Report

GP Team 2015

December 23, 2015

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1 Introduction

What is a graphic? How can we succinctly describe a graphic? And how can we create the graphic that we have described?

These are important questions for the field of statistical graphics. One way to answer these questions is to develop a grammar . A good grammar will allow us to gain insight into the composition of complicated graphics, and reveal unexpected connections between seemingly different graphics.

A grammar provides a strong foundation for understanding a diverse range of graphics. A grammar may also help guide us on what a wellformed or correct graphic looks like, but there will still be many grammatically correct but nonsensical graphics.

This is easy to see by analogy to the English language: good grammar is just the first step in creating a good sentence. Grammar makes language expressive. A language consisting of words and no grammar (statement = word) expresses only as many ideas as there are words. By specifying how words are combined in statements, a grammar expands a language's scope.

In other hand grammar of graphics is a tool that enable us to concisely describe the components of graphic. Such a grammar allow us to move beyond named graphics scatterplot and gain insight into the deep structure that underlies statistical graphics .
The power of the grammar is illustrated with a selection of examples that explore different components and their interactions .

2 Literature review

2.1 Data Visualization

2.1.1 Definition

Data visualization is the presentation of data in a pictorial or graphical format. For centuries, people have depended on visual representations such as charts and maps to understand information more easily and quickly.

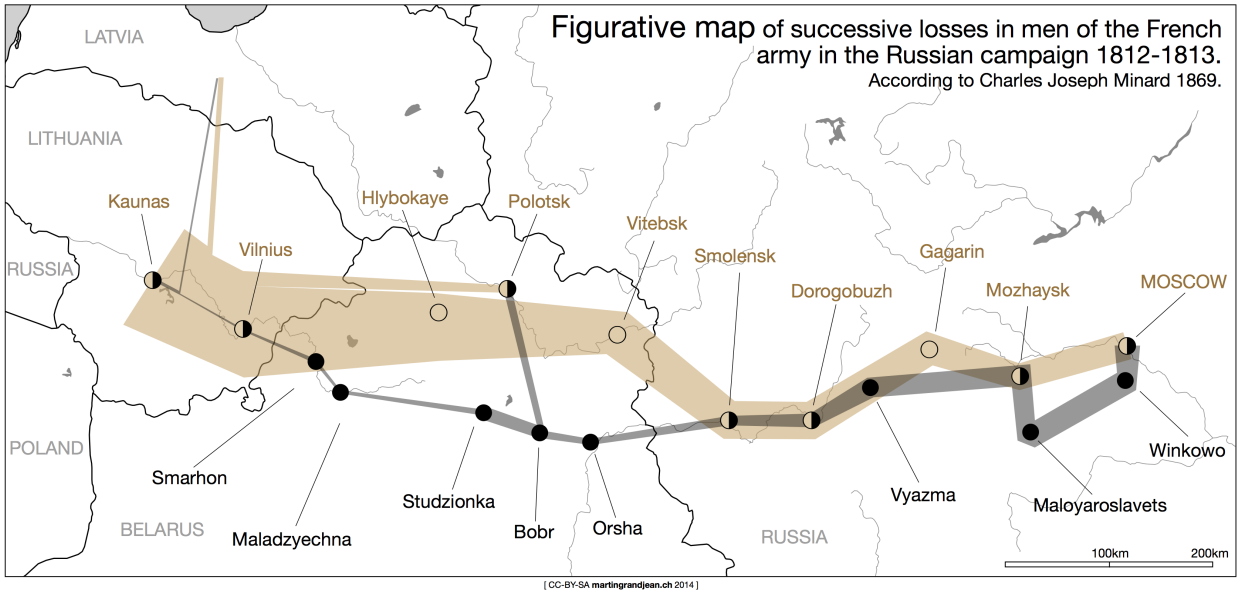
Because of the way the human brain processes information, it is faster for people to grasp the meaning of many data points when they are displayed in charts and graphs rather than poring over piles of spreadsheets or reading pages and pages of reports.

2.1.2 Data visualization importance

Visualizations help people see things that were not obvious to them before.

A spreadsheet cannot visually represent the information due to data presentation limitations, would spend hours searching among thousands of rows and columns of data with still no concrete answer about the relationship between two factors.

Figure 1: The path of Napoleon's troops across the Russian Empire of Alexander I



3 Grammar of graphics

3.1 What is the meaning of Grammar?

the whole system and structure of a language or of languages in general, usually taken as consisting of syntax and morphology (including inflections) and sometimes also phonology and semantics.
So if we think about the graphics as a language from the perspective of the grammar we should put in our minds those rules (grammar) that manage that manage these sentences or the components of the language (charts).

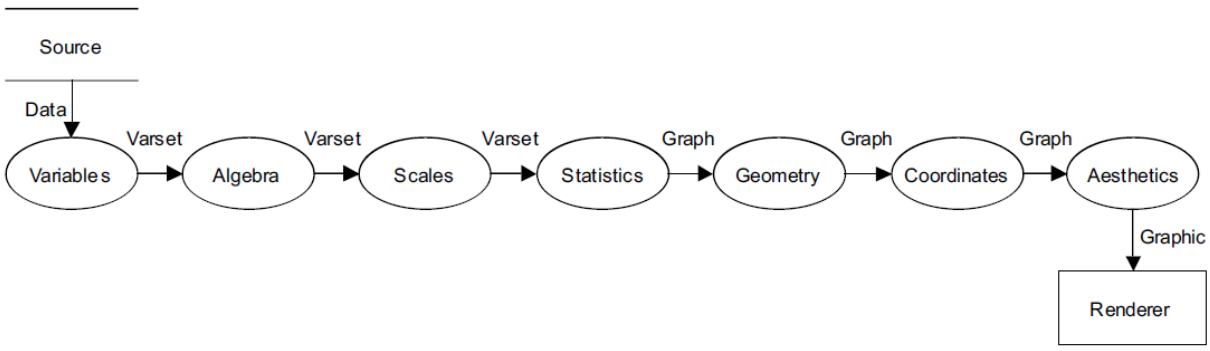
3.2 What is the Grammar of Graphics?

The regime of constructing the graphs depending on predefined rules, Hence The grammar of graphics takes us beyond a limited set of charts (words) to an almost unlimited world of graphical forms (statements).

3.3 Grammar of graphics features

- Orthogonal set of features describes all common charts, Virtually all uncommon charts.
- Language is flexible enough to
  - describe our known chart types
  - describe unknown chart types

Figure 2: Grammar of graphics layers



4 Comparative study among GoG libraries

Table 1: Comparative Study

Library	ggplot2	ggvis	ggd3	vega
Implementation	Fully Implemented	Fully Implemented	Partially Implemented	Partially Implemented GOG
Language	R	R	JavaScript	JavaScript
Issue	No interactivity.	Limited Interactivity	-Have fixed set of geoms. -No interactivity.	Set of static geometrics.
Description	It takes care of many of the fiddly details that make plotting a hassle (like drawing legends) as well as providing a powerful model of graphics that makes it easy to produce complex multi-layered graphics.	-Declaratively describe data graphics with a syntax similar in spirit to ggplot2. -Create rich interactive graphics that you can play with locally in Rstudio or in your browser.	Stop development	Vega is a declarative format for creating, saving, and sharing visualization designs.

5 Our Approach

Design & Implement a library that is based on Grammar of graphics to be the baseline of continuous contribution in the field of data visualization.

1. GoG library.
    - built with javascript runs on Node.js environment
2. Application Layer.
    - built on top of Electron.
3. Package Manager.
    - which will manage application extensions and plugins.

6 Team members playrolls

6.1 Raafat Sobhy

- List & implement Coordinate systems
    - Number line
    - Cartesian coordinate system

- Polar coordinate system
- Cylindrical and spherical coordinate systems
- Homogeneous coordinate system

6.2 Sherif Embarak

- adding full documentation to all function
- partial implementation for link, bin, region and summary functions
- importing csv files to js objects

6.3 Ahmed Fouad

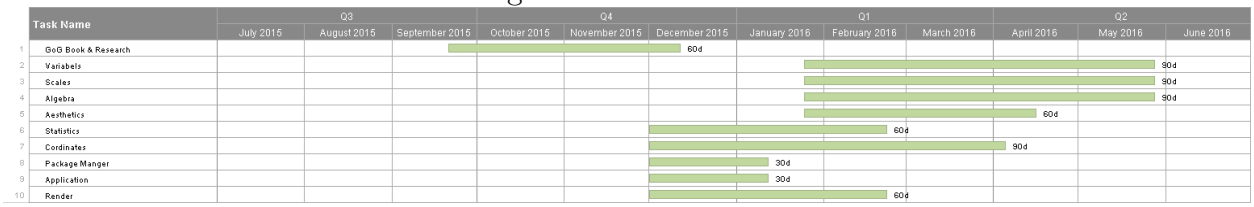
- List predefined figures in GoG book
- implementing geometric components (point, line, circle)

6.4 Yusuf Mohamed

- Package Manager
  - fetch & remove plugins from npm and place it in specific folder which will be determined after adding path variable for our application.
- Application
  - Using Electron, photon kit and internal process communication 'ipc'

7 Gantt Chart

Figure 3: Gantt chart



8 Deliverable

Partial implementation of GoG library which will make us able to generate the following charts

- Scatter Plot
- Area Chart
- Line Chart
- Bar Chart
- Histogram
- Parallel Coordinates
- Scatter Plot Matrix

References

[1] Vega `http://vega.github.io/`

[2] ggplot2 `http://ggplot2.org/`

[3] ggvis `http://ggvis.rstudio.com/`

[4] ggd3 `http://benjh33.github.io/ggd3/`