compositional style for the first time, the first, second, and third periods are respectively the periods that span from 1794 to 1800, 1801 to 1814, and 1814 to 1827. Several other musicologists, such as Bücken (1931), Schenk (1967), Moroi (1983), and Hirano (2012), have proposed different divisions. However, past musicologists do not share a common understanding of how to divide Beethoven's compositional style.

This situation could cause confusion about the stylistic evolution of Beethoven's music. The divisions in Beethoven's compositional style were not originally made from the viewpoint of musical theory, but instead based on major turning points in his biography. Therefore, recent researchers have conducted quantitative analyses to identify the specific features that characterise each period.

Richard (2011) found that the differences between the three periods of Beethoven's works can be explained by the contrast of intensity in dynamics, tempo, and harmony. Furthermore, Honingh and Bod (2011) revealed that the tritone interval category (IC) is an effective feature by which to perform discriminant analysis to determine the periods in Beethoven's works. However, it is still unclear what specific types of chords and harmonic progressions are unique in each period.

This study aims to clarify the periodisation boundaries in his compositional style and determine the specific features that distinguish one period from another. In this study, we applied supervised learning to the relative frequency of *N*-gram extracted from Beethoven's all-string quartets (16 pieces; 70 movements) in terms of harmony, melody, and rhythm. We chose the string quartets as our sample because Beethoven composed in this genre

throughout his career.

2   Methodology

We conducted a discriminant analysis using decision trees and random forests to build a model that distinguishes in which period the piece was composed. Several decision trees have been generated to visualise the classification process. The importance of various features is measured by the value of Mean Decrease Gini (MDG) that is calculated in the random forests.

3   Results

As a result of the comparison of the OOB error rates (Table 1), the models using harmonic and melodic features turned out to have better accuracy than the one using rhythmic features. Table 2 shows the OOB error rates of the models that combine several feature variables type. The discriminant models with harmonic and melodic features achieved the best accuracy. Among two-period-models, the first and the third periods work the best as the target categories.

Table 1: OOB error rate of each models

Feature variables type	unigram	bigram	trigram	fourgram
Harmony	0.3429	0.3429	0.4286	–
Melody	0.4000	0.3429	0.4000	–
Rhythm	0.6857	0.6429	0.7143	–

Table 2: OOB error rate of each models

Feature variables type	period 1 / 2 / 3	period 1 / 3	period 1 / 2	period 2 / 3
Harmony (unigram + bigram)	0.3571	0.1800	0.2727	0.4565
Harmony + Melody	0.2857	0.0800	0.3182	0.3913
Harmony + Melody + Rhythm	0.3286	0.1600	0.2727	0.4130

We found out that the important harmonic features for the classification are the relative frequencies of transition from the double dominant ninth chord with the root note omitted to the dominant chord ($\#vii^{o7}/V - V$), the progression from the dominant seventh chord to the tonic chord ($V^7 - I$), and the second inversion of the dominant seventh chord (V_3^4). The

important melodic features turned out to be the major second descent followed by the perfect fifth descent, the continuous chromatic ascent, and the repeat of same note after the minor third ascent.
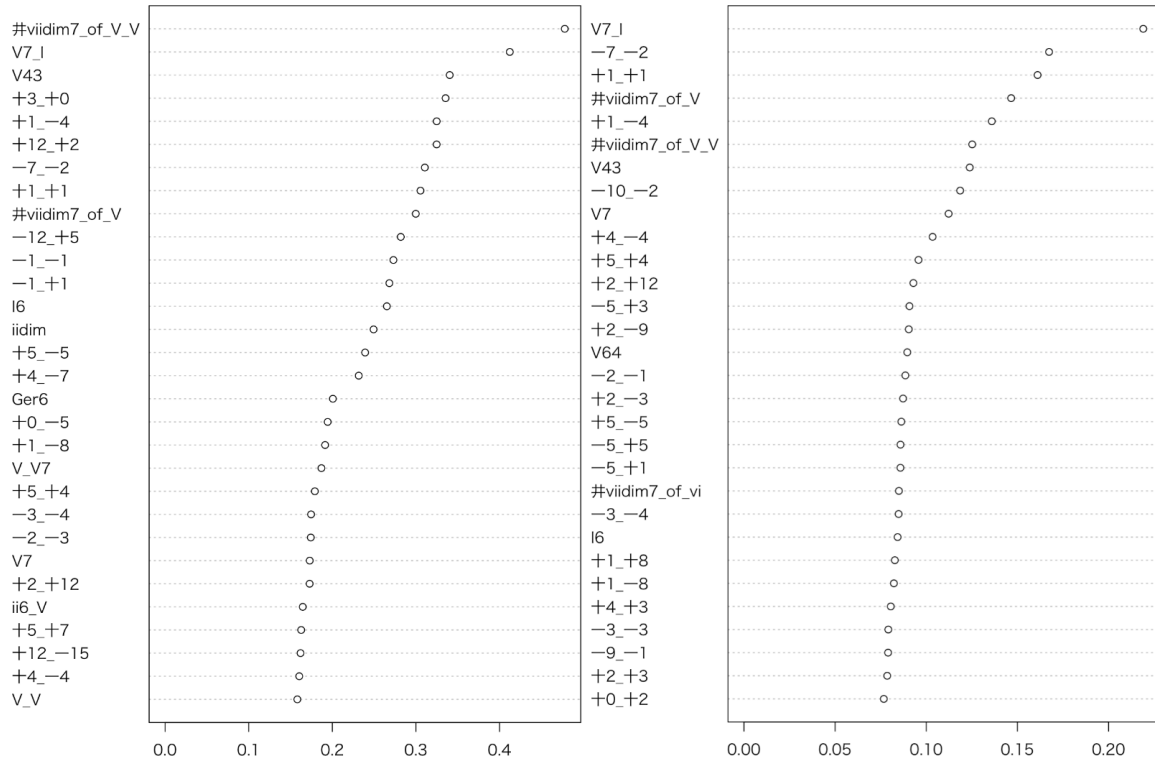

Fig. 1: Feature importance in three-period-model (left) and two-period-model (right)

Figure 2 is the visualisation of the classification process generated with a decision tree for three periods. The relative error rate for this decision tree is 0.0227. The criteria for the discrimination of the works composed in the first period are high frequency of transition from the double dominant ninth chord with the root note omitted to the dominant chord, the scarcity of major second descent followed by perfect fourth descent, the scarcity of the second inversion of submediant chord, and the abundance of chromatic ascent after chromatic descent. The chord that discriminates the second period is the high frequency of the first inversion of the tonic chord. Furthermore, the feature that sets the third period apart is the transition from the first inversion of the tonic chord to the first inversion of the dominant seventh chord.

4   Conclusion and Future Works

In this study, we found out that the periodisation by Lenz (1855) is a valid classification for the first period and the third period in terms of harmony and melody. However, the misclassifications frequently occur with respect to the second period. The accuracies of
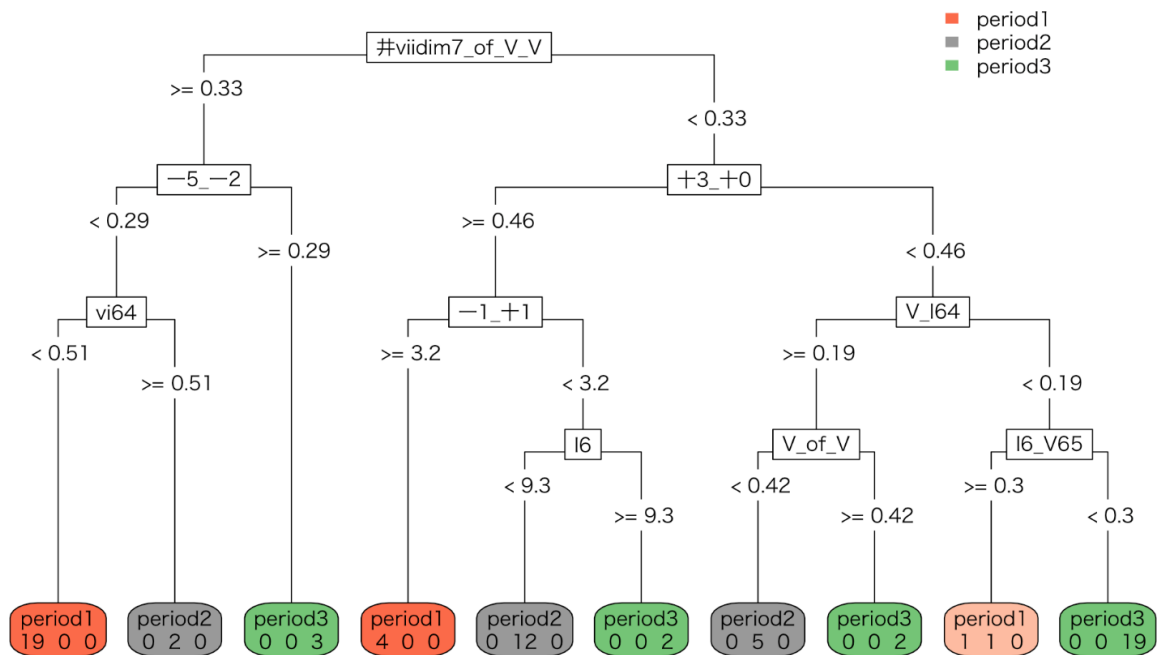
Fig. 2: Decision tree for three periods with harmonic and melodic features

two-period-models also indicate that the model performs best when the second period is not involved in the target category.

The question remains as to whether this result can be interpreted as the periodisation criteria for other genres of his music. The precise boundary that separates the last period from the rest of Beethoven's early career still remains unclear. This is due to the lack of works composed during the 14 years (1810-1825) in which he did not compose any string quartets. This indicates the necessity for further investigation that involves other genres of his music to compensate for this gap. Additionally, future research should compare the accuracy of the models based on several periodisations other than Lenz (1855) in order to ultimately redraw periodisation boundaries that best classifies the works by Beethoven in terms of stylistic evolution.

References

1. **Bücken, E.** (1931). *Ludwig van Beethoven*. Athenaion.

2. **Hirano, A.** (2012). *Ludwig van Beethoven* (*The Great Composers: Life and Works*). Ongaku-no-Tomosha.

3. **Honingh, A. and Bod, R.** (2011). "Clustering and classification of music by interval categories." *International Conference on Mathematics and Computation in Music*. Springer.

4. **Kerman, J., Tyson, A., and Burnham, S.** (2001). "Beethoven." *The New Grove Dictionary of Music and Musicians*. 2nd ed. Macmillan.

5. **Lenz, W. v.** (1855). *Beethoven et Ses Trois Style*s. Wentworth Press.

6. **Moroi, S.** (1983). *Beethoven's Piano Sonata*: *Study on Composition*. Ongaku-no-Tomosha.

7. **Neuwirth, M., Harasim, D., Moss, F.C., and Rohrmeier, M.** (2018). "The Annotated Beethoven Corpus (ABC): A Dataset of Harmonic Analyses of All Beethoven String Quartets." *Frontiers Digital Humanities*, 5(16).

8. **Richard, M. C.** (2011). "Analyzing Tension and Drama in Beethoven's First-Movement Sonata Forms." *PhD diss.* University of Toronto.

9. **Schenk, E.** (1967). "Ausgewählte Aufsätze, Reden und Vorträge." *Wiener musikwissenschaftliche Beiträge 7*. Graz.

Automated Face Detection for Pre-modern Japanese Artworks using Deep Neural Networks

Alexis Mermet[1,3], Asanobu Kitamoto[2,3], Chikahiko Suzuki[2,3], and Akira Takagishi[4]

[1]Ecole Polytechnique Fédérale de Lausanne (EPFL)
[2]ROIS-DS Center for Open Data in the Humanities
[3]National Institute of Informatics (NII)
[4]University of Tokyo

1   Introduction

In art history research, comparative style study, based on the visual comparison of characteristics in artworks, is a typical approach to answering research questions about works, such as the identification of creators, the period of production, and the skill of the painter. The creation of dataset useful for such tasks is a complicated and time consuming process for art historians. The motivation of this paper is to help creating such collection by allowing efficient interaction between humans and computers. To achieve this goal, we are using machine learning based solutions, more particularly, object detection, classification and neural networks visualization methods. An useful starting point for such work is the KaoKore dataset[1]. This collection consists of high quality, manually annotated, facial expressions from pre-modern Japanese picture scrolls and picture books.

2   Methods

The creation of a dataset like KaoKore consists of two steps; namely the detection step and the interpretation step. The detection step involves identifying the location of a face object, while the interpretation step involves identifying the meaning of a face object, such as gender, position, status, and orientation of the face. To automate this process, we need a face detector for the first step, and a face classifier for the second one. For both of these tasks, our challenge is in the size of the fully annotated dataset, which is usually

much smaller than expected for training a deep learning-based detector and classifier. This problem is caused not only by the limited availability of open Japanese artwork images, but also by the cost of manual annotation for a large number of artworks. Thus, our machine learning algorithms should learn from small dataset and help human annotators to reduce the cost of annotation.

Our technical contribution for the first task is in employing a patching approach, that we called image patching, to solve the problem of small-scale and large-size image datasets. Taking inspiration from research on style detection [2, 3] we implemented a detector using patches of variable sizes that can be used as inputs for multiple deep learning architectures[4, 5, 6, 7]. The patching approach consists of the following (see figure 1): after padding an image to a required size, we crop sub-images of a desired size from it, These sub-images, that we call patches, can either contain faces bounding boxes or not. Please refer to [8] for the detail of the algorithm.
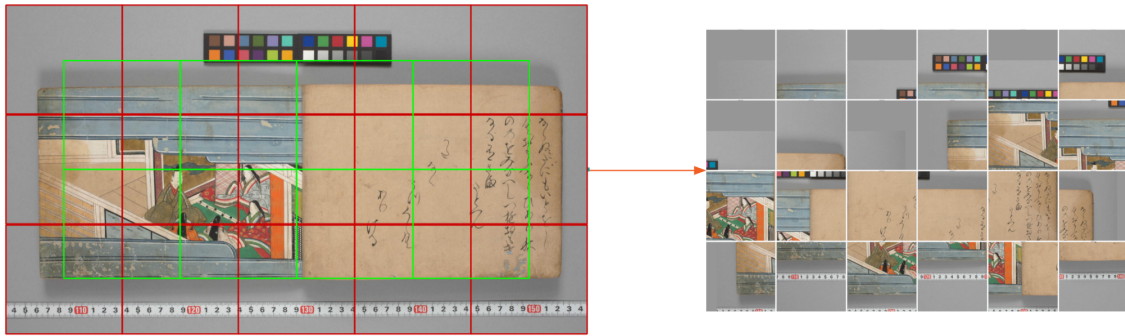
Fig. 1: Creation of patches of size 600*600 to input an SSD 300 backbone on an image from the Kaokore collection

The image patching method has the advantage of minimizing the loss of detail induced by the resizing process that occurs before entering any deep learning architecture. Using architectures with input layer of large enough dimensions, the patches created by the image patching approach are of the same dimension as the input layer. Otherwise, when the detector's input dimensions are too small, the patches obtained with image patching can be easily resized to the dimension expected by the detector while minimizing the loss of detail and preserving the patch's aspect ratios. This approach also allows to extend the dataset by multiplying the number of artworks and faces that can be used while training the detector.

For the second task of interpretation, we trained a classifier for the status of the face (see Section Results). Moreover, to study graphical features of faces in pre-modern Japanese artworks, we combined Guided Backpropagation algorithm[9] and the Grad-CAM algorithm[10] to keep track of the propagation of an object's gradient through a network and

highlighted which pixels of the object triggered positive activation in the classifier.

3   Results

We first describe dataset split and evaluation metric that needs to be defined before experiments. The dataset split concerns how to divide the dataset into a training and testing sets. In addition to a typical approach called random split, we employed new approaches called inter-books split and intra-books split to take correlations within books/scrolls into consideration [8]. In the intrabooks split, for example, each book/scroll should have its images in both the training and testing sets so that machine learning algorithms can learn from all books/scrolls in the dataset. On the other hand, evaluation metric is defined as follows.

Recall is the number of properly detected faces among all the faces that should have been detected.

Precision is the number of properly detected faces among all the faces that have been detected.

Mean Average Precision, abridged to mAP, is a measure falling between 0 and 1 used to compute the accuracy of an object detector at a given level. This level corresponds to the threshold at which we consider that a predicted bounding box and a target bounding box are overlapping or not.

For the detection step, we tried many combinations of deep learning models, and the result indicates that a Faster R-CNN architecture[6], pretrained on ImageNet[11] and setup on ResNet50[7], and patches of size 1333 * 800 is our best face detector on pre-modern Japanese artworks, with a MaP score of 82.9% and a Recall of 91.1% on the Kaokore dataset. The same deep learning architecture without patches only achieved a MaP score of 79.0% and a Recall of 89.7% 89.7%. This suggests that the patching approach is effective for training a face detector.

For the interpretation step, we trained a ResNext[12] classifier to predict the status of any face. This classifier attained an accuracy of 85.009% on all classes. It achieves high classification score on the Nobles, Warriors and Monks class while having an hard time to classify Commoners, showing that some status must have graphical representation rules while other don't. It also allowed to highlight relevant features for status classification, such as the ears, the hairstyles, the eyes and the hats.

Finally, to test the utility of our face detector in a realistic setup, we applied the detector to a completely new images from Japanese painting scrolls, 'Yugyo Shonin Engi-Emaki Shojo-Kouji Kouhon', archived in Shojo-Kouji Temple, Japan (hereafter we call it Kouhon

dataset). Without any additional training, the detector obtained the list of bounding boxes for faces from Kouhon dataset, as shown in Figure 2, and the results were then used by art historians for complete annotation. Our approach reached a precision of 84.17% and a recall of 64.65% 64.65%. This result suggests that the total cost of the detection step is reduced to only around 1/3 of its original cost in comparison to completely manual annotation.

4   Conclusion and future works

The most encouraging result is that the proposed face detector worked effective even for images from new books (Kouhon dataset) without tuning parameters. This result suggests that our face detector can be used for expanding the horizon of research through the cycle of dataset expansion and model re-training for updating parameters. In the future, we could improve our existing method for detection or even automatize the whole annotation procedure including detection and interpretation. The interpretation task could be sped up by a classifier so that art historians only have to care about hard cases that the network is not able to interpret.

Fig. 2: Detection example on the Kouhon dataset using our best performing network (using patches). Image courtesy of Shojo-Kouji Temple.

Acknowledgment

References

[1] Y. Tian, C. Suzuki, T. Clanuwat, M. Bober-Irizar, A. Lamb, and A. Kitamoto, "Kaokore: A pre-modern japanese art facial expression dataset," 2020.

[2] C. Sandoval, E. Pirogova, and M. Lech, "Two-stage deep learning approach to the classification of fine-art paintings," IEEE Access, vol. 7, pp. 41770–41781, 2019.

[3] R. Bai, H. Ling, Z. Kai, D. Qi, and Q. Wang, "Author recognition of fineart paintings," in 2019 Chinese Control Conference (CCC), pp. 8513–8518, 2019.

[4] Z. Cai and N. Vasconcelos, "Cascade r-cnn: Delving into high quality object detection," 2017.

[5] W. Liu, D. Anguelov, D. Erhan, C. Szegedy, S. Reed, C.-Y. Fu, and A. C. Berg, "Ssd: Single shot multibox detector," Lecture Notes in Computer Science, p. 21–37, 2016.

[6] S. Ren, K. He, R. Girshick, and J. Sun, "Faster r-cnn: Towards real-time object detection with region proposal networks," 2015.

[7] K. Simonyan and A. Zisserman, "Very deep convolutional networks for large-scale image recognition," 2014.

[8] A. Mermet, A. Kitamoto, C. Suzuki, and A. Takagishi, "Face detection on pre-modern japanese artworks using r-cnn and image patching for semiautomatic annotation," in SUMAC 2020 - 2nd Workshop on Structuring and Understanding of Multimedia heritAge Contents, in press.

[9] J. T. Springenberg, A. Dosovitskiy, T. Brox, and M. Riedmiller, "Striving for simplicity: The all convolutional net," 2014.

[10] R. R. Selvaraju, M. Cogswell, A. Das, R. Vedantam, D. Parikh, and D. Batra, "Grad-cam: Visual explanations from deep networks via gradientbased localization," International Journal of Computer Vision, vol. 128, p. 336–359, Oct 2019.

[11] J. Deng, W. Dong, R. Socher, L. Li, Kai Li, and Li Fei-Fei, "Imagenet: A large-scale hierarchical image database," in 2009 IEEE Conference on Computer Vision and Pattern Recognition, pp. 248–255, 2009.

[12] S. Xie, R. Girshick, P. Dollár, Z. Tu, and K. He, "Aggregated residual transformations for deep neural networks," 2016.

GIS Visualisation for the Administrative Document Catalogue of the Government-General of Taiwan

Hajime Murai[1] and Toshio Kawashima[1]

[1]Future University Hakodate

1   Introduction

The digitisation of official government documents is important from the viewpoint of history, archives, and digital humanities. However, only little digitisation and publication of historical government documents has been done in Japan. There are several reasons for this (Koga, 2005). First, Japan's frequent natural disasters make it difficult to preserve documents. Moreover, various documents were lost during the Second World War due to air raids, evacuations, and disposal (National Archives of Japan, 2006).

Two of the few exceptions are government documents from the governors general of Taiwan and Korea, which have been preserved in exceptionally good conditions (Kato, 2002). The former includes administrative documents depicting public organisations in pre-war Japan. Unlike most official Japanese documents, this collection has been published as image data and partially digitised in text format (Higashiyama, 2017).

The goal of this study is to develop a tool for visually grasping an overview of the enormous amounts of administrative documents of Taiwan. Moreover, it is also the aim of this study to investigate the usefulness of digitally archived text data of official documents for historical and social studies. For this purpose, an automatic KML data construction application for GIS visualisation systems has been developed.

2   Target contents

This study examines data from the 'Catalog Database of the Government-General of Taiwan's Administrative Documents' (ISSCU, 2015), a database outlining the documents found in the 'Catalog of the Government-General of Taiwan's Administrative Documents' (台湾総督府文書目録, CCCADGT, 1994). These text data include the titles of official documents from 1895

to 1914.

In addition to the catalogue documents, three types of datasets were created for automatic KML data construction. The first is a dictionary for old and historical words used in the target documents. The second is a word category for historical topics (Murai and Kawashima, 2018), and the third is a dataset for old place names and positions in Taiwan.

The dictionary for old and historical words in the Catalog Database of the Government-General of Taiwan's Administrative Documents includes 136 words related to places and 61 historical or cultural words. These words were added to a normal Japanese dictionary for morphological analysis, and the texts were divided into words. The word category for historical topics includes 785 words from 26 topics (see Table 1). This category was utilised for detecting topics within each official document title (Murai and Kawashima, 2018).

The dataset for old place names in Taiwan includes 274 pairs (see Table 2) of place names and geographic information (latitude and longitude).

Table 1. Number of words in topic categories

Topic category	Number of words	Topic category	Number of words
Personnel shift	119	Monopoly	16
Publicity	29	Establishment and closure	13
Rules	29	Traffic	35
Office work	20	Disaster and welfare	22
Permission	8	Mining and engineering	12
Hygiene	91	Rebellion and indigenous	22
Livestock	18	Military	56
Economy and tax	36	Agriculture	33
Judgment	53	International	25
Infrastructure	21	Residents	7
Police	16	Imperial family and rituals	28
Correspondence	14	Religion	29
Education	26	Fisheries	7

Table 2. Number of place name and global positions

Area	Number of place names	Area	Number of place names
台北 (Taipei)	32	南投 (Nantou)	11
台中 (Taichung)	26	雲林 (Yunlin)	15
台南 (Tainan)	29	嘉義 (Chiayi)	18

Area	Number of place names	Area	Number of place names
桃園 (Taoyuan)	7	屏東 (Pingtung)	16
高雄 (Kaohsiung)	30	宜蘭 (Yilan)	9
基隆 (Keelung)	3	花蓮 (Hualien)	10
新竹 (Hsinchu)	8	台東 (Taitung)	15
苗栗 (Miaoli)	13	澎湖 (Wuhu)	7
彰化 (Changhua)	25		

These names were extracted manually from the 'Catalog of the Government-General of Taiwan's Administrative Documents'.

3   KML construction

The method for extracting topics and geographic information based on the three types of databases is depicted in Figure 1. Moreover, the target titles of official documents also contain chronological information since official documents include promulgation dates. Therefore, the extracted topic categories and geographical information with chronological information were combined into the KML data format. As a result, users can visually recognise chronological and spatial shifts in historical topics by utilising the GIS application (Figure 2).

4   Conclusions and future work

The datasets including the topic word categories and place names enable the extraction of chronological and spatial characteristics for historical documents. Moreover, KML data enable users to visually recognise the geographical characteristics as well as the chronological and spatial shifts in historical topics.

Although there are various limitations to a catalogue-only analysis, the Catalog of the Government-General of Taiwan demonstrated the utility of this dataset.

One of possible future works may be utilization of named entity recognition based on natural language processing techniques. However, the accuracy is not enough at this stage, therefore, it is necessary to wait for future development of these field.

If appropriate datasets of old place names, geographical information, and words that indicate historical topics are constructed, this method and software would be applicable for other historical documents. Also there are other valuable data formats for GIS, it may be useful to support multiple formats for generalization.
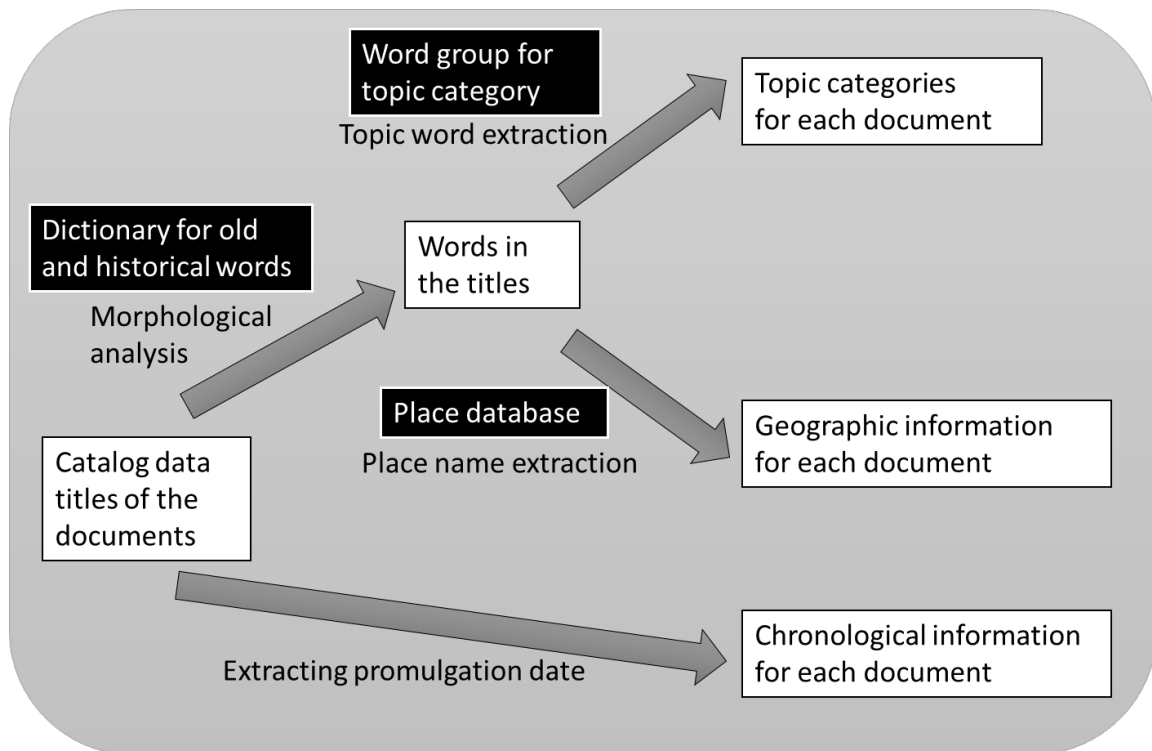
Fig. 1: Method for extracting topics and geographic information

References

Catalog Compilation Committee for the Administrative Document of Government-General of Taiwan (CCCADGT), (1994). *Catalog of the Government General of Taiwan's Administrative Documents* (In Japanese: 台湾総督府文書目録). Chukyo University: Yumani-Shobo, 1994.

Higashiyama, K., (2017). "Management of Administrative Document in the Periods of Taiwan Sotokufu" (In Japanese: 草創期における台湾総督府の文書管理). *Bulletin of Social Science Research*, Institute of Social Sciences of Chukyo University, 38(1): 51–105.

Institute of Social Sciences of Chukyo University (ISSCU)**,** (2015). "Catalog Database for the Government General of Taiwan's Administrative Documents" (In Japanese, 台湾総督府文書目録データベース). CD-ROM.

Kato, K., (2002). "Defeat and Destruction of Official Documents: The Actual Situation in the Colony and Occupation Period" (In Japanese: 敗戦と公文書廃棄-植民地・占領期における実態). *The Bulletin of the Department of Historical Documents*, 33: 105–144.

Koga, T., (2005). "Government Information and Roles of Libraries and Archives: Recent Policy Issues in Japan", *Progress in Informatics*, 1: 47–58.
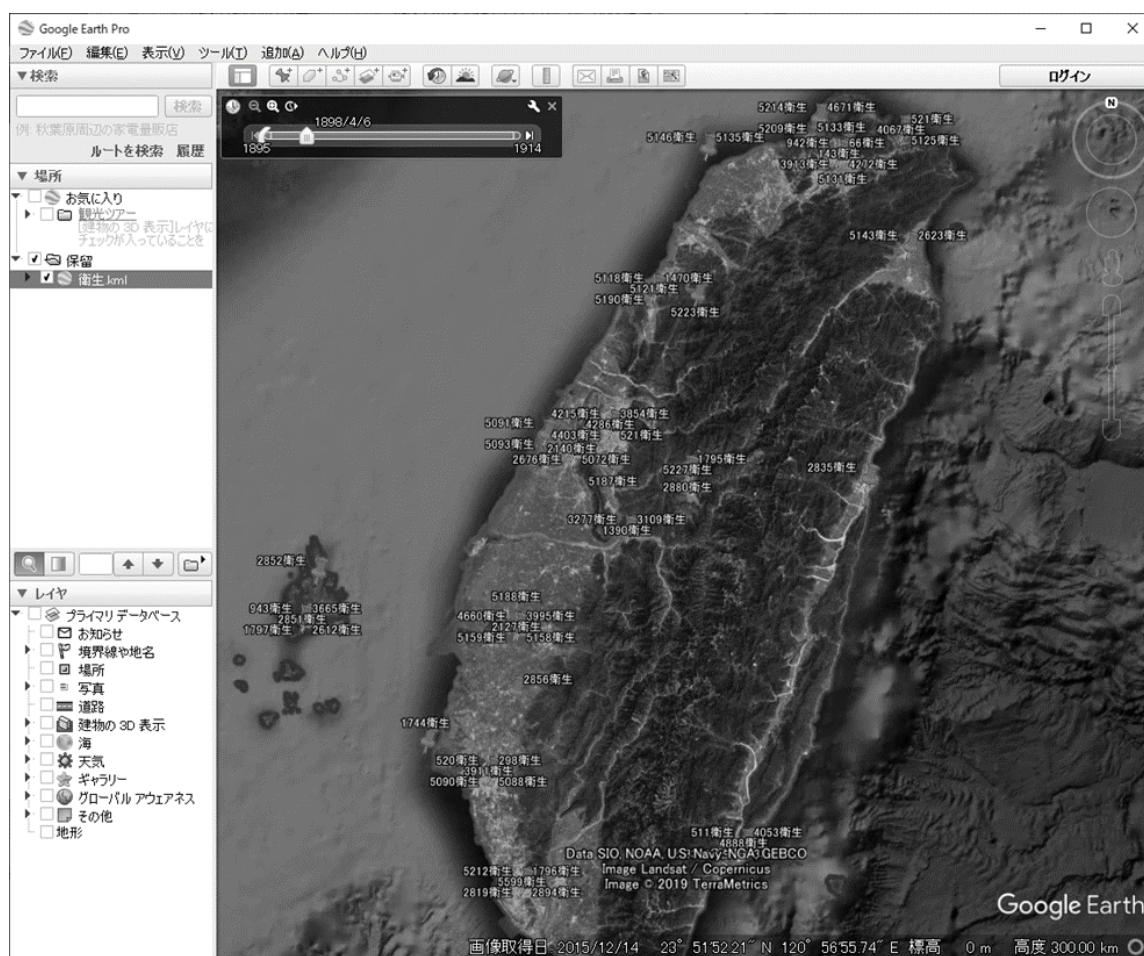
Fig. 2: Example of extracted KML on Google Earth

Murai, H., Kawashima, T., (2018). "Towards for Quantitative Analysis of Official Document Catalog of the Government-General of Formosa", *Journal of Japan Society of Information and Knowledge*, 28(2): 79–84.

National Archives of Japan, (2006). "Preserving and Using Important Records: A Trial of the Digital Archive in National Archives of Japan" (In Japanese, 重要記録の保存と利用: 国立公文書館デジタルアーカイブズの試み). *Archives*, 22: 26–29.

Educational utilization of digital archive

-Inquiry based curation learning in on-line education-

Masao Oi[1]

[1]University of Tokyo

1   Background

I. Irich criticized passive learning by linking it with social structure, and proposed to regain proactive learning [1].

1. It has been pointed out that proactive learning is lost due to the lack of "self-relevance"[2].

Proactive learning is one the main axes in the Japanese new curriculum guideline which was fully implemented from April 2020. In order to realize such learning, importance was placed on

2. developing skills of students to collect information by themselves using Information and Communication Technology (ICT) and
3. utilize facilities such as museum, library and archives (MLA) to develop multifaceted and multi-angular perspective.

2   Problems

1. Teaching materials based on local history and oral history is an example putting importance on "self-relevance" learning. However, such subjects are still far from the daily lives of students, causing temporal and spatial distances. (Thus it can not fully function as a material to induce "self-relevance".)

2. In regards to the training of information utilization ability of ICT, the educational goal is "the comprehensive learning of information collection, analysis, and transmission". However, there are criticisms that many practices only covers the instruction of ICT equipment utilization [3]. There are ICT utilization practices that focus on nurturing

thinking ability, yet, since information is "given" by teachers, learning is rather passive for children and students.

Thus, opportunity to think based on the multifaceted and multi-angular information is not given.

3. In regards to the use of MLA, it is suggested that it is important to visit related facilities [4] (to depthen the understanding of such places). However, lack in time and distance is a burden for many teachers. As a method to solve such problems, there are practical studies using digital archives such as application of the Asian Historical Materials Center and the Niigata regional video archive[5-6]. Yet, such studies are limited to individual and only single archives, therefore the materials and information are restricted to limited resources. Under such circumstances, students are unable to encounter various materials and is difficult to notice the multifaceted nature of events.

3   Solution

Therefore, in order to solve the above issues, this research has developed teaching materials, designed lessons, and practiced from the following viewpoints.

1. In order to solve the issue of "lack in self-relevance", the temporal and spatial distances between the learning target, and the learner should be reduced.

   Reduction of such distance will lead to familiarity and connectivity, which gives opportunity to think more deeply towards the learning object.

2. Passive learning due to the given teaching materials can be solved through the "curation" activity which is collecting, organizing information and materials, and adding new meanings and values towards the learning object.

3. In order to create more occasions for students to encounter serendipity (unexpected encounters and surprises) using multiple archives with diverse materials and opinions which leads to thinking from multifaceted perspectives is important.

4   Research method

A curation class was designed which used digital archives to consider history in a multifaceted and multi angled manner, multiple sources was used and practiced an inquiry-based learning classes at elementary, middle and high schools.

1. Practiced a workshop which utilized the "Japan Search" which is integrated material search digital archive as preliminary practice.

2. Implementation of a new function was made on the "Japan Search" along with the consultation of development engineers to improve functions for educational usage. By implementing such function, collaborative collection, collaborative editing, collaborative browsing and online browsing of materials became possible.

3. Constructed question from textbook materials and developed the teaching materials and class design along with the usage of "Japan Search" in accordance to the individual theme.

4. Practiced social studies classes throughout the year at elementary, middle and high school.

5. Rubric's analysis on cognitive transformation of children was conducted before and after the practice.

5   Result & Future tasks

By setting the theme based on one's own interest and creating questions as a starting point to collect materials using the integrated archive, made recognitions that the joy of exploring based on the interests and the viewpoints of reading and interpreting the materials varied depending on the person.

An integrated archives platform that is easy for anyone to use in classes, with accumulated practical examples of each unit that are closely connected to the annual curriculum and provided with educational metadata such as materials and connections with each unit is hoped to be constructed and completed.

6   Current research and future prospect

Future prospect of this research is to develop an online teaching platform to support the rich learning of distance education in order to create fair and diverse educational opportunities.

This research will contribute to inquiring support for the learning of students and the development of teaching materials for teachers.

In order to realize such concept, specifying on which metadata to use and how to promote cooperation with related organization is the future issue.

The presentation will be reporting the result of the lesson practiced using digital archive that was conducted throughout the year. Remote digital archive was used during the COVID-19 lock down from April 2020 to continue this study.

Therefore, the presentation will not only focus on how to utilize such digital archives for educational purposes, but also how it can ensure fair and equitable access to educational opportunities under severe conditions. For instance, educational method that can also function under fatal pandemic will be required in up coming era. Thus, the social significance of this research will also be discussed, report practical research with high novelty that bridges various future education and digital technology.
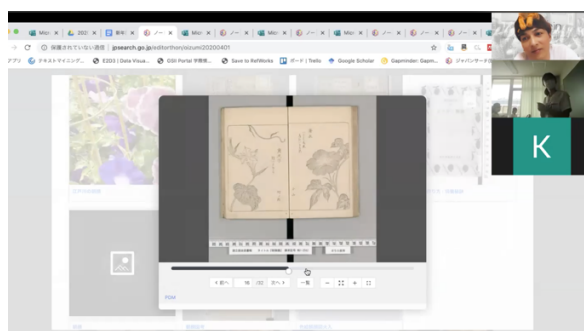

Fig. 1: Curation learning in face-to-face class

Fig. 2: Curation learning in online class

7   Bibliographic references

1 Illich, Ivan. (1977). "The deschooling society." (Azuma, Hiroshi., Ozawa, Syuuzou.). *Tokyo Sougensya*.

2 Suwa, Masaki., Fujii, Haruyuki. (2015). "*Chi no dezain Zibungototoshite kangaeyou.*" *Kindaikagakusya*.

3 Ueda, Yuta. (2013). "Consideration About the Need for Use of Archives in Education of the Information Literacy Education in High School." Records Management, No65, pp.100-108.

4 Nagai, Hiroshi. (2004). "The Significance of Archives of Social Studies Education." *Shakaika Kyouiku Kenkyu*, No.91, pp.34-40.

5 Yoshimine, Shigeki. (2007). "*Asia Rekeshi Shiryou Center to Koukou Rekishi Kyouiku.*" *Archives*, 27: 72-75.

6 Kitamura, Yorio. (2018). "Practical Research of Using Local Digital Visual Archives in Education: Possibilities and Problems." *Digital Archive Gakkaishi*, Vol.2, No.2, pp.83-86.

"Noh as Intermedia"/Intermedia Analyses of Noh Theater Plays

Takanori Fujita[1], Jarosław Kapuściński[2], François Rose[2], Scott Bailey[3], Peter Broadwell[4], Simon Wiles[4], and Glen Worthey[5]

[1]Kyoto City University of Arts
[2]Stanford University
[3]North Carolina State University Libraries
[4]Stanford University Libraries
[5]HathiTrust Research Center

The *Noh as Intermedia* project (noh.stanford.edu) uses web-based technologies for interactive annotation and visualization of performing arts materials to investigate and present how Noh theater exemplifies intermedia. "Intermedia" here is defined as a way of forming expression that draws on relationships between art forms (literature, vocal and instrumental music, stage movement, dance, masks, costumes, and props, in the case of Noh) and their cumulative impact.

To untangle some of the unique "coming together" of artistic media in Noh, the project site builds a multi-scale, "thick" analysis around high-resolution video recordings of live performances of two exemplary and contrasting Noh plays, both likely from the late 14th century CE: the feminine-centered "wig" play *Hashitomi*, with its evocations of poetry and scenes from *Genji monogatari*, and the miraculous "god" play *Kokaji*, which illustrates its tale of the forging of an enchanted sword with intricate layerings of dance, music and costumes. The site's examination of the two plays and the Noh genre itself moves from high-level essays describing the history and aesthetics of Noh to a middle-level set of interactive catalogs, descriptions, and image, video and audio examples presenting the varied and often highly systematized media elements that comprise a Noh performance. These include theatrical and dramatic forms at the macro and meso scales, poetic modes of declamation and singing, dance patterns and other gestures, instruments, rhythmic and melodic modes and musical forms, as well as costumes, masks, stage positioning and props.

Fig. 1: A faceted catalog of *shōdan* (formal sections of a play)

At the most finely detailed level, the project provides a novel playback and annotation environment that is synchronized at subsecond-level granularity with the streaming video playback, combining plot synopses, visualizations of formal sections, and synchronized libretto translations with a multilayered, multimedia score that encodes every sung or spoken word, musical element, and stage action. This score thus represents, for a specific performance, even the components of a play that are not traditionally notated, such as elements of the musical accompaniment. In an analogous manner, this entire mode of presentation has the effect of exposing, in an immediately engaging and comprehensible way, the myriad subtle details of a Noh performance whose interplay across media types lends the performances their extraordinary richness, yet which would otherwise likely go unremarked by those who are not already experts in the genre. The site's use of English as its primary language, providing transliterated romaji texts and translations whenever possible, furthers this pedagogic aim, complementing the rich lineage of Japanese-language Noh scholarship and contributing to the steadily growing body of analyses in other languages.
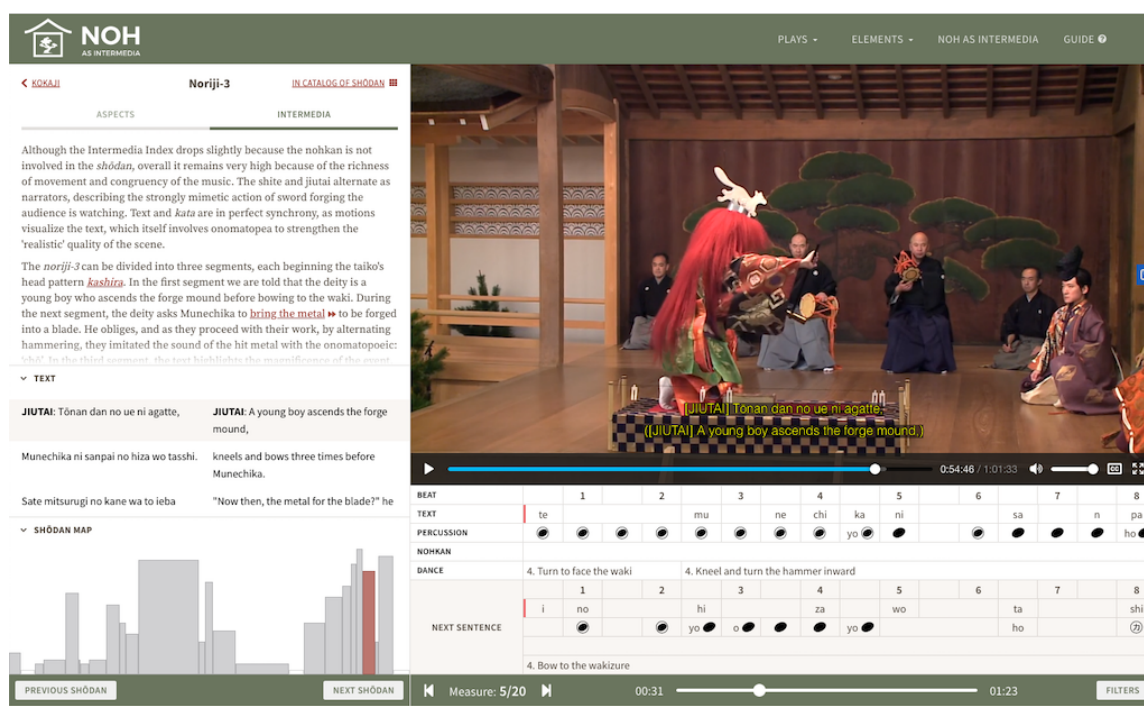
Fig. 2: The interactive playback environment, with synchronized score, text, formal map and description

The site also engages with the tensions between providing interactive, multimedia visualization and annotation features that are highly tailored to a specific performance genre (Noh, in this case) versus having the flexibility to accommodate other genres and art forms within the same framework. In this project, the investigators found that favoring the specific over the general provided the greatest degree of interpretive insight, but doing so consequently requires a greater effort to integrate other genres, particularly if these other forms are to be

presented at equivalent levels of coherence and clarity.

A primary analytical feature of the site and project is the explication of a ranking system for the *shōdan* (formal sections of a play) that assigns higher values to sections exhibiting greater intermediality. A section with poetic text, congruent music and dance receives a higher "index of intermedia" (IoI) ranking than a section with fewer such modes, and within each modality are further gradations, e.g., a section with rhythmically congruent chanting receives a higher IoI value than one that features unmetered speaking, due to the former's increased energy and use in moments of dramatic climax. While turning rich theatrical experience into numbers and graphs risks being reductive, it can be an informative abstraction for comparing the profile and flow of intermedia development between plays. The interactive visualizations on the site present these evaluations of intermediality by way of graphical *shōdan* "maps" or timelines of the performances in which a section's width corresponds to its relative duration and its height represents its intermediality ranking. Observing these visualizations in the context of the richly layered explicatory apparatus surrounding the live recordings facilitates a greater appreciation, for example, of how the macro-scale dramatic trajectory of *Hashitomi* utilizes a gradual accretion of interlinked media elements to build to a dramatic apotheosis, while *Kokaji* exhibits a greater ebb and flow between sections of high and low intermediality across its two acts. The interface explicitly seeks to hold together, and in dialectic, multiple presentations of a single originary phenomenon: the video, the timelines, the scores, etc., all as manifestations of the play, according to different modes/intentionalities. In this way, the interface itself could be seen as a form of intermedia presentation of the deeply intermedic art form of Noh.

1   References

Bethe, Monica, and Karen Brazell. *Dance in the Nō Theater*. Ithaca, N.Y.: China-Japan Program, Cornell University, 1982.

Chion, Michel. *L'audio-Vision: Son et Image Au Cinéma*. Nathan, 1990. Later translated as Chion, Michel, and Claudia Gorbman. *Audio-Vision: Sound on Screen*. Columbia University Press, 1994.

Cook, Nicholas. *Analysing Musical Multimedia*. Clarendon Press, 1998.

Hare, Thomas B. *Zeami's Style: The Noh Plays of Zeami Motokiyo*. Stanford, Calif: Stanford University Press, 1986.

Higgins, Dick with an appendix by Hannah Higgins. "Synesthesia and Intersenses: Intermedia." *Something Else Newsletter* 1. Something Else Press, 1966.

Japanese Performing Arts Research Consortium. "Nōgaku 能楽." https://jparc.online/nog

aku/, 2020.

Konparu, Kunio. *The Noh Theater: Principles and Perspectives*. Warren, Conn: Floating World, 2005.

Tamba, Akira. *The Musical Structure of Nō*. Tokyo: Tokai University Press, 1981. Originally Tamba, Akira. *La Structure Musicale Du Nô: Théâtre Traditionnel Japonais*. Paris: Klincksieck, 1974.

A fundamental study of effective visualization and description of longitudinal changes of classical Japanese poetic vocabulary

Hilofumi Yamamoto[1] and Bor Hodošček[2]

[1]Tokyo Institute of Technology
[2]Osaka University

The purpose of the current project is to report on the development of a system that visualizes the co-occurrence patterns of words in the Kokinshu (ca. 905). There are not many studies exploiting visualization technology for ancient languages, with researchers in many cases continuing to carefully analyze limited material through visual inspection. Within this context, the purpose of this study is the longitudinal analysis of ancient languages, and the development of an effective visualization system tailored to them. To that purpose, we will first prepare the vocabulary database of the ancient language, and then analyze the ancient language through a visualization providing a bird's-eye view of present classical vocabulary. Unlike modern languages, there is not a massive amount of ancient language data, and we must perform research within that limitation. In addition to that, considering that existing text expresses limited meaning and content, there are many differences between modern and ancient languages in the analyses. Uniformly solving the problem is not straightforward.

In this study, we limit the database to the Kokinshu, which is the first emperor-ordered anthology of Japanese classical poetry (ca. 905) consisting of 1,111 poems. We will use the poem texts and their contemporary language translations to examine whether the analytical process is proper and valid. Using poetry data, we will 1) calculate the similarity of each word, and 2) generate word relationship data between any two words (Mikolov et al. 2013). We have studied the extraction of relational pairs of 'orange,' 'plum,' and 'cherry' flowers in poetic Japanese (Hodošček and Yamamoto and, 2017). In this study, we statically generated 2-gram patterns of poem words without calculating each word's similarity in advance. In the present study, however, we perform an exhaustive investigation of related pairs rather than investigate particular words one at a time. We will examine the differences between calculating and not calculating the similarity of each word, and consider whether

it is possible to display dynamic word relationships without the thesaurus showing the vocabulary category explicitly.

We will apply the following procedure: first, the machine-learned processor evaluates the length of the appropriateness of the ancient language word; secondly, we will evaluate the classification of the meaning of poetic words; finally, according to the classification categories of poetic words, we will perform generation of co-occurrence patterns, and attempt to visualize. For determining the word units, we will set up the following four cases of co-occurrence patterns and examine if it is possible to generate the patterns according to the cases. I.e., 1) word pairs are adjacent, and a. the order is probabilistically constrained, b. the order is not probabilistically constrained; 2) word pairs are not adjacent, and a. the order is probabilistically constrained, b. the order is not probabilistically constrained.

An unsolved problem using machine learning for natural language processing tasks is that it cannot satisfactorily distinguish lexical similarity from lexical relevance. (Hill et al. 2015) As an example of the oftentimes disjoint relationship between lexical similarity and lexical relevance: 'plum' and 'cherry' are similar to each other, but there is no relevance between them other than that they are flowers. On the other hand, 'plum' and 'branch' are both associated as parts of plants, but are otherwise lexically dissimilar. If machine processing can separately recognize similarity and relevance, the modeling of vocabulary would be closer to a human experts, and that will contribute to the processing of classical vocabulary as well. The analysis and visualisation system will use the Kokinshu database of Nakamura et al. (1999) as the corpus.

The system of the present study is a working in progress, and the present paper will carry out the interim report. This work was supported by KAKENHI (18K00528), Grant-in-Aid for Scientific Research (C).

References

1. **Hill, F., Reichart, R., and Korhonen, A.** (2015). SimLex-999: Evaluating Semantic Models With (Genuine) Similarity Estimation. Computational Linguistics, 41(4), 665–695. https://doi.org/10.1162/COLI_a_00237
2. **Hodošček, Bor, and Hilofumi Yamamoto** (2017) A study on the extraction of relational pairs of 'orange,' 'plum,' and 'cherry' flowers in poetic Japanese. Symposium of Humanities and Computer, Proceedings of Humanities and Computer, Vol. 2017, No. 2, pp. 207–212, 12.
3. **Mikolov, Tomas, Kai Chen, Greg Corrado, and Jeffrey Dean** (2013) "Efficient Estimation of Word Representations in Vector Space" CoRR, URL: http://arxiv.org/abs/1301.3781

4. **Nakamura, Yasuo, Yoshihiko Tachikawa, and Mayuko Sugita** (1999) Kokubun-gaku kenkyu shiryokan detabesu koten korekushon "Nijuichidaishu" Shohoban-bon CD-ROM (Database Collection by National Institute of Japanese Literature "Ni-juichidaishu" the Shoho edition CD-ROM; Iwanami Shoten.

Analysis of difference between male and female facial expressions in Japanese picture scrolls using GM Method with IIIF Curation Platform

Chikahiko Suzuki[1,2], Akira Takagishi[3], Alexis Mermet[4,2], Asanobu Kitamoto[1,2], and Jun Homma[5]

[1]ROIS-DS Center for Open Data in the Humanities
[2]National Institute of Informatics
[3]University of Tokyo
[4]L'Ecole polytechnique fédérale de Lausanne
[5]FLX Style

1   Introduction

The purpose of the paper is to analyze the difference of facial expressions between male and female in picture scrolls created by multiple painters in the middle ages of Japan (13th to 16th centuries), and to clarify the production situation.

Fig. 1: Gender with different codes (left) and same codes (right).

In the Japanese picture scrolls of that time, male and female are drawn differently by combining codes. For example, warriors (武士) and nobles (貴族) are distinguished between

gender by codes such as clothes and hairstyles. However, the monks (僧侶) and nuns (尼僧) are ambiguous because they have basically same codes (Fig1). Hence monks and nuns can only be distinguished by facial expressions.

Analysis of facial expressions is also important to restore the original works. Because many manuscripts were copied in the Middle Ages of Japan. Research questions, such as the individuality of the characters in the original works, can be answered by examining facial expressions in the copied manuscripts.

To analyze the multiple facial expressions, the following way has been traditionally used. First, place a labeled photo that capture all or part of art works on a large table. Second, rearrange photos for comparison and grouping. We call this method "GM method". We show that digital technology, such as IIIF Curation Platform (ICP) (Kitamoto et al., 2018) and the machine learning with KaoKore Dataset (Tian et al., 2020), greatly enhances the usefulness and potential of the GM method.

The name GM method comes from the Italian art historian Giovanni Morelli (1816-1891) who is the founder of the style comparative study of art history with special attention to details of art works. GM also stands for Gazing Microcontents to take advantage of fragmented content (micro-content) for research (Suzuki and Kitamoto, 2019).

2   Materials

The target of this paper is one copy of *Yugyo Shounin Engi-Emaki, "Shojo-Kouji Kouhon"* 遊行上人縁起絵巻 清浄光寺 甲本 (*Kouhon*) archived in *Shojo-Kouji Temple*. The original and lost version of *Yugyo Shounin Engi-Emaki* is a 10-volume picture scroll depicting the establishment of the *Jishu* 時宗 sect of Buddhism in the *Kamakura* period (12th to 14th). *Yugyo Shounin Engi-Emaki* was copied many times during the early 14th and 17th centuries. According to previous research, multiple painters shared the work of *Kouhon* and modern and classical styles are mixed (Takagishi, 2020).

We have a particular interest in *Yugyo Shounin Engi-Emaki* in the context of the *Jishu* sect. In the Middle Ages, *Jishu* has been criticized for mixing different genders, namely monks and nuns, in the same group. Therefore, in the every copy of *Yugyo Shounin Engi-Emaki*, monks and nuns are drawn on the same scene, but are arranged in two separate groups with clear signs such as *Juuni-Kou-Bako* 十二光筥 to claim that *Jishu* is a disciplined sect (Fig2). These signs allow us to distinguish monks and nuns having the same code.

Kouhon has 28 scenes where separated monks and nuns are drawn. According to previous research, these scenes were drawn by painter A and B (both names are unknown) (Iwase, 1989). By focusing on difference between painter A and B in terms of facial expressions of

Fig. 2: Two groups with Juuni-Kou-Bako (three-colored lid box in the center).

monks and nuns, these scenes allow us to analyze how *Kouhon* was copied from the lost original work.

3   Results

The GM method with ICP consists of two steps. Frist, we used ICP to create curations for all facial expressions in *Kouhon*. At this step, we have two tasks, 1) to draw rectangles surrounding each facial expression, 2) to add basic metadata (gender, status, direction, source) of facial expressions. These two tasks should be performed by human experts, but the first task could be done faster using a machine learning-based face detector. The effect of machine learning for reduction of annotation time is discussed in another paper (Mermet et al., 2020).

Second, we analyzed 579 facial expressions appeared in the 28 scenes. At this step, we used the IIIF Curation Board (ICBoard). ICBoard shows an element of a curation like a card placed on a flat mat, which can be moved or arranged. ICBoard has many functions to help the GM method such as grouping mats and color-coded stickers.

By rearranging 579 facial expression, difference in drawing style of two painters became clear. Painter A draws a unique facial expression in deep colors. Both genders are drawn similar. The outlines of both monks and nuns have smooth curves. The variation within same gender is small. Painter B draws in light colors, the differences between genders are apparent. The outlines of the monks are rugged, while the nuns are smooth. The variation within gender is large, such as the hair shaving marks (Fig3).

Fig. 3: Facial Expression by painter A (above) and painter B (below). Marked: Red = Painter A, Blue = Painter B, Yellow = Monk

This result suggests different attitude of two painters on copying the lost original scroll. Although Painter A copied of the original composition, added his unique style. On the other hand, painter B draw different facial expressions between monks and nuns because he tried to faithfully copy the original works. We argue that monks and nuns might have been individually identified in the original picture scroll as illustrated by painter B.

4   Discussion

Using the GM method with digital technology, a large number of facial expressions were smoothly analyzed. Analysis of this scale, such as 500 photos, has been hard for real photos but the digital method using ICP allows us to embark on a comprehensive analysis of facial expressions. In addition, the GM method can be more powerful using machine learning such as object detection and classification algorithms.

Our results support the previous study that *Kouhon* was created by multiple painters. Furthermore, this result brings about a new research question as follows. Similar facial expressions appear in different scenes by painter B. If painter B faithfully copied the characters in the original, these similar characters have been intentionally drawn in the lost original picture scroll as the important person. This is an important both for art history and *Jishu* sect.

5   Acknowledgments

We thank the *Shojo-Kouji* Temple and *Yugyoji* Museum for allowing us to use images for this research.

References

Kitamoto, A., Homma, J. and Saier, T. (2018) "IIIF Curation Platform: Next Generation IIIF Open Platform Supporting User-Driven Image Sharing." *Jinmoncom Symposyum 2018* : 327-334.

Tian, Y., Suzuki, C., Clanuwat, T., Bober-Irizar, M., Lamb, A., and Kitamoto, A. (2020). "KaoKore: A Pre-modern Japanese Art Facial Expression Dataset." arXiv: 2002.08595.

Suzuki, C., and Kitamoto, A. (2019). "Using Pre-Modern Japanese Book 江戸買物独案内 as Microcontents for Reconstruction the City of Edo." *Jinmoncom Symposyum 2019* : 11-18.

Takagishi, A. (2020). *Reflections on medieval Yamato-e.* Tokyo: Yoshikawa-koubunkan.

Iwase, H. (1989). "Yugyo-Shonin-Engi-Emaki; Seijoko-Ji-Bon ni tsuite." *Ars buddhica* (185): p51-59

Mermet, A., Kitamoto, A., Suzuki, C. and Takagishi, A. (2020). "Automated Face Detection for Pre-modern Japanese Artworks using Deep Neural Networks." *JADH2020* (in press)

IIIF Curation Board http://codh.rois.ac.jp/software/iiif-curation-board/

JADH2020ワークショップ
人文系大学院における情報リテラシーの在り方

Workshop on The State of Digital Literacy in Japanese Humanities Graduate Programs

2020年11月20日
オンライン開催

時間	セッション
10:30−	開会
10:40−11:10	大阪大学のDH大学院教育の現状報告（田畑智司、黒田絢香、ホドシチェク ボル）
11:10−11:40	東京大学のDH大学院教育の現状報告（大向一輝、永崎研宣）
11:40−12:00	千葉大学のDH卓越大学院プログラムの現状報告（小風尚樹）
12:00−13:00	休憩・質問受け付け（Gフォームで）
13:00−14:00	ディスカッション（ディスカッサント：下田正弘（東京大学）、今林修（広島大学））
14:00−	終了・以後，懇親会