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].

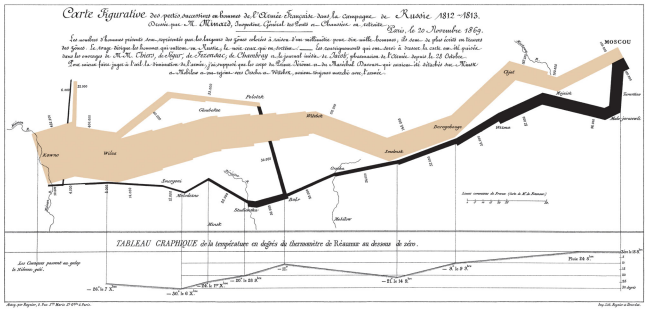

Figure 1: *Minard's visualization of Napoleon's 1812 Russian campaign, published in 1869. The image is in the public domain.*

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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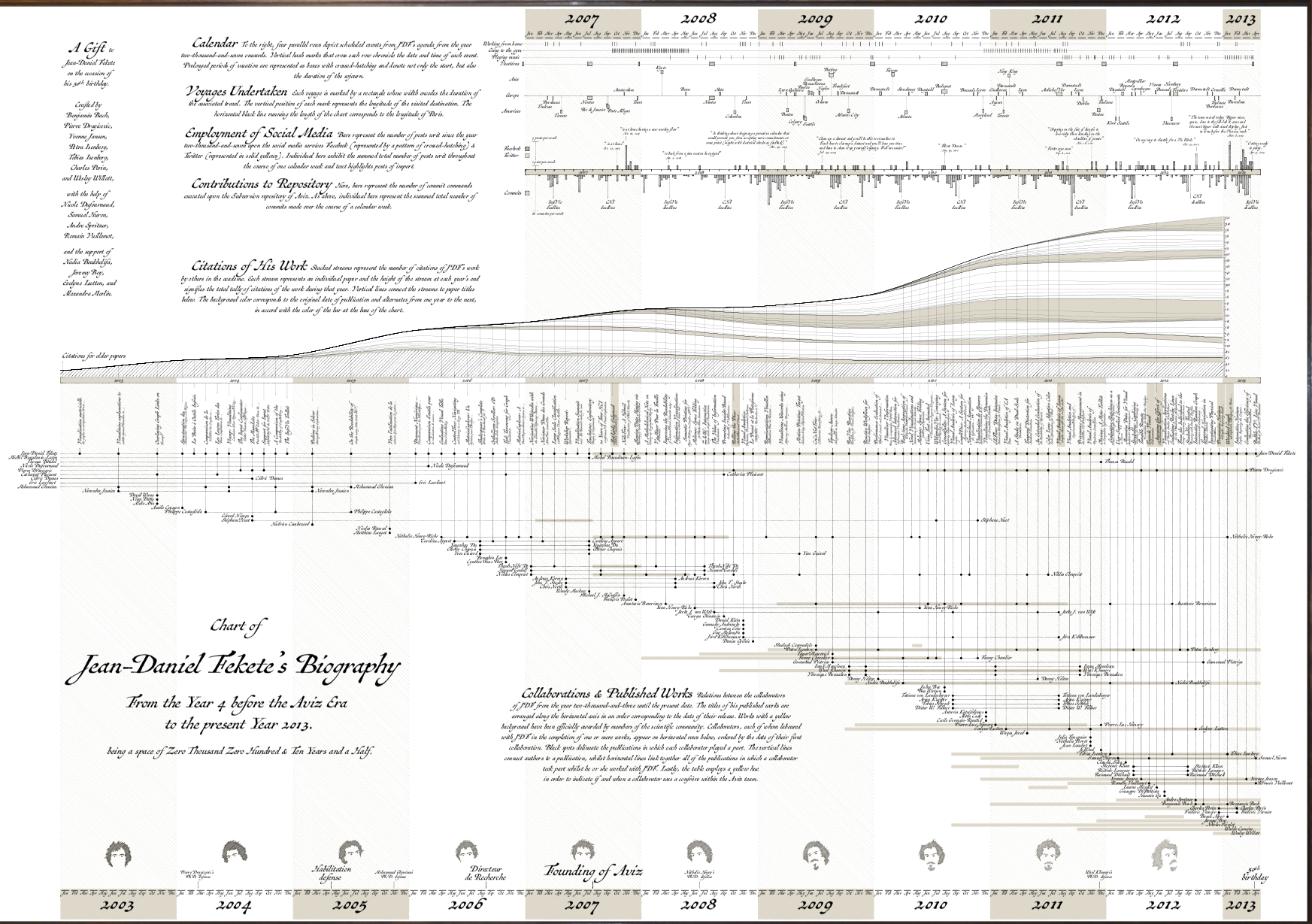
A Gift to Jean-Daniel Fekete on the occasion of his 40th birthday.
Crafted by Benjamin Bach, Pierre Dragicevic, Yvonne Jansen, Petra Isenberg, Tobias Isenberg, Charles Perin, and Wesley Willett,
with the help of Nicole Dufournaud, Samuel Huron, Andre Spritzer, Romain Vuillemot,
and the support of Nadia Boukhelifa, Jeremy Boy, Evelyne Lutton, and Alexandra Merlin.
Calendar To the right, four parallel rows depict scheduled events from JDF's agenda from the year two-thousand-and-seven onwards. Vertical hash marks that cross each row chronicle the date and time of each event. Prolonged periods of vacation are represented as boxes with crossed-hatching and denote not only the start, but also the duration of the sojourn.
Voyages Undertaken Each voyage is marked by a rectangle whose width encodes the duration of the associated travel. The vertical position of each mark represents the longitude of the visited destination. The horizontal black line running the length of the chart corresponds to the longitude of Paris.
Employment of Social Media Bars represent the number of posts writ since the year two-thousand-and-seven upon the social media services Facebook (represented by a pattern of crossed-hatching) & Twitter (represented in solid yellow). Individual bars exhibit the summed total number of posts writ throughout the course of one calendar week and text highlights posts of import.
Contributions to Repository Here, bars represent the number of commit commands executed upon the Subversion repository of Aviz. As above, individual bars represent the summed total number of commits made over the course of a calendar week.
Citations of His Work Stacked streams represent the number of citations of JDF's work by others in the academic. Each stream represents an individual paper and the height of the stream at each year's end signifies the total tally of citations of the work during that year. Vertical lines connect the streams to paper titles below. The background color corresponds to the original date of publication and alternates from one year to the next, in accord with the color of the bar at the base of the chart.
Citations for older papers
2007
2008
2009
2010
2011
2012
2013
Working from home
Going to the gym
Physician exams
Positions
Asia
Europe
Americas
Facebook
Twitter
Commits
Chart of
Jean-Daniel Fekete's Biography
From the Year 4 before the Aviz Era to the present Year 2013.
being a space of Zero Thousand Zero Hundred & Ten Years and a Half.
Collaborations & Published Works Relations between the collaborators of JDF from the year two-thousand-and-three until the present date. The titles of his published works are arranged along the horizontal axis in an order corresponding to the date of their release. Works with a yellow background have been officially awarded by members of the scientific community. Collaborators, each of whom laboured with JDF in the completion of one or more works, appear on horizontal rows below, ordered by the date of their first collaboration. Black spots delineate the publications in which each collaborator played a part. The vertical lines connect authors to a publication, whilst horizontal lines link together all of the publications in which a collaborator took part whilst he or she worked with JDF. Lastly, the table employs a yellow hue in order to indicate if and when a collaborator was a confrère within the Aviz team.
Habilitation defense
Directeur de Recherche
Founding of Aviz
40th birthday
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013