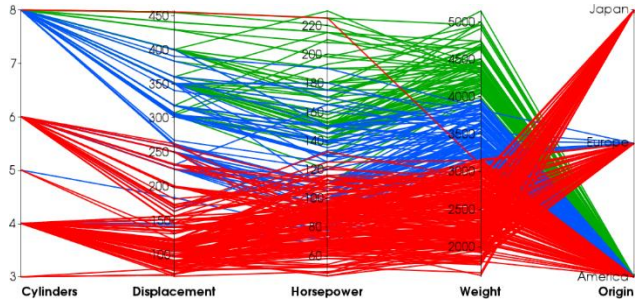
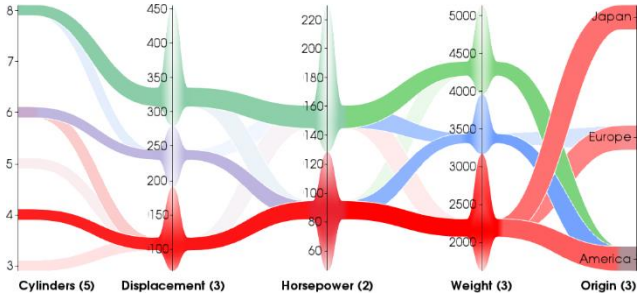
Edge bundling for parallel coordinates

Motivation

Parallel coordinates are a data visualization technique designed for multivariate data. To display the data for an n-dimensional space, the technique utilizes n-parallel lines, usually vertical. Each point of the data is represented as a polyline running though the lines. Parallel coordinates are illustrated in the Figure below (source: [3]):



The problem using parallel coordinates on big data is that big number of polylines are overlapped and makes a visual clutter, which makes parallel coordinates hard-to-read. Therefore, various modifications of parallel coordinates were proposed. One of the modifications is edge bundling; The method merges similar polylines into bundles, which makes the histogram look much clearer without losing displayed information (see Figure below, source [3]).



Goal

Your task will be to:

- Develop and implement parallel coordinates with edge bundling (either as an extension to the parallel coordinates as implemented in the visualization toolkit VTK [3] or as a standalone c++ library).
- Do an evaluation on real data (for example fiber properties gained from CT images).

Starting literature

1. H. Zhou, Panpan Xu, X. Yuan and H. Qu, “Edge bundling in information visualization,” in Tsinghua Science and Technology, Vol. 18 (2), pp. 145-156, April 2013. doi: 10.1109/TST.2013.6509098.
2. David Selassie, Brandon Heller, Jeffrey Heer, “Divided Edge Bundling for Directional Network Data,” Visualization and Computer Graphics, IEEE Transactions on, June 2011, doi: 10.1109/TVCG.2011.190.
3. G. Palmas, M. Bachynskyi, A. Oulasvirta, H. P. Seidel, T. Weinkauf, “An Edge-Bundling Layout for Interactive Parallel Coordinates,” Proceedings of the IEEE Pacific Visualization Symposium, pp. 57-64, March 2014, doi: 10.1109/PacificVis.2014.40.
4. The Visualization Toolkit - vtk.org

Kontakt

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