KTH Stockholm
CSC :: HPCViz
Visualization, Spring 2016, DD2257
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Homework assignment No. 02

Due April 22, 2016

Task 2.1: Dualities for Parallel Coordinates — 2+4+4 P

Create a new 2D experiment. Draw a scatter plot and a corresponding parallel coordinates plot side-by-side. In this experiment, both plots will show the same data.

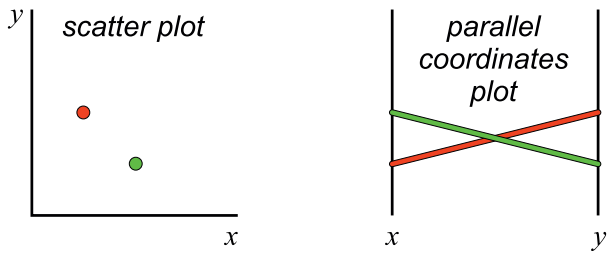

Figure 1: Arrangement of scatter plot and parallel coordinates plot.

For each of the following tasks, create a new button that triggers a function, which fills the scatter plot and the parallel coordinates plot with the same data. **Always show both plots at the same time.**

(a) Create data that forms a straight line with a negative slope in the scatter plot.

(b) Create data that forms a circle in the scatter plot.

(c) Create data that forms a hyperbola in the scatter plot.
Hint: It is best to use the hyperbolic sine and hyperbolic cosine functions to create the hyperbola as follows:

$$\begin{aligned} x &= a\cosh\mu \\ y &= b\sinh\mu \end{aligned}$$

where a, b allow to adjust the shape of the hyperbola. Good starting values are $a = b = 1$. Furthermore, choose $-3 \leq \mu \leq 3$ with a high number of sample points.

(d) (Bonus Points: +5) Compute and show both arms of the hyperbola from (c). Show the corresponding ellipse in parallel coordinates in *full*, i.e., not only one side.

Task 2.2: Parallel Coordinates Plot — 10 P

You are given a multidimensional data set. Load it from disk and display all its dimensions in a parallel coordinates plot.

Details:

Create a new 2D experiment. Allow the user to define a file name using a string property `ADD_STRING_PROP()`.

Load the given file as a CSV file. CSV means *comma separated values*. CSV files are text files where each line represents a different observation point. Within a line, the dimensions are separated by commas. Here is an example:

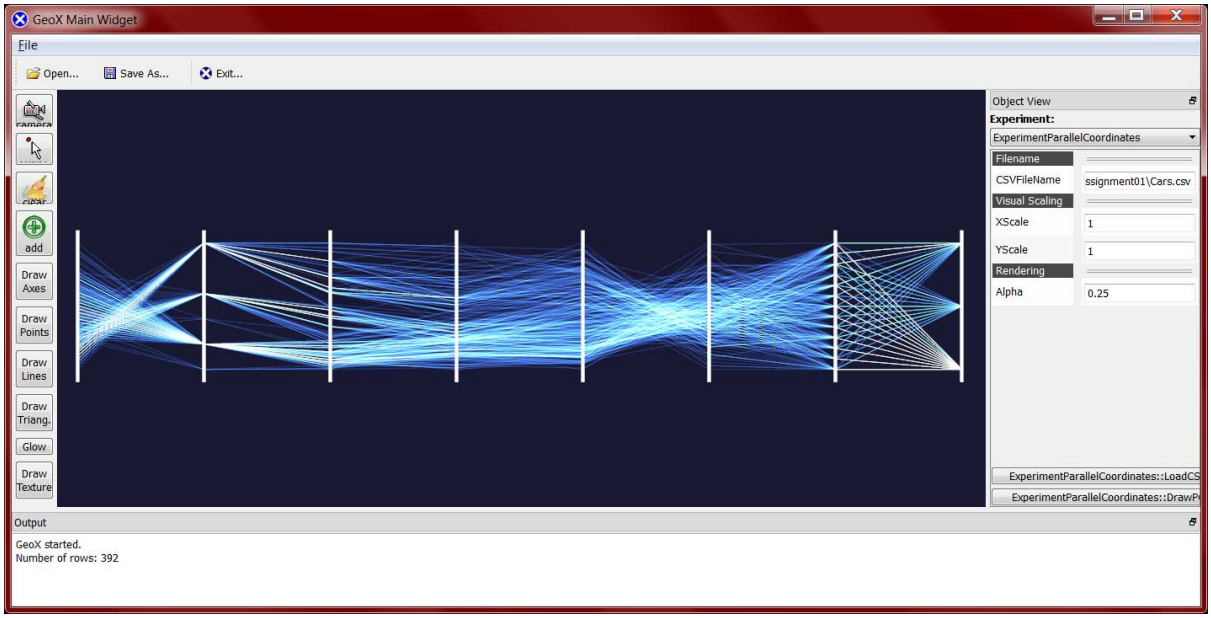

Figure 2: Result after loading the *Cars* data set.

```
MPG,Cylinders,Displacement,Horsepower,Weight,Acceleration,Year,Origin
18,8,307,130,3504,12,1970,1
15,8,350,165,3693,11.5,1970,1
```

The file starts with a header line, which describes each dimension. This is the only line in which you have alphabetic characters. All following lines contain only numbers and commas. You can assume that there are no spaces and no "quotes".

This assignment comes with the *Cars.csv* data set. Use it to test your code. However, we may also load other data sets during the interview (with a different number of dimensions and observation points).

Display the given data using a parallel coordinates plot. Use the same order for the axes as it is given in the file. If you make the line semi-transparent, then you get less overplotting. To do that, change the alpha-component of the line color to be smaller than 1. If you do that, try pressing the *Glow* button on the left side of the viewer.