/burl@stx null def /BU.S /burl@stx null def def /BU.SS currentpoint /burl@lly exch def /burl@llx exch def burl@stx null ne burl@endx burl@llx ne BU.FL BU.S if if burl@stx null eq burl@llx dup /burl@stx exch def /burl@endx exch def burl@lly dup /burl@boty exch def /burl@topy exch def if burl@lly burl@boty gt /burl@boty burl@lly def if def /BU.SE currentpoint /burl@ury exch def dup /burl@urx exch def /burl@endx exch def burl@ury burl@topy lt /burl@topy burl@ury def if def /BU.E BU.FL def /BU.FL burl@stx null ne BU.DF if def /BU.DF BU.BB [/H /I /Border [burl@border] /Color [burl@bordercolor] /Action « /Subtype /URI /URI BU.L » /Subtype /Link BU.B /ANN pdfmark /burl@stx null def def /BU.BB burl@stx HyperBorder sub /burl@stx exch def burl@endx HyperBorder add /burl@endx exch def burl@boty HyperBorder add /burl@boty exch def burl@topy HyperBorder sub /burl@topy exch def def /BU.B /Rect[burl@stx burl@boty burl@endx burl@topy] def /eop where begin /@ldeopburl /eop load def /eop SDict begin BU.FL end @ldeopburl def end /eop SDict begin BU.FL end def ifelse

Visual Analytics on World University Rankings

Valerio Evangelisti

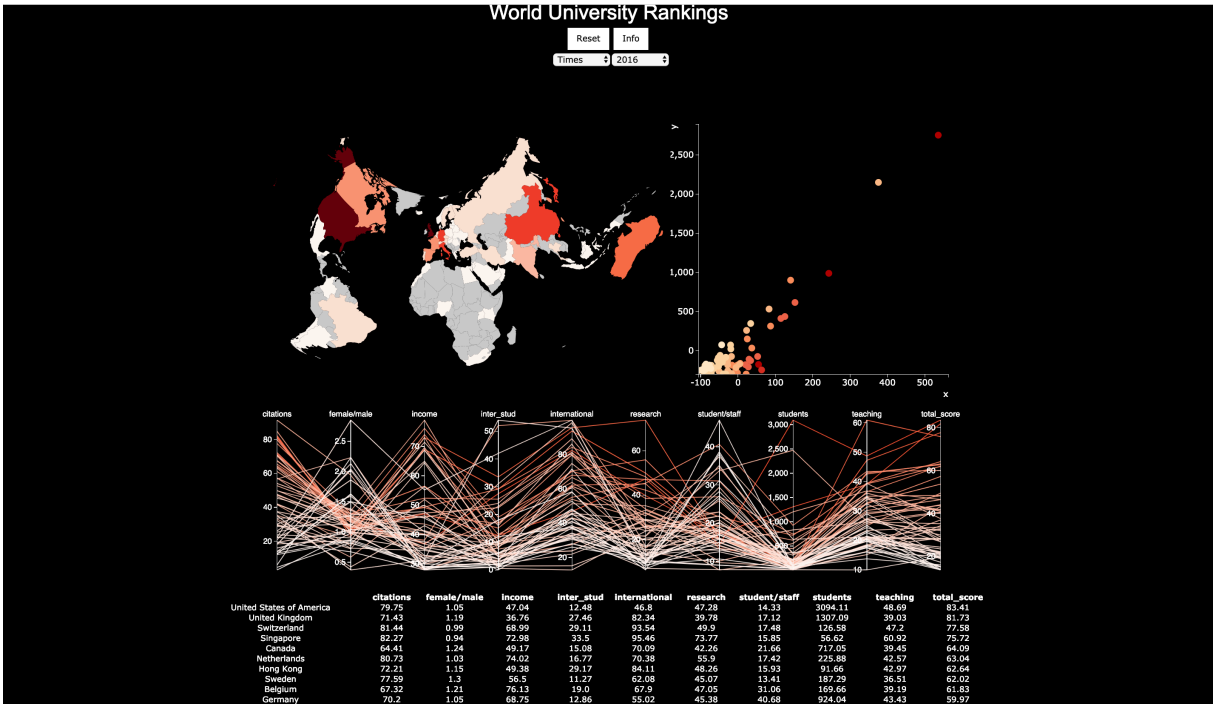

Fig. 1. Sceenshot of the entire interface.

Abstract— The project here described was developed to put into practice all teachings of the Visual Analytics course. It concerns the visualization of world university rankings to let the user have a clearer idea about the world university context. All data are represented using well-known views to keep the interface as simple as possible to interact with.

The user can choose thanks to a select form which ranking and year he wants to see.

In details, the map lets select countries for which the user wants to know more, the scatterplot is the representation of an MDS algorithm that visualise the distance between countries or universities. At the bottom of the page I have a parallel line chart that plots the specific value, this value are than classified below it in a ranking in which the precise value for each characteristic is expressed.

The interface was thought to fit in a FullHD (1920x1080) screen, even if it works also if we resize the browser window (the minimum resolution supported is 1440x1080).

3.1 Map

Fig. 2. Map in which the nations are coloured considering the number of university inside the specific rank

The map is the first element that allows the user to interact with the application. On the basis of the user choice, nations are coloured darker and darker depending on the number of university of that nation present in the ranking. Clicking on a nation lunches a new analytic that compute all the necessary data for the selection.

3.2 Scatterplot

Fig. 3. Scatterplot that represents the whole dataset. Each point is a nation/university and the colour of the point encodes the total score of each

Each point in the scatterplot represents a nation or a university and the colour encodes the total score. I used two different colour scaling d3.scaleQuantize().range(d3.schemeOrRd[9])[1] and d3.scaleQuantize().range(d3.schemeYlGn[9])[1]. The choice of which use depend on how many countries the user select. In case of single selection, the scatterplot will show the university of the corresponding nation whit the first colour scheme. Instead if the choice is of two nations, the scatter will plot the universities of both countries but with different colour to let the user distinguish better the differences.

Due to the high number of element of the dataset, it was mandatory to apply an algorithm that let visualise everything better. I decided to apply MDS [?] . It computes the level of similarity of individual cases of a dataset, returning the result with the two coordinates x and y A 2D scatterplot is the best way to graphically represent the relation between points and to spot possible clusters. In this case it helps the student to quickly see that most of the bad and good universities are grouped together in a particular area.

Each point has associated two event handlers. The first one allows to make visible a tooltip showing the name of the country/university just by mouseovering over it. The second handler is associated to click events: by clicking on two different points on the scatterplot, it will show a popup table with the comparison of the two selected elements.

3.3 Parallel Coordinates

Fig. 4. Parallel Coordinates that represents the whole dataset, one line for each country/university. The color again encodes the classification of the customer

Parallel Coordinate view is one of the best way to represent data with more than two dimensions in a 2D space.

Depending on which ranking is chosen by the user, the chart will have a different numbers of columns. Each line in the Parallel Coordinate chart represent one country/university.

Thanks to a brushing event handler it is possible to apply some filters to this chart, so that the user can visualise better what it's more important for him. It is also possible change the position of the y-axis to let the user visualise the chart as he prefers.

This chart is strongly related to the table below it.

3.4 Table

Fig. 5. Table in which are showed the 10 better countries/university in the selection

As said before, this table is strongly related to the Parallel Coordinate chart. This table will show the first ten element in the specific ranking or in the specific selection made by the user form the map or the Parallel chart.

To let this table be more understandable and complete the integration with the above chart, a mouseover handler make not only the selected row to highlight (so that the user is not confused between all the numbers) but also highlight the corresponding line in the Parallel chart.

4 Analytics

Since Javascript is not so fast handling large amount of data and it is not suitable doing intense computations, we needed to move the analytics part into a python program.