Introductory Assignment

DATA VISUALISATION

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Minard's map of the retreat of Napoleon's army from Russia:

The visualisation of the data is done through the use of D3.js JavaScript library.

The map shows the (approximate) position of Napoleon's army as it invades and retreats from Russia in the 1812 campaign; the width of the lines show the size of the army as it dwindles from a maximum of 340,000 to an end value of 4,000. No scale is displayed for concision. The line colors Blue, Orange and Green represent the 3 Army Divisions.

There are minor improvements in this visualisation as compared to the original such as different branches of the army have been given their own colour.

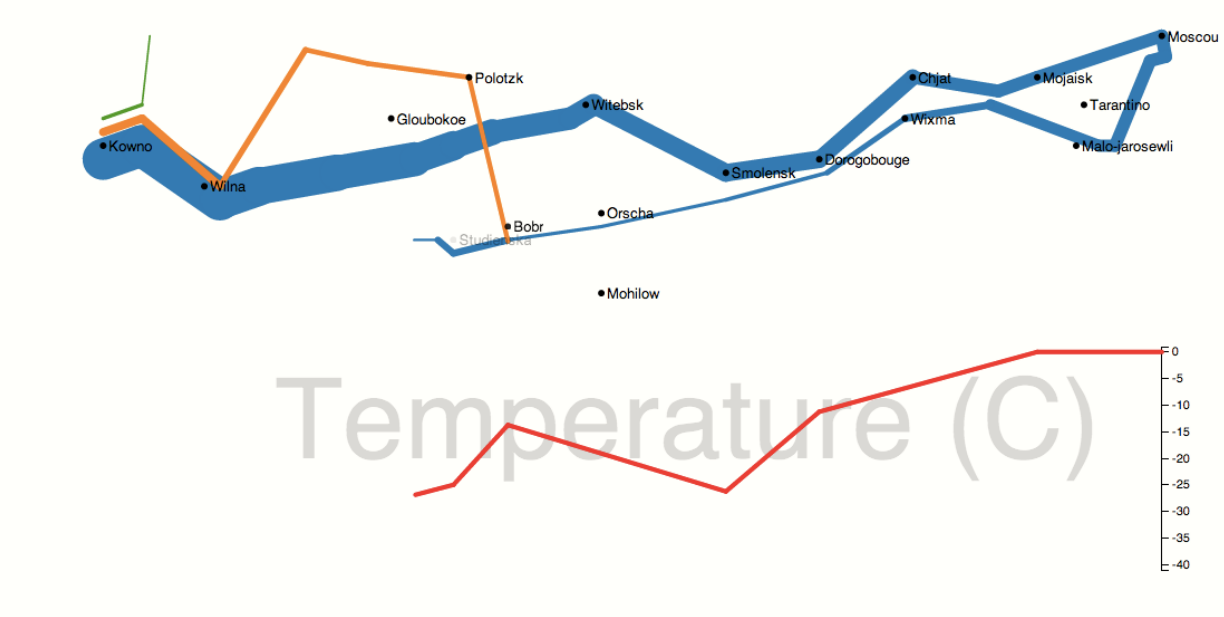

Figure 1: A reimplementation of Charles Joseph Minard's map for Napoleon's Army Campaign

Usage for D3 trail layout – It is instantiated by calling the function: once parameters are set, the layout() method is run to get values back.

Particle Physics Experiments at LHC:

When it comes to computing and analysing data of subatomic particles, it becomes quite difficult to keep track of such a large amount of data for them.

The data is collected from various detectors such as ALICE, ATLAS, CMS etc. which is analysed by scientists. Collisions of the particles travelling at such a high speed in the plasma happen within tiny fraction of a second. Picking out the particles deemed important, the paths are retraced and this is where graphical visualisation of this data is really important.

It helps by presenting us with a visual/graphical proof to confirm the existence/interaction of concerned particle(s) among others.

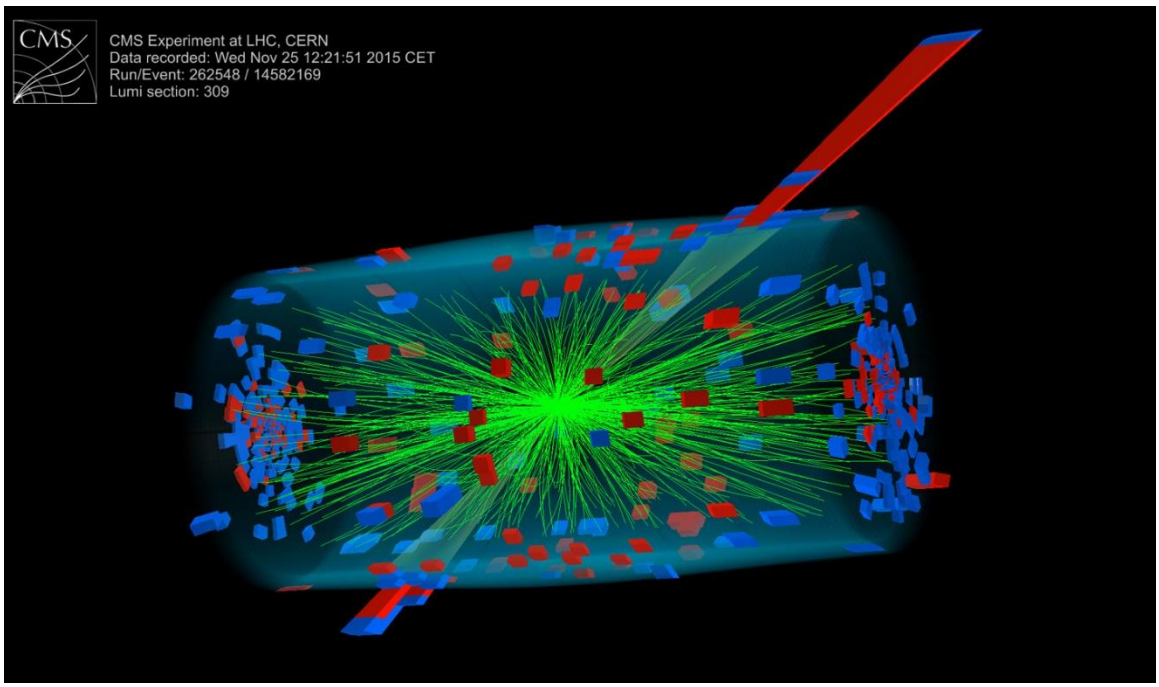

Figure 2: Lead ions collide in the CMS detector (in LHC, at CERN)

This requires not just various 2D graphs and charts but also volumetric rendering. There are various open-source tools which can be used to tackle this problem.

ParaView, an open-source tool for parallel visualization of massive datasets, the Visualization Toolkit (VTK), an open-source toolkit for scientific visualization, and Tangelohub, a suite of tools for large data analytics.

Another useful data visualisation system is Lemonweb. It is the data visualization component of the LHC Era Monitoring (Lemon) system. It consists of two subcomponents: a data collector and a web visualization interface.

References:

1) https://en.wikipedia.org/wiki/Charles_Joseph_Minard
2) http://benschmidt.org/D3-trail/minard.html
3) http://www.datavis.ca/gallery/minard/minard.txt
4) http://mbostock.github.io/protovis/ex/napoleon.html
5) http://opendata.cern.ch/
6) https://cds.cern.ch/record/1988107?ln=en
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