

Lines and Layouts: Some Suggestive Examples

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The talk gathers selected subjective experiments from my visualization research. The selections have a connected pair of themes: lines and layouts. Part of this relates to my armchair thoughts about the visual traversal lines of analysts studying plots. My conjectures were that: 1) explicit lines helped guide visual traversal, 2) repetition of the same traversal facilitates memorization, 3) shorter traversal produced by sorting or other construction tends to provide the impression of simpler appearance, and 4) perceptual groups produced through use of lines also can simplify appearance. A second use of lines is to connect points or objects in different panels as in M and N plots. A closely related connects points with the same plot to link views of the same object. A third use is to show explicit differences of pairs objects. A fourth set of uses is to convey functional relationship, contours or skeletal structure. For contours the ability see around lines makes the use of lines and meshes an alternative to translucent polygons representations. Considering more perspectives and applications increases the list of uses.

The talk brings together many examples. Some old 3-D examples involve minimal spanning trees and contours. A more recent stereo example shows 6-D points by directed lines connecting pairs of 3-D points. An example in cluster evaluation uses point color to represent results of one clustering algorithm and VERI (visual empirical regions of influence) lines to connect points. Lines connecting points in the same cluster use the cluster color. White lines highlight VERI connected points with color mismatches. Multivariate touring without the VERI lines seems impoverished! Yet another example uses sequences of 3-D line segments to represent sequences composed of the letters A, C, G, and T in the open reading frames of genes that have been clustered by their expression over time. The layout involves a self-similar coordinate system. A generalization uses 3-D line segment strings to represent sequences of the 20 amino that make up proteins. Not all the examples are winners for the particular application. However ideas, such self-similar coordinate systems may suggests other applications. Certainly suggestions conflict with some interpretations of graphics design guidance. Examples violate notions of using only data ink and of connecting only points where interpolation is implied. The talk should provide seeds for an interesting discussion.