Visualization and the Humanities: Towards a Shared Research Agenda

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──── **Abstract** ────

This report documents the program and the outcomes of Dagstuhl Seminar 23381 *"Visualization and the Humanities: Towards a Shared Research Agenda"*. The seminar was motivated by the fact that visualization has become a vital element in (digital) humanist research practices recently, while the value and impact of research at the intersection of visualization and the humanities is still widely debated and frequently contested from both sides. Visualization scholars critique the service-oriented focus on visualization as a tool to facilitate humanist research, which hampers the discovery of complementary and mutually enriching research perspectives for all fields involved. At the same time, humanists warn of visualizations' roots in the quantitative sciences which introduce non-trivial shifts in the topology of knowledge-power, creating epistemic, political, ethical, pedagogical, and cultural tensions. Building on advances in this young and highly interdisciplinary research area, the seminar discussed how to leverage synergies and how to build productively on tensions between methodologies at the intersection of visualization and (digital) humanities fields that span a vast spectrum of research philosophies and methods. The seminar thus brought together researchers and practitioners from the fields of visualization, computer science, the humanities, and design to reflect on existing research methods within visualization and the humanities, to identify tensions and synergies between the different fields, and to develop concrete avenues that address and leverage these.

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1   Executive Summary

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Large-scale digitization initiatives of cultural materials have fueled an interest in both computer science and humanist research fields to develop advanced computational methods specifically tailored to humanities research. In this context, recent years have seen a particular excitement around visualization (VIS) as a method to facilitate humanist research practices, visible in a wave of surveys and reflections from both humanist and visualization perspectives (Benito-Santos, 2020; Bradley, 2018; Drucker, 2020; Hinrichs, 2019; Jänicke, 2017; Windhager, 2018).

From a digital humanities' (DH) perspective, visualization appears as a fascinating option to make sense of cultural collections and subject matters at a large scale. Visualization has the potential to complement traditional humanities (TH) research approaches that typically focus on the in-depth interpretation of selected cultural materials. From the perspective of visualization researchers, the humanities provide a unique application domain for designing and studying the impact of visualization tools and related sense-making processes. Maybe more importantly, however, the humanities stimulate methodological and conceptual innovation in the visualization field, by formulating novel demands on visualization while criticizing standard visualization approaches that have their roots in the sciences. However, conceptualizing and conducting impactful research that mutually benefits and fuels all fields involved in this highly interdisciplinary area is an enormous challenge. Visualization scholars depend on humanities experts to adapt and tailor technologies for a complex and critical application field, but they also suffer from a dominant unidirectional focus on visualization 'as a service', which hampers the development of novel, complementary and mutually enriching research perspectives (Hinrichs, 2019). At the same time, many humanists warn of visualizations' roots in the quantitative sciences which disrupts traditional humanist methods of knowledge generation and discourse and introduces non-trivial shifts in existing topologies of knowledge-power, creating epistemic, political, ethical, pedagogical, and cultural tensions (Allington, 2016; D'Ignazio, 2020; Marche, 2012); scholars have warned of intellectual *Trojan horses* (Drucker, 2011), the *curse of counting* (Da, 2019), and *unhappy neighborhoods* (Correll, 2019).

Visualization and the humanities, indeed, seem to subscribe to fundamentally different research philosophies, approaches and methods. There is also a lack of explication and understanding of what characterizes methodologies across the fields and how to manage the complex mixture of methodological similarities and disparities. This not only challenges research collaborations at the intersection of visualization and the humanities and complicates the identification of core foundations and methods to teach, but also hampers the formulation of research outcomes and a shared research agenda to drive forward future interdisciplinary initiatives in this area. In order to unleash and direct synergies inherent in transdisciplinary research and teaching across the humanities and visualization we need to share, converse and reflect on each others' research approaches, methods and processes and how these impact and shape research at the intersection of the humanities and visualization. Along these lines, this Dagstuhl Seminar aimed at addressing three main questions and related challenges:

- **DH⇒VIS: How do humanistic approaches impact visualization research and practice?**

- **VIS⇒DH: How does visualization impact knowledge production in the humanities?**

- **DH⇔VIS: Leveraging synergies between the fields, what could a shared research agenda look like?**

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3 From Motivation to Realization

Directly building upon and advancing related ongoing discussions in visualization and the humanities, this Dagstuhl Seminar brought together researchers and practitioners from the fields of visualization, computer science, the humanities, and design with the goal of outlining and concretizing methodological synergies to fuel novel research that has an impact on all research fields involved. In particular, the aims of the seminar were to:

- Reflect on existing research methods within visualization and the humanities,
- Identify tensions and synergies between the different fields, and
- Develop concrete avenues that address and leverage these.

By the end of the seminar, these goals had been achieved by supporting active and projected ongoing work in these areas:

1. Community building within the interdisciplinary group in order to sustain future research;
2. Formation of subgroups to support exchange of information and sustain collaboration;
3. Creating specific outputs for publication and resource building;
4. Targeting projects and activities for short and longer-term research activity.

Seminar Structure & Activities

The seminar was structured into 4 parts and related activities: a *pre-seminar reflection*, an *icebreaker* activity, a *topic brainstorming* activity, *input talks* along the three highlighted questions above, and corresponding *breakout sessions* in working groups and cross-cutting *plenum discussions*.

Pre-seminar Reflection.   In order to get participants thinking about the seminar's topic and challenges, we invited them a few weeks prior to identify and characterize research methods/theories/approaches that they felt were relevant to the fields of visualization and the humanities. We facilitated this reflection activity in the form of a brief survey that invited participants to explore the following prompts:

- Choose and name one method/theory/approach that you find relevant for knowledge production in the area of your expertise.
- Do you think this method/theory/approach belongs to a certain or multiple field(s) or area(s)? If so, please specify.
- What are the key characteristics of this method/theory/approach?
- Why do you deem the method/theory/approach as interesting? How have you used it? Why does it have promise?
- How well is knowledge – developed using this approach – received? How reliably is it judged?
- How are successes and failures of applying this method/theory/approach characterized?
- What is the relation of this method/theory/approach to the humanities (if any)?
- What is the relation of this method/theory/approach to visualization (if any)?
- How does this method/theory/approach create or leverage synergies between visualization and the humanities (if at all)?
- Please add any references below that illustrate the method/theory/approach and its application.

The idea of this survey was to help establish a common understanding of relevant concepts – and to discuss inter-method relations on that basis. Participants submitted over 20 approaches that ranged from quantitative and qualitative methods for data analysis, theories, as well as practical design methods. These formed a valuable basis for break-out group discussions (see, for example, the summary of the *Theories & Methods* working group).

Icebreaker Activity.   One of the challenges we anticipated for the seminar was to connect researchers and practitioners from quite diverse fields and to create an environment that would enable participants to engage in in-depth, sometimes controversial, yet productive discussions. In order to address this, one of the first seminar activities consisted of an icebreaker activity which, initially developed by Tatiana Losev[1], invited participants to create a sketch using pencils and paper reflecting on the following prompt:
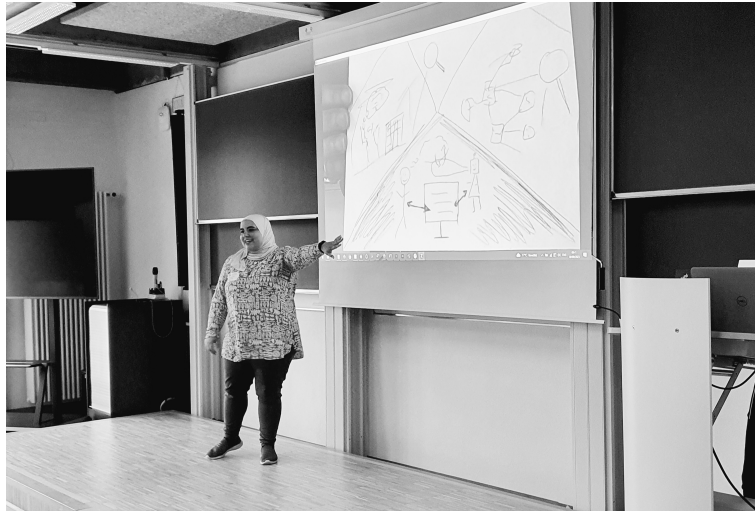
How do I see myself in relation to the seminar topic: "Visualization and the Humanities: Towards a Shared Research Agenda"

Rather than using pre-fabricated slides to introduce themselves, participants introduced themselves through their sketches (see figure below). This activity already revealed the many different perspectives participants brought to the seminar topics as well as a remarkable diversity of possible representation approaches – some playful, some practical, some more abstract.

Topic Brainstorming.   The icebreaker activity was followed by a topic brainstorming that invited participants to identify topics, questions, challenges, gaps, barriers and activities that they would like to see being discussed during the seminar. This activity followed a traditional "collection & clustering" approach where topics were first gathered in the form of sticky notes and then collectively clustered by theme, again, roughly following the three perspectives VIS⇒DH, DH⇒VIS, and synergies between VISDH⇔DH. These topic clusters, along with the input talks, formed the basis for discussions in break-out groups (for an overview of selected topics discussed, see the summary of working groups).

Input Talks.   Throughout the seminar we had three sessions of semi-formal input talks that were roughly structured by perspective (VIS⇒DH, DH⇒VIS, and synergies between DH⇔VIS) and that focused on topics central to the shared research agenda: visualization, ethics, methods in the humanities, pedagogical concerns, and intersections of epistemic, political and cultural tensions in visualization as it intersects with the humanities. These input sessions provoked lively and constructive discussion that, in turn, fed into the break-out sessions. An overview of the input talks can be found in the **Overview of Talks** section of this report.

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[1] `https://www.tatianalosev.com/`

Break-out Sessions.   The themes for these sessions were generated in the topic brainstorming mentioned above through use of clustered post-its and synthesis of questions and topics they contained. Break-out groups ranged in size and were flexible, so participants could move among them. An overview of topics discussed in break-out groups can be found in the **Working Groups** section of this report.

Plenum Discussions.   These were essential conversations that involved all seminar participants and allowed consensus and agenda-setting to emerge from conversations.

Energies never flagged in the course of the week, and sub-group conversations and research interests continued to form through the meal-time and coffee-break exchanges, as well as in the after-hours lounge. One evening was used to take up a prompt from one of the break-out groups and do a drawing exercise with volunteer participants (see *Vis in the Humanities & Encodings (output session)*. Two-thirds of the seminar attendees engaged in the activity, with positive results that may become the foundation of a publication analyzing the potential for innovation in the outcomes.

Methods and Platforms

Several tools and platforms were used before, during, and after the seminar to provide shared resources, real-time responses and dialogue, as well as record-keeping. These included:

- **Miro Board** for sharing materials: This was perhaps the least used of these platforms.
- **Joint Note-taking** in Google Drive: This was highly used and useful in real time and for creating a record of presentations, and equally important, responses and discussions.
- **Discord Channel:** Supports lively, ongoing real-time exchanges, as a way to keep sub-groups in touch and the Seminar's conversation going.
- **Google Drive:** Proved to be invaluable for collecting inputs, reports, abstracts, and other materials useful as a record of the seminar and also as a resource for future work.

Reflections on the Planning Process

The planning process unfolded over an almost three-year period, with several iterations resulting in a successful proposal. The five coordinators (including Jason Dykes who was unable to attend the seminar) met regularly on Zoom to define the motivation, methods, structure, schedule, and potential participants. The combination of expertise and variety of professional networks was reflected in the highly interdisciplinary composition of the seminar participants. No recommendations for changes in this process seem necessary, though an account of the roles and responsibilities, even tasks that need attention at different points in the planning timeline, might assist future organizers in being sure that there is an even distribution of the workload. Our group functioned extremely well in this regard.

Outline of Outcomes

The outcomes of the seminar included two major areas of activity: a) *community building* and b) developing *topic-specific output goals*.

Community Building.   The seminar identified a large number of topics that require further discussion and engagement and exchanges to consolidate and develop the VIS+DH field of practice. While initiatives such as the VIS4DH workshop exist, the seminar confirmed a clear need for further community building to sustain and deepen a whole range of interdisciplinary exchanges at the intersection of Visualization and Digital Humanities. Related Seminar discussions resulted in:

- The commitment to create a website for sharing resources, projects, calls for papers and emerging research opportunities;
- An email list for posting events and activities;
- A writing group to review and facilitate publications at the intersection of visualization and the humanities;
- Various plans for future meetings and coordination of individual working groups (see **Working Groups** section in this report) – coordinated mainly through the Seminar's Discord channel.

Topic specific outputs.   Each working group defined their own potential collcetion of outputs (see **Working Groups** section), including but not limited to:

- Plans for an anthology of short-form reports on various topics (see topics discussed by working groups);
- Ideas for papers and longer-form research on ethics, methods, practices, and assessment criteria;
- Possibilities for research collaboration from within each group;
- Interest in creating pedagogical resources.

Suggestions for Future and Follow-up Activities

The seminar generated tremendous intellectual and professional excitement about collaboration on research, pedagogical resource development, and sustained activities at the intersection of visualization and the humanities. A workshop that would support rapid prototyping of proposed projects to see what would be required from the visualization, computer science, and design communities and from the humanities' community might expose more about how such work would support genuinely rewarding intellectual activity with potential for applications and implementation with broader use. In particular, the idea of interactive visualizations that promote and sustain interpretative practices, predictive models, transformative tools, and other innovations might be explored with the goal of imagining their use in business, scientific, educational, social science, and cultural/institutional domains.

4   Overview of Talks

4.1   What are Methods in the Humanities?

Johanna Drucker (University of California at Los Angeles, US)

Only one method exists in the humanities: interpretative reading. The method has many modalities (approaches) and techniques (applications) but within the historical tradition from which the humanities derive, the act of reading (mainly) texts is the single approach to knowledge and understanding. This can be tracked in Western culture to the reading of sacred texts in the religious communities of the three Abrahamic faiths: Judaism, Christianity, and Islam. This practice is also central to Eastern traditions in Buddhism, Hinduism, and Confucianism. While the study of images, dance, spatial rituals, and other activities are persistent in humanistic practices, the development of disciplines that considered these as objects of study comes much later than textual study. As a field, art history appears in

the late 18th-century. The social sciences such as sociology, anthropology, archaeology are largely the outcome of 19th century syntheses of empirical methods from natural sciences and humanistic topics of research. By analogy, these disciplines perform "readings" of images, practices, and social phenomena that are not constituted solely by texts. The various inflections that nuance the method of interpretative reading – critical theory, deconstruction, queer theory, feminism, decolonizing approaches – each bring a set of distinct and significant perspectives and insights into the ideological frame, calling attention to often unacknowledged assumptions and biases of traditional interpretation – but these are also interpretative reading practices.

4.2 Scraps

Stefania Forlini (University of Calgary, CA) and Bridget Moynihan (Library and Archives Canada – Ottawa, CA)

With this talk, we enter ongoing traditions of salvaging, repurposing, and re-valuing the remnants of the past. Drawing predominantly from feminist, queer, and archival critical theories, as well as artistic and/or vernacular practices, we offer what we call a "scavenger method". We focus on scraps that preserve (albeit imperfectly, in different degrees of ruin) material traces of other times and "users". These scraps offer opportunities to read history "against the grain" of dominant narratives and work as a provocation for visualization and humanities researchers to experiment with practices of re/contextualization of historically specific data.

4.3 Simple VIS Makes LIT Complex (As they should)

Christophe Schuwey (Université de Bretagne Sud, FR)

Scholars in the Humanities often think of data visualization as graphs, maps and trees. In this talk, I argue for the essential role of other, less expected types of visualization, and how humanities hypothesis can extend and diversify the notion of data and visualization, both for the fields of humanities and data visualization. Indeed, for scholars in Early Modern literature, one example of visualization revolutions lies in the ability to access and read Early Modern texts in their original layout, thanks to initiative such as Google Books or Gallica. Considering type size, layout and text formatting as data reintegrate issues of materiality directly into textual analysis, challenging traditional approaches and methods in literary studies. I used the example of La Bruyòre's Caractères to show how several interfaces designed with a fine-grained understanding of the work in mind enable the work to be visualized differently, profoundly transforming the understanding and perception of a literary masterwork. Such interfaces challenge the preconceived idea of a marmoreal masterpiece, from restoring its inherent dynamics (multiple editions with multiple additions and modifications over a short period), to enabling new approaches to its various translations across Europe.

4.4   Computational Iconographies

Fabian Offert (University of California – Santa Barbara, US)

While more traditional types of neural networks have long been part of digital art history, the epistemic implications and methodological affordances of contemporary large-scale vision models have not yet been systematically analyzed. We focus our analysis on two main aspects that, together, seem to suggest a coming paradigm shift towards a "digital" art history in Johanna Drucker's sense. On the one hand, the visual-cultural repertoire newly encoded in large-scale vision models has an outsized effect on digital art history. The inclusion of significant numbers of non-photographic images allows for the extraction and automation of different forms of visual logics, from which computational iconographies of almost arbitrary complexity emerge. Large-scale vision models have "seen" large parts of the Western visual canon mediated by Net visual culture, and they continuously solidify and concretize this canon through their already widespread application in all aspects of digital life. On the other hand, based on a technical case study of utilizing a contemporary large-scale visual model to investigate basic questions from the field of urbanism, we suggest that such systems require a new critical methodology that takes into account the epistemic entanglement of a model and its applications. This new methodology reads its corpora through a neural model's training data, and vice versa: the visual ideologies of research datasets and training datasets become entangled.

4.5   Data Visualization in the Humanities – Challenges and Opportunities

Steffen Koch (Universität Stuttgart, DE)

My presentation discusses conditions under which research scenarios in the humanities can benefit from abstract data visualization. Using the Damast prototype as an example, the talk demonstrates how the combination of abstract data visualization, the recording of analysis provenance, and long-term data preservation support the reproducibility of interactive visual analyses. However, even when providing a certain level of reproducibility, it is necessary to provide sufficient context when presenting visually abstracted research data. An orthogonal topic are cultural differences between research disciplines in collaborative projects. Publication traditions and the reception of joint research in the individual disciplines can negatively impact early-stage research careers. Another issue are the different requirements regarding the sustainability of research outcomes. If collaborative research should become a success story, these aspects need to be discussed openly.

4.6   Visualization & Uncertainty: A Love/Hate Relationship

Michael Correll (Northeastern University – Portland, US)

The reification of data is the bedrock of visualization. Uncertainty adds roadblocks to this process: how do we chart the unknown or the unknowable? Overcoming this roadblock involves the reduction of uncertainty down to probabilities, a "real abstraction" that fails to capture how people experience or reason about uncertainty, but nevertheless has normative force: we often try to make people act as "statistical golems", and punish/degrade them when they don't. In this talk I explore the frictions introduced by the probability-based visualization of uncertainty, and the visualization work that highlights these frictions.

4.7   Epistemology of History Research as Seen by a Visualization Researcher

Jean-Daniel Fekete (INRIA Saclay – Orsay, FR)

Visualization researchers are very familiar with the epistemology of natural sciences and follow its model for exploring data. The social sciences do not follow this epistemology, leading to misunderstandings between the two communities when discussing how visualization tools should support research. There is a need to align the expectations and assumptions between the two communities to converge to usable tools and more constructive criticisms. In particular, the social sciences deal with several levels of beliefs for their research questions; some hypotheses are plausible while others are competing and can remain with these statuses for a long time (for generations). Additionally, the nature of the "data" is not as clear-cut as in the natural sciences. Therefore, this talk is an invitation to visualization researchers and practitioners to better support the subtle levels of truthfulness required by the social sciences as well as mechanisms to intervene in the data to provide contextual information (in a transparent manner).

4.8   Best Practices Considered Harmful (some of the time)

Sheelagh Carpendale (Simon Fraser University – Vancouver, CA)

I will start this talk by discussing the differences and nuances among the concepts of Best Practices, Guidelines, Lessons Learned, and Heuristics, pointing out frequently ignored pitfalls and potentially looming pain points. I will then discuss how the pendulum between advantages and disadvantages can be mitigated by individual attitudes and actions.

4.9   Unvisualizing Texts: Hermeneutics of Visualization in Textual Scholarship

Joris van Zundert (Huygens Institute – Amsterdam, NL)

In this contribution, I discuss the suboptimal visualizations that textual scholarship applies to transmedialize (historical) text sources in a digital environment. Current digital scholarly editions are text (or glyph) essentialist and ignore for the most part all material information of the documents that they are contained in, ignoring thus also all aspects of non-glyph communication besides sometimes relational information expressed by e.g. marginals, footnotes, etc. This current TEI-XML "good practices" based approach has hermeneutical and pernicious epistemological ramifications as digital scholarly editions are repeating indefinitely a book metaphor, but in a bland abstracted, reductive, and non-creative way. Hermeneutically, this does a disservice to the texts and documents they are trying to re-represent. Epistemologically, they are relatively "poor" and do not inspire exploration of any new engagement or knowledge inference from the texts themselves.

4.10   Some synergies: Working together at intersections of Visualization & (Digital) Humanities

Jeremy Douglass (University of California – Santa Barbara, US)

Looking beyond the model of formal research collaborations between disciplined visualization researchers & humanities scholars, this input reflects on expanded ideas of synergy (sun+ergos) as "working together." In role-based thinking, working together may include a humanities scholar + visualization researcher, or artist... or a hum scholar who is ALSO a vis researcher / artist (& vice versa). In work-based thinking, beyond the "two halves" work model ("I do vis, you do humanities") is instead the "speak the same language" model: e.g. this specific intersection of the humviz is a domain, so we develop a shared domain-specific language (in a technical or general sense). In each community you afford a different "you" for purposes of synergy – my past collaborative "mes" include artist, domain expert, developer et cetera. Some of the most productive thinking about "working together" is grounded in personal experiences, situating ourselves and reflecting on projects and roles, moving between e.g. the humanities, information visualization, computer science, & fine arts. We collaborators are usually more complex than the simplified role they overtly play, and have more to offer a collaboration. I explore this idea through role-based reflection on four of my visualization+humanities synergies at different career stages: 1) an artist researching historical visualization forms as traditions within community (as PhD researcher, Software Studies Initiative), 2) a Critical Code Studies hermeneuticist using artist-provocateur exploratory visualization (as co-author on Reading Project: A Collaborative Approach to Digital Literary Criticism), 3) the "infrastructure guy" supporting humanities teams with virtual machine clouds while they use visualization to read (grant Co-PI on the WhatEvery1Says Project), and 4) teaching viz to humanities students (as faculty lab director / project lead) in two projects: Panelcode, a minimal markup language for visualizing comics compositions as abstract

layouts, and in The Transverse Reading Project, a visual atlas of branching narratives. When "working together" in hum+viz, reflect on your experiences and situate yourself. When seeking synergies, which "you" is the collaborator?

4.11 Electronic Health Records that support clinical reasoning

David Pao (Royal College of Art – London, GB)

Unlike the paper medical record, which is created by clinicians for their own use, the Electronic Health Record (EHR) is predominantly designed by non-clinicians. The EHR interface is the cornerstone tool through which clinicians review, interpret, create and curate patient data. EHR interfaces are consistently criticized for their poor usability, which results in clinician burnout and sub-optimal, clinically misaligned data being propagated throughout a health system–infinitely and without degradation.

This research aims to realign EHR interface design with the central tenet of user-centredness by better understanding the clinician user. It seeks to achieve this by understanding how the EHR interface can specifically support a clinician's practice–defined here for the first time as clinical usability (CU).

The hypothesis is that, using a provocative prototype designed by a single clinician as a visual starting point, a Participatory Action Research (PAR) approach can effectively capture, codify and communicate a clinician community's CU knowledge to inform the transdisciplinary field of EHR interface design. This leads to the central research question, "How can a clinician community contribute CU knowledge to the design of their EHR interface?"

This research contributes tangible, real-world and communicable new knowledge. First, CU knowledge within a set of novel CU-specific heuristics, which bridge the longstanding gaps between the designer and clinician user, and design and evaluation, that have come to characterize this design field. Secondly, CU knowledge embodied within the Sexually Transmitted Infection Query Interface (STIQI) development prototype and its Representational Epistemic (REEP) design blueprint, not previously seen in either commercial or research settings.

4.12 Towards radically thick new tools: Visualizing ambiguity

Mathieu Jacomy (Aalborg University Copenhagen, DK)

Data visualization, as a practice and as an academic field, has dedicated more time to visualizing uncertainty than ambiguity. Those are not the same thing: although knowledge reduces uncertainty, it amplifies ambiguity. Ambiguity arises as a feature of the things, beings and phenomena we describe and study.

In this short talk, I draw on a minimal case: community detection in networks. Although we can say that communities exist in the network I use for an example, their demarcations are ambiguous. I show five different ways to visualize that ambiguity, and I propose a scale to help people assess the status of ambiguity in their own visualizations, or that of others.

1. Ambiguity as noise: it is not visualized
2. Ambiguity as an accident: visualized as an anecdote
3. Ambiguity as context: it is visualized, but as an afterthought
4. Ambiguity as a problem: it is fully visualized, but gets in the way of understanding the rest
5. Ambiguity as a feature: it is the purpose of the visualization.

From there, I sketch a possible program at the intersection of the digital humanities and visualization: building radically thick new tools. It may draw on two influences. The "thick description" formalized by anthropologist Clifford Geertz, and "radical empiricism" as stated by the pragmatist philosopher William James.

It is worth noting that during the discussion following the talk, Johanna Drucker proposed to expand this program to other things similar yet distinct from ambiguity: polyvalence, polysemy, multistability, etc.

4.13   The Line Graph and the Slave Ship

Lauren Klein (Emory University – Atlanta, US)

When we encounter a line graph or a pie chart, we tend to think of the role of visualization – if we think of it at all – as simply revealing the meaning of the data underneath. The reality, however, is that the act of visualizing data generates meaning in and of itself. In this talk, I return to the origins of modern data visualization in order to excavate this meaning. Exploring two examples of early data visualization – the line graphs of British trade data included in William Playfair's Commercial and Political Atlas (1786) and the Diagram of a Slave Ship (1789) created and circulated by a group of British antislavery activists, I connect Enlightenment theories of visual and statistical knowledge to contemporaneous ideas about race and nation. By examining and re-visualizing the data associated with these charts, I will further show how data visualization always carries a set of implicit assumptions – and, at times, explicit arguments – about how knowledge is produced, and who is authorized to produce it. Placing this work in the context of my larger project, Data By Design: An Interactive History of Data Visualization, I will conclude with a consideration of the ethics of visualization in the present. Through a discussion of contemporary examples, I will show how data visualization can bear witness to instances of oppression at the same time that it can – if intentionally designed – hold space for what cannot be conveyed through data alone.

4.14   Uncomputational Thinking or What VIS/DH owes to the humanities

Lamqaddam, Houda (University of Amsterdam, NL)

In this talk, I discuss the power structures that underlie interdisciplinary work between visualisation and humanities research. Funding cuts in the humanities and the soft power of the computational function to create a power imbalance among collaborators that can lead to

"disciplinary capture". I explore three ways that this imbalance affects the research outcomes: through the erasure of humanistic theory, one-sided positioning, and the devaluation of research outcomes. I outline the possible approaches that humanist scan select to engage with visualisation researchers. I end by introducing the concept of "uncomputational thinking" as a method for visualisation research in a humanist context, and point out the importance of slowness and methodological humility in the process.

5   Working groups

5.1   Complexity

Derya Akbaba (Linköping University, SE), Alfie Abdul-Rahman (King's College London, GB), Mark-Jan Bludau (FH Potsdam, DE), Michael Correll (Northeastern University – Portland, US), Mennatallah El-Assady (ETH Zürich, CH), Linda Freyberg (DIPF – Berlin, DE), Nicole Hengesbach (University of Warwick – Coventry, GB), Mathieu Jacomy (Aalborg University Copenhagen, DK), Houda Lamqaddam (KU Leuven, BE), Isabel Meirelles (The Ontario College of Art and Design University, CA), Bridget Moynihan (Library and Archives Canada – Ottawa, CA), Fabian Offert (University of California – Santa Barbara, US), Bettina Speckmann (TU Eindhoven, NL), and Florian Windhager (Donau-Universität Krems, AT)

This breakout group focused on the polysemic concept of *complexity* in visualization. One challenge in visualizing digital humanities data is the complexity of the analyses and the objects of inquiry. For instance, a simple bar chart might be considered sufficient to surface information about a company's sales data over the course of financial quarters (Gelman, 2013), but would not be considered sufficient to capture the important features of a novel corpus or musical scores, or at least not in a way that provides sufficient input for hermeneutical study (Windhager, 2018). There is also a connected tension between the oft-stated goal of visualization to simplify (instantiated in principles like Tufte's maxim to increase the "data-ink ratio" or reduce "chart junk" (Akbaba, 2021) and the hermeneutical impulse to reveal complexity or unpack tacit assumptions. A final related tension was how to manage the complexity "hidden" in superficially simple visualizations (Kostelnick, 2007): for instance, provenance information, methodological choices, and the mathematical sophistication entailed in layout algorithms and dimensionality reduction methods.

The discussions of the group settled on several angles around how complexity can function as a design material. That is, complexity not as an inherently bad or unnecessary component to be reduced as much as possible, but as a material or resource (like color, text, sound, or even machine learning (Dove, 2017; Holmquist, 2017) that can be used to accomplish a number of design goals. Clarifying this concept involved first exploring the different meanings of complexity (Latour, 2008; Latour, 2012; Norman, 2016). For instance, complexity in the size of the data (say, the number of facets or dimensions), complexity of the transformation or representation, visual complexity of the visualization, complexity in the interactive affordances of the visualization, complexity in interpreting the visualization, and the complexity of the communicative goal.

Exploring these different axes of complexity allowed the construction of examples of interesting locations in "complexity space." A scatterplot that directly encodes two quantitative values that are relatively straightforward to describe–say, the number of pages in a novel plotted against the date of publication–is differently complex than a scatterplot of, say, a two dimensional projection of the same novels from a high-dimensional space, even though both result in a very similar, superficially "simple" visualization. The backing data, and what it means to interpret visual features like clusters or outliers, are fundamentally different, even as the objects of inquiry and the visual design are identical.

The conversation then moved to examples of "beneficial" complexity (Hullman, 2011): using complexity to, say, encourage the reader of the visualization to slow down and defamiliarize themselves with the phenomenon of interest (Bradley, 2016), communicate or disclose uncertainty or provenance information, encourage new or serendipitous ways of interacting with the data [McCurdy, 2015; Thudt, 2012) or even to simply communicate that the phenomenon of interest are, in fact, more complex than they might otherwise appear. The group concluded with a (partly provocative) statement: that, as with Tesler's law of UX design (Norman, 2016), there is a "conservation of complexity" in visualization design: a visually simple visualization is likely hiding vast methodological or rhetorical complexity, and a visually complex visualization might allow much more straightforward paths to communication or analysis.

The group explored several potential outputs, settling on an initial multi-faceted study of complexity as design material: collecting interesting examples of artifacts (both visualizations and otherwise) that live in interesting areas of complexity space, definitions and framings of the myriad forms of complexity, and potential functions (both positive uses but also abuses) of complexities in design.

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5.2   Encodings

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Many predefined data types exist (time, hierarchy, connections, geography, ordered, etc.), each with inherent visual representations. Each of these data characterizations and implicit encodings limit interpretation. Where is materiality, experience, missing data, contemporary context, and so on?

If current visualization techniques are understood to be "statistically-based visual data analysis", then there are many gaps to humanities needs, which include:

- no given data schema
- completely flexible encoding environment
- support for multiple simultaneous hypotheses
- abilities to fragment and recombine data
- easy access to sources and context
- high multi-dimensionality but not dimensionality reduction
- no singular narrative: many, but also narratives of mis- and dis-information
- uncertainty is not simplistic: potentially thousands of aspects of uncertainty

Furthermore, the objectives of the current standard approach to data visualization include fast and unambiguous decoding of representations. However, slow reading is an explicit objective for the humanities. Many encodings dissuaded or underexplored should be re-examined: 3D, imagery, glyphs, etc... 3D visualization, for example, requires a point of view, there is no singular god-like overview with 3D. Humanities needs a wider, flexible graphical vocabulary, and per project, or per analysis. Humanities visualization needs to embrace the complexity of slow reading (Brath, 2023).

The act of creating and generating a visualization should be an interpretative process: sketching supports this well, whereas data visualization tools require training which is too hard. The current approach to data visualization pre-supposes data: the broader situational context includes phenomena > corpora > data > sketches > encodings > uncertainty > visualization, which can be cycled through in any order.

One effective direction of future research is a combination of hand-drawn sketching of visualizations with simple interactions to converse with data and iterate: for example, I can connect my data to the sketch, or use the sketch to search and extract data, or use difficulties within this conversation to prompt new avenues of exploration and interpretation (possibly using complementary AI).

The discussion has shown a lot of avenues for theoretical and practical explorations that could culminate in a potential anthology that includes provocations and speculative case studies around the issues around encodings and visualization in the humanities.

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5.3 Vis in the Humanities & Encodings (output session)

Richard Brath (Uncharted Software – Toronto, CA), Johanna Drucker (University of California at Los Angeles, US), Johannes Liem (Donau-Universität Krems, AT), Christophe Schuwey (Université de Bretagne Sud, FR), and Joris van Zundert (Huygens Institute – Amsterdam, NL)

The discussion group *Vis in the Humanities & Encodings'* addressed the question of the need for novel visualization techniques in the humanities. Humanistic interpretive activity does not necessarily fit well with traditional computational quantitative visualization nor a linear method sequencing hypothesis, data, development, and evaluation. Furthermore, current visualization does not work well with heterogeneous data nor polyvalent interpretation.

At the highest level, group members felt that the issue could be best addressed through a prompt for speculative case studies, and reference to case studies related to humanities visualization but not perceived as such. A few examples include:

- Temporality: e.g. the decay of Damien Hurst's shark
- Perception of data: What lens or perspective is used? For example, currency has no intrinsic value outside the conditions of which value is assessed.
- Instantiation transforms interpretation: e.g. Shakespeare's Sonnet 18
- Illusion of stability: works are continuous re-interpreted, e.g. fan fiction

To test the provocations, we directly engaged 30 workshop participants with the following prompt: *"Remember when paint programs had cool brushes that create wacky effects? Sketch a tool that has unexpected behaviors. Make a visual effect. Then imagine what kind of data it could represent."* After 20 minutes of drawing 32 responses were assembled (see below).

Individuals selected a drawing at random, presented it to the group, with a brief community interpretation. Some representative examples are shown below. Provocation outputs generated novel visualization transformations, such as reversing visual encodings into text, automated contextualization, exposure of data gaps with biological generative data fills, interpretation resistance encoding and so on. There are a number of publications feasible for the outputs, as well as a reusable method.
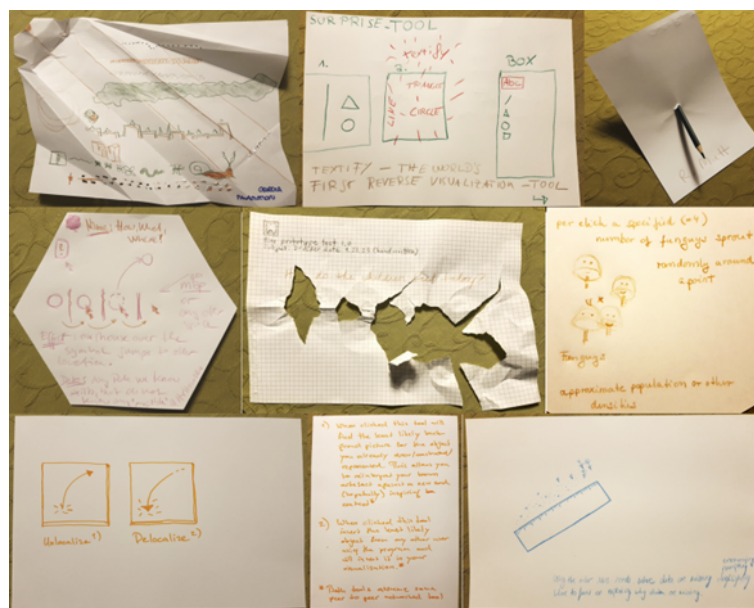
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5.4 Historical examples – of VIS4DH

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The key outcome from this working group is expected to be an open collection of visualizations sourced from the humanities and from the history of using graphical representations of data in this field. This is required because a rather small set of historical examples currently perpetuates that "visualization must look like these". Related challenges include

- The collection of related meta-data, forsuch as source, provenance, why it is a visualization, contents description, medium, date, authorship, copyright permission, interpretation, references (e.g. grant proposals), and related files (e.g. dataset, URL, etc).
- Infrastructure to collect and organize the visualizations.
- Some form of definition of "visualization" and "history".
- The need to integrate variety of existing sources of historic data visualizations (although not necessarily humanities-centric), including for example the Data Visualization Society's slack channel (vizsociety.slack.com) and contributions tagged #topic-historical-viz.

5.5 What is / How are data?

Richard Brath (Uncharted Software – Toronto, CA), Johanna Drucker (University of California at Los Angeles, US), Yanni Loukissas (Georgia Institute of Technology – Atlanta, US), Isabel Meirelles (The Ontario College of Art and Design University, CA), and Fabian Offert (University of California – Santa Barbara, US)

What is data? Arguably, for VIS4DH we need more pluralistic approaches with tolerance for different epistemologies. Positivist work needs to acknowledge its framework – as should all other approaches towards "drawing things together" (Latour, 1999; 2011).[2] This could be an essential contribution which humanities can offer to the field of visualization. From this working group's point of view, it is a matter of methodological rigor to talk about *what you mean by data* – and a range of closely related quetions – when we build our work on this concept.

- How to make explicit what we mean by data? (Expansive, inclusive, but explicit)
- What is data? (E.g., a mix of affective information)
- Where does data stop and context start?

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[2] Latour's account of sampling soil through overlay to abstract mathematical representation. Gaps between can't be bridged, they are always jumped. Same thing happens on the mathematical side – throw away something. Collect the data outliers? The stack? What is thrown away at each level of the stack? Scientific images allow you to reason in ways that are different from text. Bucket of contingencies. Decisions about removing/simplifying are meant to assist cognitive processing.

- How to bring in the context? (Discrete numbers vs. what context)
- How is data?
- What happens before the spread sheet?
- What is the relation between unstructured data and structured data?
- Unstructured vs. unstructurable? (Offenhuber, 2019).
- What data does not lend itself to visualization – or can all data be visualized?
- What are the instruments used to collect the data? (Data lifecycles are worth capturing)
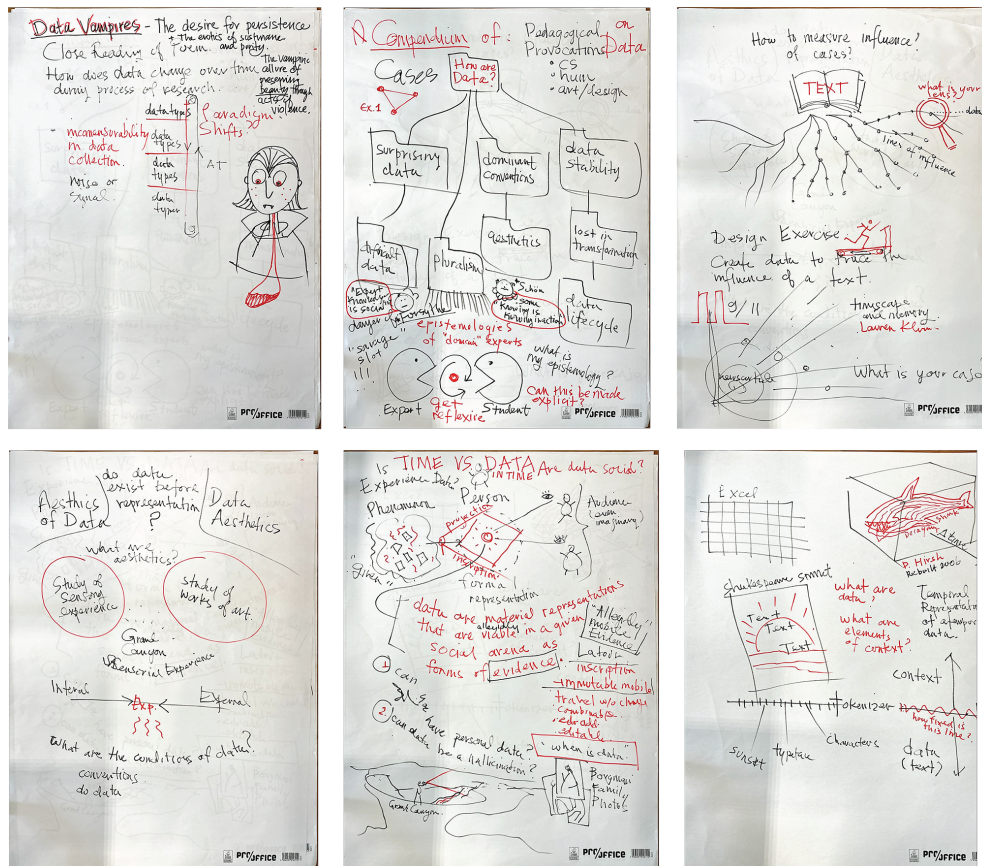
Further discussions of this working group revolved around the relationship between *data and aesthetics* as motivated by the questionable criticism of data being "aestheticized" as a threat to objectivity and purity of data. Aesthetic judgments and categories in the world include formal characteristics and ways of looking at and talking about them (e.g. "cute") that register consumer categories. Criticism of this sort appears not as valuable as it claims, synchronously over-producing and under-producing quality criteria. However, what is the relationship between data and "cute", "gimmicky", "zany", etc.? Could we think about data as an aesthetic category, which is necessarily culturally situated, embedded, then expressed and instantiated? In order to be recognizable, data has to be a rhetorical category and should count as evidence for some claim you are making. *Data is what counts* – not in the quantitative sense but in the relevance – so lay them out on a page and then define systems of measure. Be explicit about what "counts". Data as an aspect of what you want to know, desire?

During their discussions, the group deliberately aimed for documenting their discourse in a multimodal fashion, as illustrated by Yanni Loukissas' graphic recordings of related conceptual and practical challenges (figure below).

Working group's action points.
- A book of provocations.
- Example of things that are data in a surprising way.
- What counts as data? A typology of dominant cultural forms across domains.
- Difficult data – a book of this.

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5.6 Visualization Literacy

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During the two breakout group sessions on literacy, discussions revolved around the central term (and consequently the scope), i.e., whether it was "data literacy", "data visualization literacy" or "visualization literacy". It was agreed that the most appropriate (and inclusive) term was "visualization literacy". Major concerns about the topic included the limitation of the current definition to the understanding of statistical graphs (e.g., bar charts, scatter plots) and networks, the lack of agreement on what other methods and techniques should be considered under the concept of "visualization literacy", the lack of teaching materials including feedback from instructors, and the difficulty in addressing students with different backgrounds.

Understanding "literacy" exclusively as "statistical charts literacy" leads to teaching a limited number of charts and tools, that promote summarization and reduction for the rapid consumption of information, a necessary aspect in some analyses, but limiting in others, especially in the humanities. At the same time, a standardized visual vocabulary (e.g., bars,

lines, grids) does not allow other encoding options required for rhetorical expression and interpretation. This led to the question: what else should be included in the concept of "visualization literacy"? Among others, we discussed: the use of free encodings adapted to each visualization as proposed in data humanism (and consequently slow reading), the use of visual vocabularies for interpretation (e.g., repulsion, impact, fold), the study of non-representational approaches (i.e., starting with the visualization), the visualization of different temporalities, and the analysis of comics using visualization.

The teaching materials available are limited in content, as described above, and are not always adapted to the different contexts. This creates a barrier for many and makes it especially difficult to teach groups with students with different prior knowledge (e.g., computer science vs. humanities training), a common scenario in the digital humanities.

As future steps, it was decided to create a more comprehensive repository of teaching materials, which will also collect detailed feedback from users. We also set out to write a manifesto on the need to expand the concept of "visualization literacy", and therefore its teaching, evaluation, and impact on the development and use of tools.

5.7   Theories & Methods

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The discussion group on *Theories* delved into the question and role of theories in describing the relationship between the two research communities of visualization (VIS) and the (digital) humanities. The concept of theory is fundamental to research. Theories in any form reflect the conditions for the possibility of building knowledge and are integral to research settings. Within the discussion, two central approaches were delineated. There was an in-depth exploration of the understanding of the term "theory."

- What is understood by theory?
- What role do theoretical considerations play in everyday research and collaborations?
- How do theories differ from methods?

Against this backdrop, we engaged deeply in a survey on relevant research methods, theories, and approaches in the field of VIS+DH which has been conducted prior to the seminar, and with which participants documented their guiding concepts and procedures with short fact sheets (see Figure).

Building on the repository of theoretical approaches gathered, we then turned our attention to theory-specific implications, promises and pitfalls for interpreting visualizations, designing visualizations, and research practices in both communities. In this context, we worked through three exemplary theoretical schools – Hermeneutics, Semiotics, and Critical Theory – to explore what it might mean to (re)view visualization as an outcome and process through

these theoretical lenses. What becomes visible and negotiable when we create and interpret visualizations hermeneutically, semiotically, or critically? How do theoretical considerations manifest in visualizations?

One major outcome of the discussion was the observation that the theoretical pluralism in the humanities provides an opportunity to negotiate (data) visualizations in their contingency and situatedness. As an initial output, we aim for an article that focuses on the multiperspective potential of theories and visualizations. Inspired by Steven Wallace's poem "Thirteen Ways of Looking at a Blackbird" (1954), the idea is that theories allow us to illuminate different aspects of a data set and/or data visualizations. Another associated output is a visual glossary of theory for/in visualization, representing a kind of "theory browser".

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5.8   Ethics

Georgia Panagiotidou (King's College London, GB), Alfie Abdul-Rahman (King's College London, GB), Michael Correll (Northeastern University – Portland, US), Leonardo Impett (University of Cambridge, GB), Lauren Klein (Emory University – Atlanta, US), and Geoffrey Rockwell (University of Alberta – Edmonton, CA)

As information visualizations are increasingly used to engage citizens on social and political issues, this interdisciplinary group came together to discuss the *ethics of visualization*. The group started broadly, by discussing what is ethical, and quickly came to a discussion of case studies, each from a different discipline and/or perspective. We talked about the neutrality of data, appropriation of voice, neutrality of the visualization in itself as a perceptual, cultural and historical object as well as an interface with issues such as accessibility and interactivity.

The group decided to take action on these discussions by setting up a series of case studies of varied nature that illustrate the ethical entanglements of data and their visualization. As a preliminary step towards this case study synthesis, the group has been holding monthly meetings since the original Dagstuhl Seminar and submitted a short paper to the ADHO conference exposing their approach and initial sketches for these case studies. The paper initiates a discussion on the ethics of visualization through the development of six case studies ranging from historical examples of slave trade and anatomy to current day pandemic, climate, and algorithmically designed visualizations. These case studies are meant to form an initial part of a reflective educational activity for visualization students, designers, and practitioners.

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5.9   Surveying the State-of-the-Art

Alejandro Benito-Santos (University of Salamanca, ES), Alfie Abdul-Rahman (King's College London, GB), Jean-Daniel Fekete (INRIA Saclay – Orsay, FR), Aida Horaniet Ibanez (University of Luxembourg, LU), Lauren Klein (Emory University – Atlanta, US), Rabea Kleymann (TU Chemnitz, DE), and Florian Windhager (Donau-Universität Krems, AT)

This breakout group deliberated on research directions for a survey titled *Visualization for the Digital Humanities.* The initial discussion revolved around defining the survey's scope and boundaries (McNabb, 2019), pinpointing pertinent research questions, and enhancing these through insights from recent, related surveys (Benito-Santos, 2020a; Benito-Santos, 2020b; Jänicke, 2015; Jänicke, 2017; Windhager, 2018). A pivotal part of the dialogue focused on the prevailing types of visualizations in digital humanities, their impact, and the chronological development of visualization tools. A critical objective of the survey is to pinpoint significant "inflection points" – such as influential papers, books, libraries, and tools – that have markedly shaped the field. The group highlighted two notable gaps in existing literature: The need for an in-depth understanding of how current visualization systems foster diverse interpretations and perspectives on data, and a lack of insight into the evaluation techniques (Isenberg, 2013) employed in VIS4DH practice. Addressing these gaps, the survey aims to encapsulate current trends, identify potential deficiencies, and spotlight underutilized techniques, thereby providing comprehensive guidance for future research in this area.

The consensus was that the survey should encompass a wide range, covering research articles in visualization and humanities across various data types, including texts and images. It should emphasize recent developments, best practices, and seminal publications. The intended audience spans both humanities and visualization practitioners, suggesting a potential dual publication approach. The data collection methodology will integrate quantitative scraping with qualitative analysis, underscoring the significance of datasets, theories, methods, and evaluation techniques, thus ensuring a well-rounded and impactful survey.

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