# Graph-theoretic methods for Data Visualization II: Navigating high-dimensional spaces and RnavGraph R package

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RnavGraph is an R package that facilitates controlled exploration of high dimensional data space via (user determined) low dimensional trajectories through that space. The trajectories are paths on a navigation graph (navGraph), a graph whose nodes are plots and whose edges represent transitions from one plot to another (see Hurley and Oldford, 2011, Comp. Stat.). In RnavGraph, there are two primary display regions the navigation graph (or navGraph) in one and the some visualization of the data in the other. The navGraph display drives the data visualization. The user moves a "You are here" circle, or "bullet", from one node to another along defined edges, causing one data visualization to be smoothly morphed into the other.

In this talk, I will give an overview of the current RnavGraph and demonstrate its functionality on some high dimensional data (e.g. images). The data visualization shown will be a 2d scatterplot of the high dimensional data objects (points, images, text, glyphs) specially implemented in Tcl/Tk to permit selection, zooming, and brushing. Each node of the navGraph corresponds to a scatterplot on two variates of the data; each edge represents either a 3d or 4d transition from one scatterplot to the other (depending on whether the node scatterplots share one variate or no variates). In the case of a 3d transition navGraph, moving the bullet from one node to the another simply rotates one scatterplot to another and a walk on this navGraph produces a display sequence of 2d scatterplots rotating into one another.

How RnavGraph's design can provide the navigational infrastructure to build new visualizations will also be described.

This talk is based on joint work with Adrian Waddell.