BIG DATA TIME MACHINES: DECOLONIZING THE FUTURES OF POST-DIGITAL HISTORIES

Megan Sapnar Ankerson
University of Michigan

Introduction

Among the many ambitious promises to accompany the rise of Big Data, none sound more glorious than the opportunity to time travel. Google celebrated the 15th anniversary of Street View by announcing: "Time Travel is now available with the Google Maps app for iOS and Android!" When it added 20 petabytes of historical satellite data to its Google Earth platform, the company debuted its "3D Time Machine" with similar fanfare. And when *The New York Times* digitized over 100 years of newspaper clippings and 6 million photographs housed in their "morgue" (*The Times* print archive) they did not make it available online as Morgue 2.0. Instead, they launched The New York "TimesMachine," a database of digitized pages of the printed paper published between 1851 and 2002.

The time machine metaphor extends well beyond American Big Tech and media companies. It is also driving collaborative international alliances like "Time Machine Europe," an EU-funded large-scale research initiative (LSRI) devoted to using machine learning to extract the "Big Data of the Past" for the future of Europe. Between 2019 and 2024, over a hundred projects in cities from Antwerp to Zurich launched Local Time Machines in a vast effort to mine thousands of years of European archives and construct an advanced computing infrastructure built on AI that "will enable Europe to turn its long history, as well as its multilingualism and interculturalism, into a living social and economic resource." These archival futures promise universal access to history through spatiotemporal 4D reconstructions, allowing future researchers, tourists, and business leaders to explore historical datasets in new ways. The 21st-century proliferation of these "Big Data Time Machines" raises profound questions not just about the future of history and historical research, but also about what counts as historical knowledge and who gets to participate in making sense of the past. Examining how these systems work in the service of Western knowledge monopolies is crucial if we hope to dismantle power structures that extract data resources for profit by rendering marginalized people as invisible and alternative epistemologies as illegible (Quijano, 2000).

Material-Semiotic Machines

This paper draws on decolonial perspectives that unsettle Western power structures and data-extraction processes integral not only to capitalist Big Tech (Mejias & Couldry, 2024), but also to the historical imaginaries that Big Data makes possible when European cultural heritage assets become a key driver of economic growth. Through a critical material-semiotic analysis of Time Machine Europe and select examples from Local Time Machine projects (including Amsterdam, Venice, Netherlands 3D, and Ybbs an der Donau in Austria), I examine the discourses, design strategies, and aesthetic techniques that structure archival encounters with large historical datasets.

This involves analyzing how an aesthetic experience of time travel is fashioned through a platform's UX design, data architecture, navigation structures, technical descriptions, packaging and promotional materials. More than just interface metaphors or science fiction, I regard these time machines as material-semiotic entanglements that organize knowledge, structure temporality, and forge specific historical imaginaries. They offer ways of making sense of history and positioning oneself in relation to historical knowledge. What epistemological assumptions undergird these practices? Whose voices and experiences are highlighted or ignored? How can critical feminist data studies as well as insights from Afrofuturism and Indigenous futurisms be deployed in ways that critically and creatively rupture the white settler paradigms that are still deeply embedded in archival science and technoculture today?

The material-semiotic approach I employ is informed by critical race theory and feminist technoscience studies that emphasize how cultural imaginaries and technical artifacts are conjoined together and mutually constituted. (Olesen & Markussen, 2016; Suchman, 2012) As Lucy Suchman puts it, "technologies materialize cultural imaginaries, just as imaginaries narrate the significance of technical artifacts" (2012, p. 48). These configurations are by no means neutral. Andre Brock (2020) and Nick Couldry (2024), among others, have argued that whiteness, patriarchy and coloniality undergird Big Data, AI, and Big Tech visions of history as a process of capitalist resource extraction. To examine how this plays out in terms of Big Data Time Machines, I focus on the archive aesthetics that represent historical records through tropes of time travel.

The Politics of Archive Aesthetics

Media historian John Corner introduced the term "archive aesthetics" in his analysis of documentary film to refer to audio-visual practices around the cinematic display of historical records (old newspaper text, faded photographs, archive footage), used "to convey audiences into history" (2006). Corner identifies a distinctive mode of audience address and the use of specific techniques (animation, voice over, editing) to construct a historical imaginary that serves as both a site for "objective" historical knowledge (including the historical fetishism of this knowledge) and a subjective space "for the reconstruction of historical experience and feeling and for the play of historical fantasy" (2006, p. 296). Analyzing the archive aesthetics of Big Data Time Machines involves examining how material-semiotic arrangements organize their historical journey and convey users into history.

The paper identifies a range of aesthetic strategies (fly-over tours, augmented reality applications, performance art, 4D models of architectural space) that have long dominated Western representational practices and the construction of historical knowledge. These strategies are analytically organized by discussing four major techniques: space mastery (mapping, 4D reconstruction, exploration), time sliding (chronological scrubbing across a linear playhead), data digging (archaeology of files), and reparative visualization (making disparities and gaps visible). It uses these examples to illustrate how archive aesthetics embody fantasies about time and history that are not just visual but deeply political. For Jacques Rancière (2004, 2022), aesthetics are political because they structure (and hence can also rupture) how reality is perceived and who gets to participate in its common creation. Aesthetics here are not about beauty. Rancière argues that aesthetic experience organizes (or reorders) the "distribution of the sensible," the established social orders governing what can be seen or said, who can be heard, and what is considered legitimate and valuable when it comes to making sense of any narrative, including history and historiography (Rancière, 2004).

As both technical and symbolic systems, as scientific tools and mediated forms of entertainment, time machines and time travel offer vantage points for gaining critical purchase on the ways historical datasets are used to generate new temporal experiences and historical perspectives. In other words, despite its origins in Western science fiction, I suggest it is not the speculative device of the time machine that needs to be abandoned. Rather, it is the monopoly of the Western temporal imagination over history, including linear time and racial capitalism, which limits the more capacious potential for multicultural decolonial perspectives. Big Data Time Machines, for better and/or for worse, are poised to radically reconfigure the politics of what it means to "know history" in the digital age. The paper concludes by turning to speculative fiction about time travel by Black, Latinx, Caribbean, and Indigenous storytellers whose work unsettles the hegemonic dominance of this historical bloc (Dillon, 2012; Cornum, 2023; Alcocer, 2011). These decolonial and speculative critiques might help internet scholars, artists, archivists and historians to work together in rupturing the hold that Western temporal and taxonomic systems of thought have over history, while also imagining alternative and more just data futures.

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