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Assignment 2 Part A

Declaration: I have read, and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at http://www.tcd.ie/calendar. I have also completed the Online Tutorial on avoiding plagiarism 'Ready Steady Write', located at http://tcdie.libguides.com/plagiarism/ready-steady-write.

Description:

Tools: The following visualization was built using ***Leaflet.js*** and ***D3.js*** along with ***HTML***, ***CSS***, and ***JS*** in the Firefox browser. The following .png image was obtained by taking a screenshot of the browser window. The original image, as rendered, is of size 1500 by 850 pixels. The provided dataset was not manually modified in any manner. All data processing was handled by code.

Data: The `d3.csv()` function was used to load the *minard-data.xlxs* file that was exported from excel as csv. Once loaded data is available, functions `extractCityData()`, `extractPlatoonData()` and `extractTempData()` are called to pre-process the dataset and transform it into the desired format for displaying cities on the map, army routes on the map and the temperature line plot respectively.

Code Structure: All code is contained within files *index.html*, *index.*css, and *index.*js. The entire visualization is an SVG (all text, map, and markings). Leaflet.js was used to incorporate a map fetched from OpenStreetMap. This map is rendered as an SVG element to which are appended 2 other SVG elements (one for the visualization heading and one for the temperature line graph). Initial portion of the *index.js* file handles loading/configuration of the map using Leaflet.js. Then plot heading and subheading are then added, followed by definition of 3 key functions `plotPlatoonData()`, `plotCityData()`, and `plotTempData()` responsible for adding markers, lines and labels to the map plot using methods offered by Leaflet.js like `L.marker()` and `L.polyline()`. Submitted code is well commented for improved readability.

Data Encoding: Of the 8 channels, this visualization mainly leverages 3 as stated below.

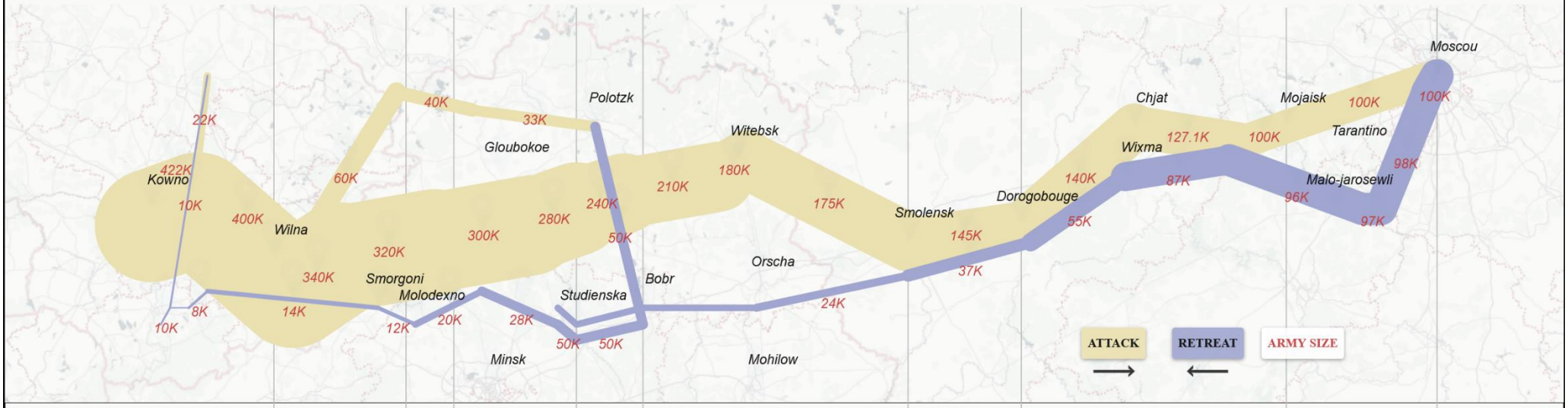
1. **Position**: Geographic data corresponding to (latitude, longitude) army position at different points in the campaign is captured on a map. Labels displaying quantitative values denoting no. of survivors is also strategically positioned close to lines denoting each leg of the journey. Difference is temperature is encoded in the line plot by varying heights and their horizontal placement also corresponds to the longitude at which they were measured. Time taken during the return journey is also encoded into points on the line plot by labelling them with the associated month in which the temperature was measured. An interesting placement choice is that of the temperature line plot y axis. Choosing to place this axis on the right rather than on the left as is typically the case with line plots, intuitively guides the viewer's eye to read this line plot from right to left thereby subtly signalling relation of values here with the return journey from Moscow rather than the journey towards there.
2. **Size**: Army strength (no. of survivors) at each point in the journey is captured by the thickness of the lines on the plot.
3. **Colour:** The categorical attribute capturing whether the campaign was attacking/retreating is encoded by means of colour such that yellow corresponds to 'attack' and blue corresponds to 'retreat'.

Pros: This visualization effectively captures 5 attributes (journey positions, attack/retreat, temperature, army size, time taken for retreat) using the right encoding channels for each attribute. Changes in army size is projected with good discriminability that evidently and accurately informs the viewer of the disastrous nature of the campaign given the obvious differences in line width. Related points on the map were effectively grouped via connecting lines.

Cons: The visualization combines the Hue and Size channels which can potentially lead to the darker coloured line appearing more thinner than it is when compared to the lighter line. This was avoided by increasing brightness and decreasing saturation of the darker colour (blue). The line plot corresponds to temperatures on the return journey only (this is mentioned via 2 bold immediately striking words in the heading), thus, ideally the vertical grey lines should touch the blue path and not extend beyond/under it. This was, however, not possible to implement in the given timeframe due to limited control features offered by Leaflet.js and challenges surrounding its compatibility with D3.js. There was no way to retrieve latitude values associated with each point where the vertical line intersects the journey lines as these, as given in the dataset, don't precisely align with available city or army location coordinates. An attempt was made to compute the equation of the line between every 2 journey points and obtain latitude upon providing corresponding longitude on this line, but this produced inaccurate results likely due unknown parameters related to Leaflet's pixel to geographic coordinates mapping scheme.

FIGURATIVE MAP of the successive losses in men of the French Army in the RUSSIAN CAMPAIGN OF 1812-1813

Drawn by Mr. Minard, Inspector General of Bridges and Roads in retirement. Paris, 20 November 1869. The numbers of men present are represented by the widths of the coloured zones. Yellow designates men moving into Russia and blue shows those on retreat. - The information used for drawing this map were taken from the works of Messrs. Chiers, de Segur, de Fezensac, de Chambray and the unpublished diary of Jacob, pharmacist of the Army since 28 October.



GRAPHIC TABLE of the TEMPERATURE in degrees of Reaumur Thermometer during RETREAT ONLY