Visual Showcase: An Illustrative Data Graphic in an 18th–19th Century Style

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Abstract

We exhibit an data graphic poster that emulates the style of historic hand-made visualizations of the 18th–19th century. Our visualization uses real data and employs style elements such as an emulation of ink lines, hatching and cross-hatching, appropriate typesetting, and unique style of computer-assisted facial drawings.

1 Introduction and Motivation

Illustrative visualization as an NPAR application domain has a two-fold design space. Typically it uses principles from traditional illustration to improve computer-generated visualization [Rautek et al. 2008]. However, sometimes it can also be its graphical style that makes a visualization an illustrative one—the visual style and the design principles being employed [Agrawala et al. 2011] then representing the illustrativeness (and added usefulness) of a visualization. Thus aspects of CAe also play a role in illustrative visualizations, and the specific style in an illustrative visualization can affect a viewer's perception and cognition as Agrawala et al. [2011] argue.

As an example in this second part of the illustrative visualization design space we created a poster (as an output of an implemented visualization tool) that aims to re-create the visual style of the historic hand-made visualizations of the 18th and 19th centuries, such as the ones by Minard (e. g., Fig. 1), Playfair, Priestley, and Nightingale. These early infographics have generated considerable interest among visualization researchers and are generally seen as compelling. Thus imitating their style may entice people to spend more time engaging with the data. Our work arose as a lab-wide effort to create such an aesthetically pleasing and engaging visualization of personal data on the occasion of our visualization team leader's 50th birthday. Almost all lab members participated in obtaining the necessary data, implementing the visualization elements, and realizing the visual target style. In the following we briefly outline the general design principles that we employed and provide some details on some of the expressive style elements that we used.

2 General Design Principles & Realization

Rather than making up fake data suitable for depiction, our visualization is based on real data: publications, collaborations, social media activity and repository use, travels, calendar events, and yearly portrait images. In contrast to, e. g., many of Minard's visualizations (e. g., Fig. 1), ours thus focuses on time instead of space (and time) and we arranged all data with respect to a timeline. Similar to many of the targeted visualizations, however, we also aim for a precise depiction. Despite the originals being hand-made, all lines, shapes, and writing had to be depicted accurately—only the inking tools were to exhibit slight noise due to the ink deposit process of the used pen (see below). Also, we chose the font *AntiquarianScribe* because it imitates the character of the writing used by a 18th century cartographer. Similarly inspired by the example visualizations, we used a small set of well-chosen colors (white, black, and a light beige) for data depiction and only allowed color fills to be varied by hatching. To be able to use hatching for a number of different but overlapping elements, we used the principle of opposing hatching directions (e. g., hatching in the bar graphs or the faces vs. the background hatching indicating every other year). Finally, we added elements to visually link different visualizations and several (partially manually adjusted) annotations and produced the poster in vector format for reproduction [Isenberg et al. 2005].

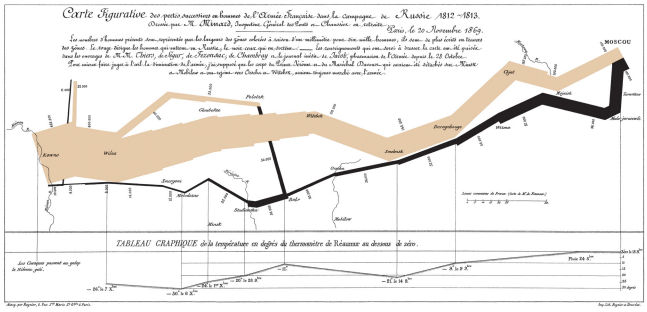

Figure 1: *Minard's visualization of Napoleon's 1812 Russian campaign, published in 1869. The image is in the public domain.*

We developed an inking class that replaces Java2D's normal rendering and that supports vector output. The inking is realized using small offsets to a line's outline to emulate the pattern of ink being deposited on paper as one draws a line. The offset pattern is inspired by the characteristics of the chosen font. Curves are realized by drawing Bézier segments as a polyline with a sufficient number of sub-segments. Regular and cross-hatching for data shapes is implemented as a straight-forward 2D hatching pattern with parametrizable spacing. The cross-hatching of the portrait images is based on binary shaded silhouette images with the hatching lines being placed at a 90° angle and using wide gray background lines and thin black foreground lines (for details see [Dragicevic et al. 2013]).

3 Poster

The poster we exhibit in the visual showcase (shown on the following page) is printed in landscape format on roughly A0 size (precisely 112 cm × 82 cm including the frame) to be large enough to be readable. The original poster is set in a wooden frame that also resembles those from the target period. With this exhibit hope to start a discussion at the conference on illustrative visualization and the use of expressive techniques in the different visualization domains.

References

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