Chapter 48
Expressing Data, Space, and Time with Tableau Public™:
Harnessing Open Data to Enhance Visual Learning through Interactive Maps and Dashboards

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ABSTRACT

Virtually every subject area depicted in a learning object could conceivably involve a space-time element. Theoretically, every event may be mapped geospatially, and in time, these spatialized event maps may be overlaid with combined data (locations of particular natural and human-made objects, demographics, and other phenomena) to enable the identification and analysis of time-space patterns and interrelationships. They enable hypothesis formations, hunches, and the asking and answering of important research questions. The ability to integrate time-space insights into research work is enhanced by the wide availability of multiple new sources of free geospatial data: open data from governments and organizations (as part of Gov 2.0), locative information from social media platforms (as part of Web 2.0), and self-created geospatial datasets from multiple sources. The resulting maps and data visualizations, imbued with a time context and the potential sequencing of maps over time, enable fresh insights and increased understandings. In addition to the wide availability of validated geospatial data, Tableau Public is a free and open cloud-based tool that enables the mapping of various data sets for visualizations that are pushed out onto a public gallery for public consumption. The interactive dashboard enables users to explore the data and discover insights and patterns. Tableau Public is a tool that enables enhanced visual- and interaction-based knowing, through interactive Web-friendly maps, panel charts, and data dashboards. With virtually zero computational or hosting costs (for the user), Tableau Public enables the integration of geospatial mapping and analysis stands to benefit research work, data exploration and discovery and analysis, and learning.

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INTRODUCTION

In the age of "big data" and "open data," the broad public has access to more information than they have ever had historically. Some of this data has been released to the public domain through open government endeavors (Gov 2.0). Others have been shared as part of the "digital exhaust" (or "data exhaust") of Web 2.0, or the social age of the Web (with APIs enabling access to a range of social media platforms, social networking sites, microblogging sites, wikis, blogs, and other platforms). Another source of datasets comes from academia, with a range of sites that host downloadable datasets as part of the formal publication process. Beyond these prior open-access and / or open-source datasets, there are also propriety ones released by for-profit companies as part of their public service and public relations outreaches. Much data are collected by sensor networks in physical spaces and robots on the Internet and Web. The popularity of mobile devices, navigation systems, and software applications that track location data means that there are publicly available datasets of geo-spatial or locative information. Much of this data, though, cannot be understood coherently without running them through data analysis and visualization tools—to identify patterns and anomalies, as well as create data-based maps, graphs, and charts. If "big data" is going to have direct relevance to the general public, they have to be "big data"-literate: they have to be able to understand and query big data. Concomitant with the "democratization of data" are some tools that enable data processing and visualization. One leading free online tool, Tableau Public, the free public version of a professional enterprise suite (Tableau Professional), serves as a gateway to such data analysis and visualization. This chapter provides a light overview of the software tool and its possible use in multimedia presentations to enhance discovery learning.

The dynamically generated visualizations themselves are almost invariably multivariate and multidimensional, with labeled data in a variety of accessible visualizations; these may include multiple pages of related visualizations. While these visualizations may be complex, there are others that may be created for other purposes than research and discovery; some data visualizations are whimsical and attention-getting (to capture attention and encourage awareness of the data).

The public edition of Tableau Public provides a gigabyte of storage for each registered user. There is no "save" for the visualizations except through publishing out the data visualizations on the Tableau Public Gallery, which makes all visualizations publicly viewable in an infographics and data visualization gallery, along with the downloads of related datasets. The panel charts are zoomable and pan-able; they enable data filtering (with responsive dynamic revisualizations). This gallery is of particular use if public awareness is part desired outcomes. Such maps and data visualizations have been used in an emerging class of digital narratives, used by journalists and other storytellers (Segel & Heer, 2010) in computational journalism, or journalism which relies on in-depth data processing to tell "data stories" or "narrative visualizations". Such presentations meld data, statistics, design, information technology, and storytelling, for a broad audience. As such, these visualizations appear also as parts of commercial sites based around business, real estate, and others. They are used as online conversation starters in a variety of contexts.

Contents may be authored in Windows machines only, but the dashboards and data visualizations are viewable on Windows and Mac machines without any plug-ins required (just browsers with JavaScript enabled). The makers of this tool use the tagline, "Data In. Brilliance Out," to express their objectives for the tool. As a tool for multimedia presentations, Tableau Public enables rich and interactive data visualizations to broaden the perceptual (visual) and cognitive (symbolic reasoning, textual, and kinesthetic) learning channels to understand data. Tableau Public is a free tool (albeit a cloud and a hosted