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Visualizing Futures of Networks in Digital Humanities Research

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Introduction

Papers including the topic "Networks, Relationships, Graphs" have comprised roughly 10% of submissions to ADHO's annual conference for the past 4 years - a sizable portion, to be sure, but one that has remained roughly consistent in that time (Weingart, 2015). "Networks" are, in the abstract, familiar to humanities scholars devoted to studying complex relationships. This potential is alluring, but advanced network analytical techniques are challenging to implement and interpret. And overly complex visualizations have attracted derogation from some scholars, deriding visually-impressive but uninterpretable graphs as "hairballs."

This roundtable will take up crucial questions: What kinds of data, questions and interpretive techniques are appropriate for network analysis? How does the disciplinary skillset of the humanist researcher determine, enable or limit effective network analysis? To what extent does the use of data visualization serve to surface, or submerge, essential knowledge about the data? How should scholars in the digital humanities navigate the intense methodological demands of network science? How should such scholarship be evaluated, peer-reviewed, taught, and studied? In the face of these many challenges, what are the futures of networks in DH?

Network Sources / Network Evidence

Why transform our research sources into networks? For some projects, the simple reframing of evidence as a network visualization provides a sufficiently novel perspective to pose more precise research questions and to isolate specific avenues for more research. For research fundamentally about network structures and dynamics, more advanced techniques, including simulation and quantitative hypothesis testing, are required to produce valuable results.

Which path to take may depend on one's sources. Some sources are naturally transformed to networks: correspondence from one individual to another (Winterer, 2012; Ahnert and Ahnert, 2015), for example, or kinship relations. (Jenkins et al., 2013) But less obvious sources may also be seen as networks, such as characters co-occurring in a plot, or documents connected by shared topics. The abstracting and filtering effect of network analysis can also be

powerfully applied to illuminate how sources themselves interact to construct knowledge of subjects (Kim, 2013).

How can we encourage more creative thinking about transforming sources (from collections, archives, texts, objects, and more) into networks? When is "basic" visualization productive by itself? Where are complex methods like agent-based simulation or predictive modeling best used? How can network analysis be used to illuminate power imbalances within the scholarly infrastructure? What are strategies for dealing with known unknowns (and unknown unknowns!) in network research, and how can we visualize these missing data?

Disciplinary relationships: Complexity science, humanities, and DH

Examples of the "network" or "graph" idiom, whether actually visualized or merely referenced within a text, can be found in citations well predating modern-day tools for network analysis. They are numerous in sociology (Freeman, 2004), but also in the history of art (Barr Jr, 1936), anthropology (Gell, 1998; Hage & Harary, 1983; Foster, 1969), geography (Bertin, 1967), and economics (Koenig et al., 1979), among others. The idea of the network is a seductive one for humanists who wish to study the multilayered web of interactions between any number of agents (authors, texts, readers, artists, artworks, viewers, patrons), in order to discern how those interactions produce structure and meaning all their own. To do so, however, scholars must grapple with guidelines for expressing assumptions, formulating hypotheses, and gathering and testing evidence using a language of network theory and sociology that can seem alien, if not inimical (Galloway and Thacker, 2007). How have humanities scholars navigated this challenge when using network analysis?

Compounding this effort is the rapid expansion of network and complexity science in its own right. This rapid evolution challenges humanists who would adopt some of these methods for their research. Can a single scholar can find their way without formal partnership with a collaborating network scientist? This raises issues particularly for peer review: How are these papers evaluated between their methodological and their content disciplines?

Network visualization

As with its determination and preparation, visualizing humanities network data in a comprehensible manner is an inherently interdisciplinary task that requires a knowledge of the academic domain, rigorous archival and data management work, and an effective engagement with visual design practices. The proliferating use of visualization tools to represent network data in the digital humanities demonstrate both the potential and the difficulty of this undertaking. The immense complexities of the human connections that network visualizations represent and the probabilistic mathematics that distribute its nodes combine to confound and defy consistent interpretation. Basic technical constraints of dimension, visual design traditions, and a relentless drive for legibility all further reduce, constrain, or even determine the possible interpretations of a dataset from a diagram.

What can humanities researchers engaged in the active process of network visualization do to make informed and effective computational, interpretive, aesthetic and practical decisions? In what cases is the beleaguered "hairball" still a productive or generative approach, in spite of the difficulty it can pose to interpretation? What other alternatives exist? How can the tools, design traditions and/or algorithms currently in use, as well as the introduction of new approaches, dimensions and technologies enhance the power of a network visualization to express and communicate essential understandings about humanities datasets?

Networks and Interactivity

How could new dynamic interactions with network visualization help us better understand and explore our data? With the rise of data journalism and in-browser apps, network visualizations are increasingly interactive, using animations and dynamic features to visualize additional dimensions. Such interactivity can help further an argument, and encourage the user to engage with the data. But, how sustainable and accessible are these visualizations? The long-term viability of these network visualizations depends on continued support, from updating code libraries to adapting to new browser requirements. Moreover, interactivity can be too demanding for slow internet connections, while also complicating workflows for both print and online publication. Added interactivity may also foreground style over substantive engagement with research questions.

What is the relationship of these interactive graphs to their textual explications? How can we design interactive visualizations for multiple modalities and bandwidths? How can digital humanists determine when interactivity is furthering their network analysis? How might interactive network analysis leverage the insights of social annotation tools to analyze metadata on users' interactions with network visualizations, or utilize more immersive digital experiences, such as virtual or augmented reality?

Access to network methods and tools

All of these challenges intersect with how we teach network analysis and how the scientists teach themselves. The algorithmic transformations of network analysis are not easily accessible, and present a major barrier, particularly to those without any background in data analysis or programming. Those network analysis tools that are accessible to newcomers - and are thus frequently taught in short-term DH workshops - privilege the visualization of networks while largely concealing the behind-the-scenes work of network metrics calculation.

As with computational text analysis, it is simply beyond the scope of graduate programs in the humanities to take

on complete responsibility for training its students in network analysis methods (Underwood, 2014). What strategies in mainstreaming computational textual analysis within DH (e.g. the emergence of dedicated "text labs" at several institutions) could be used to produce more substantive work in DH? What failures should be avoided? Where does network analysis in DH diverge so much from computational text analysis that entirely new strategies need to be considered? Moreover, how can practitioners of network analysis in DH make their research understandable and accessible to a larger audience?

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Open, Shareable, Reproducible Workflows for the Digital Humanities: The Case of the 4Humanities.org 'WhatEvery1Says' Project

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Introduction

This panel reports on the open, shareable, and reproducible workflow methodology for digital humanities research developed by the 4Humanities.org "WhatEvery1Says" (WE1S) project. WE1S is topic modeling a large corpus of articles related to the humanities in newspapers, magazines, and other media sources in the U.S., U.K., and Canada from 1981 on. While the panel presents WE1S's conceptual goals and prototype experiments in using outcomes in humanities advocacy, its focus is on the technical and interpretive workflow developed by the project for humanities-oriented data work. WE1S's *manifest system* for data provenance and workflow management, its *virtual workspace manager* for integrated, containerized data manipulation and processing, and its *interpretation protocol* for how humans read topic models suggest a generalizable open approach based not on particular technologies and methods but on annotated methods. Moreover, there is a philosophical fit between such an approach and the public-facing goals of the WE1S project. WE1S is about opening