

# Big Data Visual Analytics with Parallel Coordinates

Julian Heinrich  
CSIRO Digital Productivity  
North Ryde, Australia  
Email: julian.heinrich@csiro.au

Bertjan Broeksema  
Luxembourg Institute of Science and Technology (LIST)  
Belvaux, Luxembourg  
Email: bertjan.broeksema@list.lu

**Abstract**—The abstract goes here.

## I. INTRODUCTION

In many contexts we find the need to explore large data sets, both in terms of data points as well as in number of variables. A technique, well known in the visualization community, for exploring high variate data sets is Parallel Coordinates. Parallel coordinates visualizes many variables at the same time by drawing an axis for each variable parallel to each other. A single data point is represented by a line which crosses each axis at the value the data point selects for the variable represented by the axis. Outside the visualization community however, it seems not so widely used, despite its straight forward usage.

In this exposition we present a web-based implementation to make it accessible to and usable for a wide audience. This implementation also demonstrates the core functionality of parallel coordinates. It supports large data in terms of data points by providing progressive rendering and density based rendering features. Furthermore it shows how parallel coordinates can be extended by advanced analytics by connecting it to the R analytical environment through OpenCPU. This is a work in progress, which can be accessed online at <http://www.parallelcoordinates.de> and serves as demonstration for potential implementation of more targeted applications.

## II. ANALYTICS

### A. OpenCPU

Provides communication with R Provides caching Can be made scalable using SparkR (distributed R)

### B. Clustering

R Provides many clustering algorithms out of the box A thin wrapper is required to provide a consistent API for the front-end

### C. Dimensionality reduction

Like clustering, many dim. red. techniques available in R. Widely used analytical approach to search for structure E.g. PCA

## III. RENDERING

### A. Progressive rendering

### B. Density

## IV. CASE STUDY

## V. CONCLUSION

The conclusion goes here.

## ACKNOWLEDGMENT

The authors would like to thank...

## REFERENCES

- [1] H. Kopka and P. W. Daly, *A Guide to L<sup>A</sup>T<sub>E</sub>X*, 3rd ed. Harlow, England: Addison-Wesley, 1999.

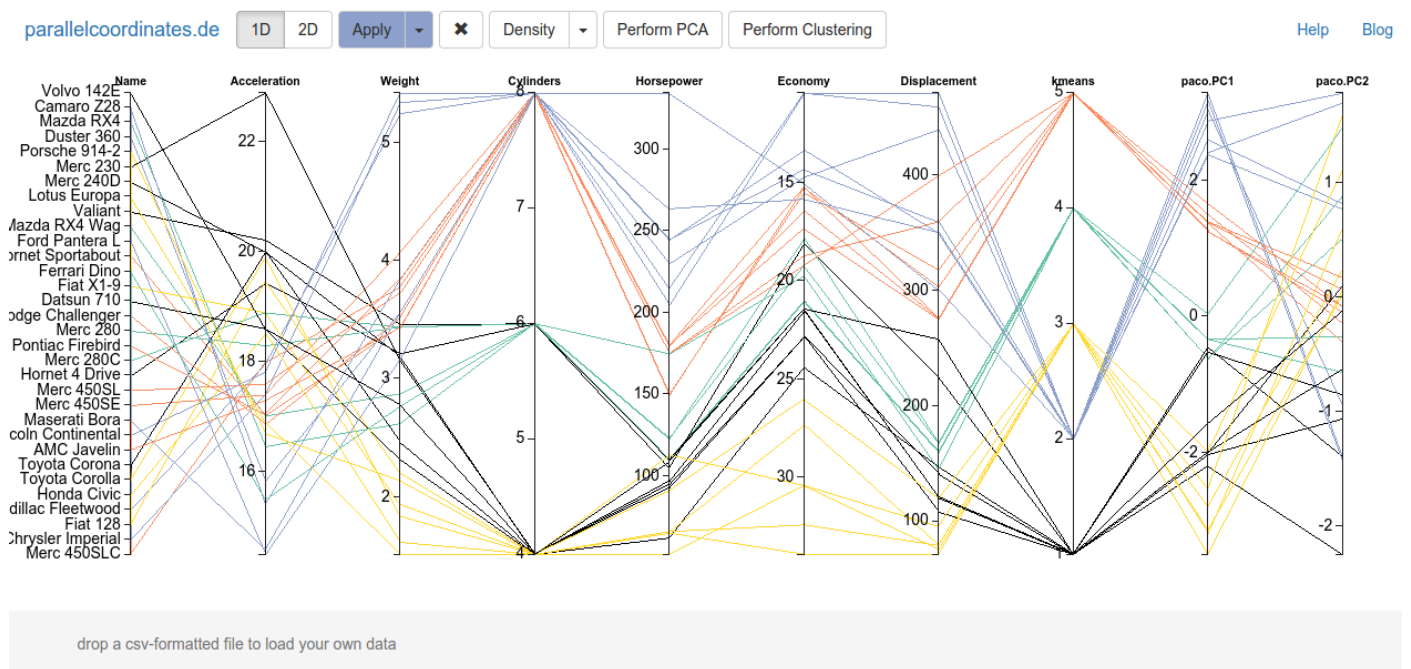


Fig. 1.