When the Tech Kids are Running Too Fast : Data Visualisation Through the Lens of Art History Research

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Abstract—The recent years have seen a rise in humanities interest for digital data analysis tools, including data visualization. However in the field of art history, major resistance to, and distrust of digital tools are still prevalent. Through collaboration and discussion with art historians, we identified the unique perspective of digital art historians, the specific nature of data handled in the field, and the culture behind such a wide-spread reticence. In this paper, we introduce this perspective to the growing discussion around the collaboration between the fields of data visualization and digital humanities. We also suggest principles for digital tools that better cater to the needs of art history researchers, and ways for art historians to foster a culture that is more open to digital tools.

Index Terms—Data visualization, Digital humanities, Art history, Digital art history

1 Introduction

In recent years, digital tools have been slowly but surely gaining traction in several humanities fields [6]. While still being an emerging field, digital humanities aim at providing technical support to humanities research by helping researchers gain new perspectives through allowing the tackling of larger data sets, offering synthetic representations of information, or providing faster ways to accomplish similar results. In the specific field of art history, the efforts to introduce digital tools have not been too fruitful yet [15].

In the analysis of a survey [14] conducted in 2011 of the art history community perception of digital research, Zorich describes the cultural barriers to digital art history as follows [15]:

> "Art history is widely seen as a solitary endeavor whose participants are drawn to the contemplative nature of their research. Collaboration is relatively rare, and there is little sense that one needs to cross over into other disciplinary frameworks in order to pursue scholarly inquiry. Art historians also are described as perfectionists, a trait that serves them well in the discipline, but is at odds with the nature of digital research, where nimbleness being able to work quickly to release research in preliminary and iterative stages is vitally important. Finally, the discipline is seen as overly conservative, operating under a century-old, risk-averse model. For those who are vested in this model, digital art history threatens their operational paradigm, requiring new training, methodologies, and modes for communicating and distributing research that changes the practice of art history as it is now conducted."

A few years later, the tools introduced for art historians have not been able to bridge the acceptance moat surrounding the practice of art history research.

Recently, increasingly more researchers are looking into analysing and improving the collaboration between visualization and humanities [13] [5] [9]. To this growing debate, we want to contribute the lessons we learned from a year-long collaborative project designing and building a visualization tool in an art history context. Throughout our collaboration with art history professors and students, we have identified some of the characteristics of art history research that have often been overlooked when developing new tools and systems for the field.

In this paper, we describe the specificity of the data analysis approach in art history. We also put forward principles visualization designers can use to develop more adapted tools for digital art history research. Our goal is to encourage more mindfully developed tools for art historians to be better equipped in their daily tasks, while fostering a sense of trust and collaboration between the fields.

2 Project Background

This paper describes conclusions from collaborative work between human-computer interaction researchers and art historians through project Cornelia[1]. The project is aimed at building better tools to support art history research, while building on the concept of "slow digital art history" [4]. This approach aims at overcoming the reticence for digital tools existing in the art history field by proposing a research methodology where digital tools do not replace traditional research, but accompany and support it. Indeed, the "fast" aspect of digital tools doesn't need to equate new research methodologies, techniques, and vocabularies. Digital art history can cohabit with researchers' time-tested methods, and provide support for menial data archival and retrieval tasks, as well as potentially more complex ones, through databases and adapted visualizations tools.

In project Cornelia, a hybrid team of computer scientists and art historians collaborate to build a database of historical players, as well as a network visualization tool to represent the interlinks among studied members. One of the resulting visualizations is presented in Figure 1, and shows a genealogical tree augmented with time-dependence and extra-familial links. This visualization is to be included in a database exploration tool as visual support of the familial and community-related information existing about each person. If at first sight, the tool looks like an analog and minimalist family tree, it is for a good reason. Indeed, we understood quite early how skepticism around digital tools and culture impeded most tools designed for art historians to be accepted and effectively used as part of the research process. We therefore toyed with a few different prototypes first, before focusing our efforts on a design that was seemingly close to traditional representations, while packing extra features that only appear upon interaction (these can be seen in the live version of the tool online in the project Cornelia website). Figure 1 shows the pre-interaction state of the tool.

Through the experience of designing and creating this visualization tool for the project, we had the opportunity to collaborate with professors and doctorate students in art history, and hear their feedback and perspective on the place of digital tools - including visualization - on contemporary art history research. The following arguments stem from

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[1] https://www.projectcornelia.be/

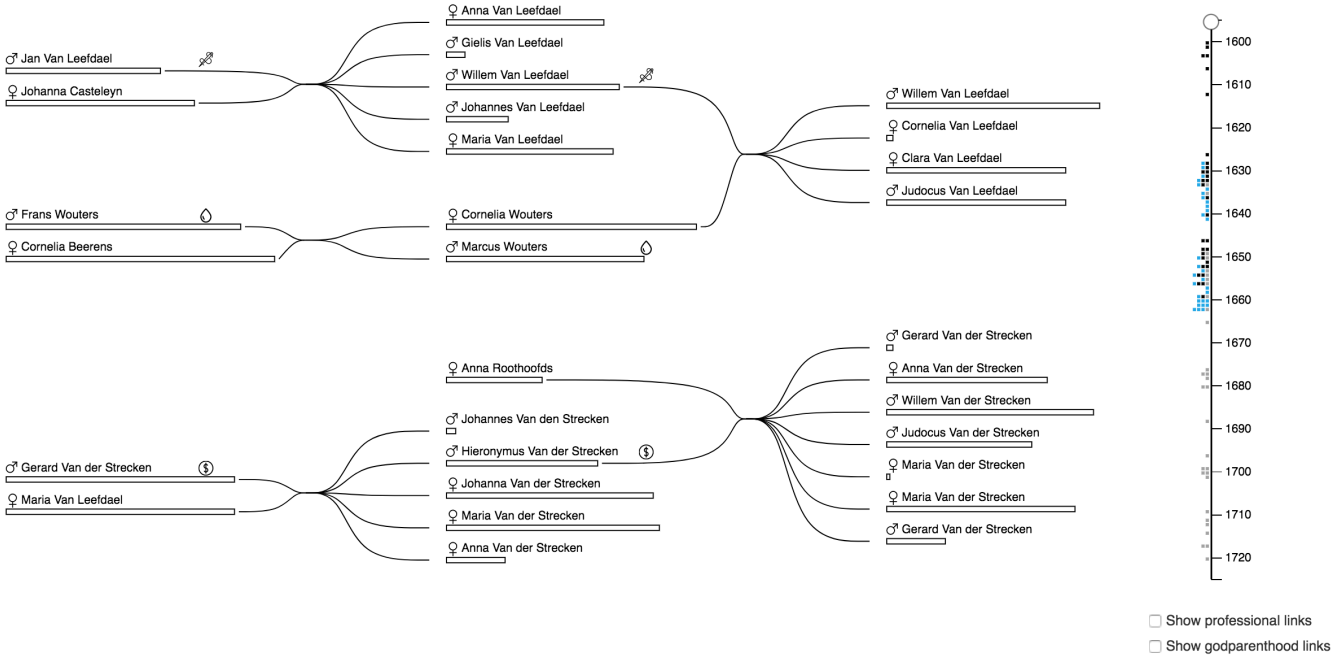

Fig. 1. Main visualization before interaction.

discussions, interviews and accounts from art history researchers, as well as a look at the literature produced on the topic.

3 Data analysis approach in art history

The data analysis approach followed in the field of art history is different from what we in the STEM field are generally used to, and must therefore be taken into consideration when designing for the field. From our discussions with art history experts, we extract some characteristics about the type of data and contributions that art history is built around.

3.1 Data sources

Rather than numbers and statistical data, much of the data analyzed by art historians is the artworks themselves. The core of what can be seen as data are the paintings, tapestries, sculptures etc. that are being studied. The nature of such media make data analysis obey different rules than the mathematical and statistical analyses that may characterize other fields. The artworks are then complemented by external documents and archives tracing the lives and connections of artists. While the artwork can therefore be viewed as a visualization of information, said resources (e.g. archival documents, books) provide the essential context for their analysis. These resources also have specific characteristics distinguishing them from what we commonly view as metadata.

3.2 Field Characteristics

- **Rich interpretable data.**

  Artworks are often the elements that trigger reflection, rather than contain answers. While common data visualizations present the user with synthesized views of data and answers to research questions, a painting will most often be the starting point for contemplation. It will therefore inform the search for meanings, details, intentions, and focal points. Artworks therefore pose questions instead of answering them.

- **Subjective contributions.**

  Artwork analysis is filled with subjectivity. The contribution of an art historian will therefore often consist in making a claim denoting a unique perspective. This perspective is usually gained through meticulous reading of archival documents, coupled with in-depth artwork analysis. Contributions are therefore often based on putting in evidence previously unexplored nuances. In this context, the use of aggregates, statistics and data-crunching algorithms by computer scientists is viewed as an approach where the reflection and the nuance disappear in the face of the data [14]. Making the analogy with the concept of "distant reading" in literature, Bishop also notes the loss of "singular genius" when literature is viewed "as an integrated system of global publishing" [3]. In the field of art history, graphs can therefore be viewed as too strict, mathematical and closed to interpretation.

- **Sparse finite datasets.**

  In more technical fields, technical advancements have allowed researchers to tackle big datasets, and draw conclusions based on large scales of information. However, in the world of art history, it is common for a researcher to focus on a very small number of players for years at a time. Within that scope, finite resources and archives mean the need to delve in smaller quantities of data. Narratives are therefore built based on few data points, and are often more suggestive in nature. Moreover, missing data comes as no surprise. The archival resources needed to provide context for works of art are often few and far between, for various social, economic, and geopolitical reasons. In project Cornelia database for instance, several instances exist where large chunks of archival documents (from a particular borough, or time period) are non-existent, because they were not preserved, or because they were destroyed during war times. Missing data is therefore an integral attribute of the dataset. It can even be beneficial as it provides researchers with pointers to potential key persons, dates, works that could complete the story.

- **Internal debate.**

  A further objection from the art history field to digital methods is part of a global humanities resistance to what is considered a move to a neo-liberal consumption-driven view of research. For Grusin, the funding of digital humanities as a whole can be seen as a "manifestation of cutbacks in public funding for higher education" [8]. In her article "Against Digital Art History",

Bishop invokes the same idea, noting that digital art history is a "subordination of human activity to metric evaluation". She links the flourishing of digital humanities to an approach aiming at making the humanities produce "useful" output [3]. Indeed, as Adema & Hall rephrase, while presenting Grusin's work, the result is that "instead of feminist, queer, and other forms of theory, the emphasis within digital humanities is on more productive and marketable skills" [2]. This attempt to make digital humanists work in measurable, productive, quantifiable terms are themselves explained as being directly linked to the neoliberalization and corporatization of the academy [8].

4 Thinking Data Visualization for Art History

While technical advances mean art history researchers could be much better supported in their data retrieval and analysis, we can observe resistance from traditional researchers to the field of digital humanities [6]. A few arguments can often be heard against the practice of digital art history, such as the fact that "paintings are the only images needed", to dismiss the need for visualizations of data, graphs, and other visual aids for art history research. Another commonly held stance is that "The tech people are running too fast". Indeed, a focus on technological advances and big data representations have left art historians feeling that digital humanities researchers are going at a high speed as far as technical advances, without that translating into a better addressing of their specific needs. This standpoint is an alarming one as far as collaboration between the fields of digital humanities and art history, as it communicates a breached trust, and the belief that software designers do not have their best interest at heart. If we can convince art historians that we are willing to produce work at the service of art history, we may be able to address this resistance.

With that in mind, we put forward principles of data visualization designed for art history research. These are derived from our research on developing network visualizations for art historians [11], briefly presented in Section 2.

- **Applying user-centered design**

  Research has shown that interest for digital tools is still on the low side for humanists. In the recent years, low usability has been pointed as an obstacle even for the users who showed interest in the field [7] [11]. Following user-centered design principles could be a possible solution to this. User-centered design is defined as an approach which pursues the active involvement of users at every stage of the design process [10] [12]. Whether through usability testing, idea generation, or in-situ observations, involving users has been found to "assure that the product will be suitable for its intended purpose in the environment in which it will be used" [1]. Viewing art historians as users whose needs must be centered in the design of digital tools could be a first step in ensuring their acceptance. Similarly, investing in usability, user trust and acceptance and supporting user work-flows rather than presenting innovative - but disconnected - tools could correct the view of historians that the field of digital humanities is "running too fast", and is not built with their needs as a goal.

- **Immersion in art history culture**

  The same way that a data visualization tool developed for theoretical physics researchers will not be able to translate to the needs of medical doctors, tools built for linguistics researchers for instance will not do for political scientists. Although often lumped up as a single concept, digital humanities do not refer to a homogeneous vocabulary, practice or culture. Researchers in data visualization who are building digital humanities tools must learn to view each field in its complexity, appreciate its culture, vocabulary and agenda, in order to better address the needs of its researchers. The challenges that art history researchers face are unique to them. Effective visualizations will therefore be the ones that are tailored specifically for their culture, data and work-flow.

- **Focusing on sources of information**

  The focus on veracity of sources is primordial in the field of art history. Distrust of any presented information before accessing its provenance is indeed essential to the practice of history research. This becomes even more critical when we factor in the initial distrust from researchers of art history in digital data analysis tools. Presenting sources of information in clear, verifiable manners is therefore decisive to building trustworthy tools.

- **Centering the artwork**

  As described in Section 3.1, the main source of information in art history research remain the artwork itself. For that reason, developed visualizations should have a way to go back to the artwork representation.

- **Designing for aesthetic experience**

  Aesthetic experience is critical for an audience of art history experts. When we first started collaborating in this project, one of our partners had to apologize before partly explaining the disinterest from art historians for digitals tools being due to software tools being "ugly". However, if we keep in mind the academic and personal manner with which art historians experience aesthetics, this becomes self-evident. Attracting more interest in the art history community therefore also means putting aside the aesthetic standards used in the software world to propose visualizations users will be satisfied to engage with.

In the end, while digital humanities tools are often overlooked in tech research because they do not necessarily present technological advances, data visualization as a field is comprised of much more than computational challenges. For an art history audience, the obstacles of acceptance and actual use raise questions of visualization that are far from answered. Designing visualizations that cater to data missingness, specific aesthetic expectations and complex use-cases presents challenges that the visualization field needs to face as well. In return, a larger acceptance of digital humanities for data visualization researchers means a wider reach for our field, in a world that has been tough to enter. Data visualization has everything to gain from including wider varieties of domains and challenges to its practice.

5 Preparing Art History for Data Visualization

While data visualization researchers should be mindful of art history research specificities, there are steps to be taken within the art history community itself to build a culture where digital tools are sought and appreciated. We suggest three main directions for these.

- **Introducing data visualization to humanities students**

  The lack of technological savvy, as well as a lack of understanding of the *potential* of the digital world, were identified by Zorich as some of the concrete barriers to digital research [14]. While some programs include information visualization modules and classes, we suggest that rather than being taught aside as a separate field, data visualization and digital tools should be integrated in the study of humanities. This would be a first step in training the next generation of art historians to see data visualizations, and digital tools in general, being used and integrated in a research practice. Moreover, we believe that that would equip more art historians to be in the cockpit of future tools that better address their needs.

- **Investing in community building**

  Mutual trust should be established between the fields of data visualization and art history if we aim for the field of digital art history to advance. Within teams, this means setting up visits and co-working spirit to help both sides familiarize with each others' worlds. Building trust and familiarity in one another's work can make designers and historians alike more open to communicating specific needs, voicing discontent, and identifying opportunities for growth.

- **Pushing for slow digital art history**

  Digital tool usage in art history can be preceded by the mindful research processes researchers are used to. The speed of processes allowed by new technologies does not require the full redesign of research style, or the necessary breaking up with working methods. Adopting a slow digital art history methodology can communicate to tool designers that the goal isn't necessarily mathematical precision and speed, but the setting up of software that can support the existing tasks of researchers, at the rhythm that they think is best.

6 Conclusion

In this paper, we presented the particular perspective of the stakes and the obstacles standing before the practice of digital art history. We proposed principles for the design of visualization tools, as well as steps that art history researchers can take for strengthening the collaboration between the fields.

Digital art history is an interesting way for us visualization designers to experiment, innovate and practice research. However, the processes we intervene in belong in art history. It is therefore on all of us to invest in building tools that can make researcher easier for art historians, and rebuild trust and curiosity in digital tools.

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References

[1] C. Abras, D. Maloney-Krichmar, and J. Preece. User-centered design. *Bainbridge, W. Encyclopedia of Human-Computer Interaction. Thousand Oaks: Sage Publications*, 37(4):445–456, 2004.

[2] J. Adema and G. Hall. Posthumanities: The dark side of'the dark side of the digital'. *Journal of Electronic Publishing*, 19(2), 2016.

[3] C. Bishop. Against digital art history. *International Journal for Digital Art History*, (3).

[4] K. Brosens, K. Alen, A. Slegten, and F. Truyen. Maptap and cornelia slow digital art history and formal art historical social network research. *Zeitschrift für Kunstgeschichte*, 79(3):315–330, 2016.

[5] M. El-Assady, V. Gold, M. John, T. Ertl, and D. Keim. Visual text analytics in context of digital humanities. *Work. Vis. Digit. Humanit. as part IEEE VIS*, pp. 1–10, 2016.

[6] B. Frischer, J. Unsworth, A. Dwyer, A. Jones, L. Lancaster, G. Rockwell, R. Rosenzweig, and S. Wells. Summit on digital tools for the humanities: Report on summit accomplishments. *Charlottesville, VA*, 23, 2006.

[7] F. Gibbs and T. Owens. Building better digital humanities tools. *DH Quarterly*, 6(2), 2012.

[8] R. Grusin. The dark side of digital humanities: Dispatches from two recent mla conventions. *differences*, 25(1):79–92, 2014.

[9] U. Hinrichs, M. El-Assady, A. J. Bradely, S. Forlini, and C. Collins. Risk the drift! stretching disciplinary boundaries through critical collaborations between the humanities and visualization. 2017.

[10] Z. E. H. Kahraman. Using user-centered design approach in course design. *Procedia-Social and Behavioral Sciences*, 2(2):2071–2076, 2010.

[11] H. Lamqaddam, K. Brosens, J. Aerts, and K. Verbert. Nahr: A visual representation of social networks as support for art history research. In *Proceedings of the 10th NordiCHI Conference*. ACM, In press.

[12] S. S. V. Mallin and H. G. de Carvalho. Assistive technology and user-centered design: Emotion as element for innovation. *Procedia Manufacturing*, 3:5570–5578, 2015.

[13] S. Simon, S. Mittelstdt, D. A. Keim, and M. Sedlmair. Bridging the gap of domain and visualization experts with a liaison. In E. Bertini, ed., *Eurographics Conference on Visualization (EuroVis) : Short Papers*, pp. 127–131. The Eurographics Association, 2015. doi: 10.2312/eurovisshort.20151137

[14] D. M. Zorich. *Transitioning to a Digital World: Art History, Its Research Centers, and Digital Scholarship*. Diane M. Zorich, 2012.

[15] D. M. Zorich. Digital art history: a community assessment. *Visual Resources*, 29(1-2):14–21, 2013.