# Visual Wormholes

Cutting through multiple data dimensions with visualizations

Whether on a computer screen, paper, or a poster, visualizing more than two data dimensions on a two-dimensional plane presents interesting challenges. Purposeful use of visual channels, however, can enable encoding of high-dimensional data in a manner that visually communicates connections and correlations within a high-dimensional dataset.
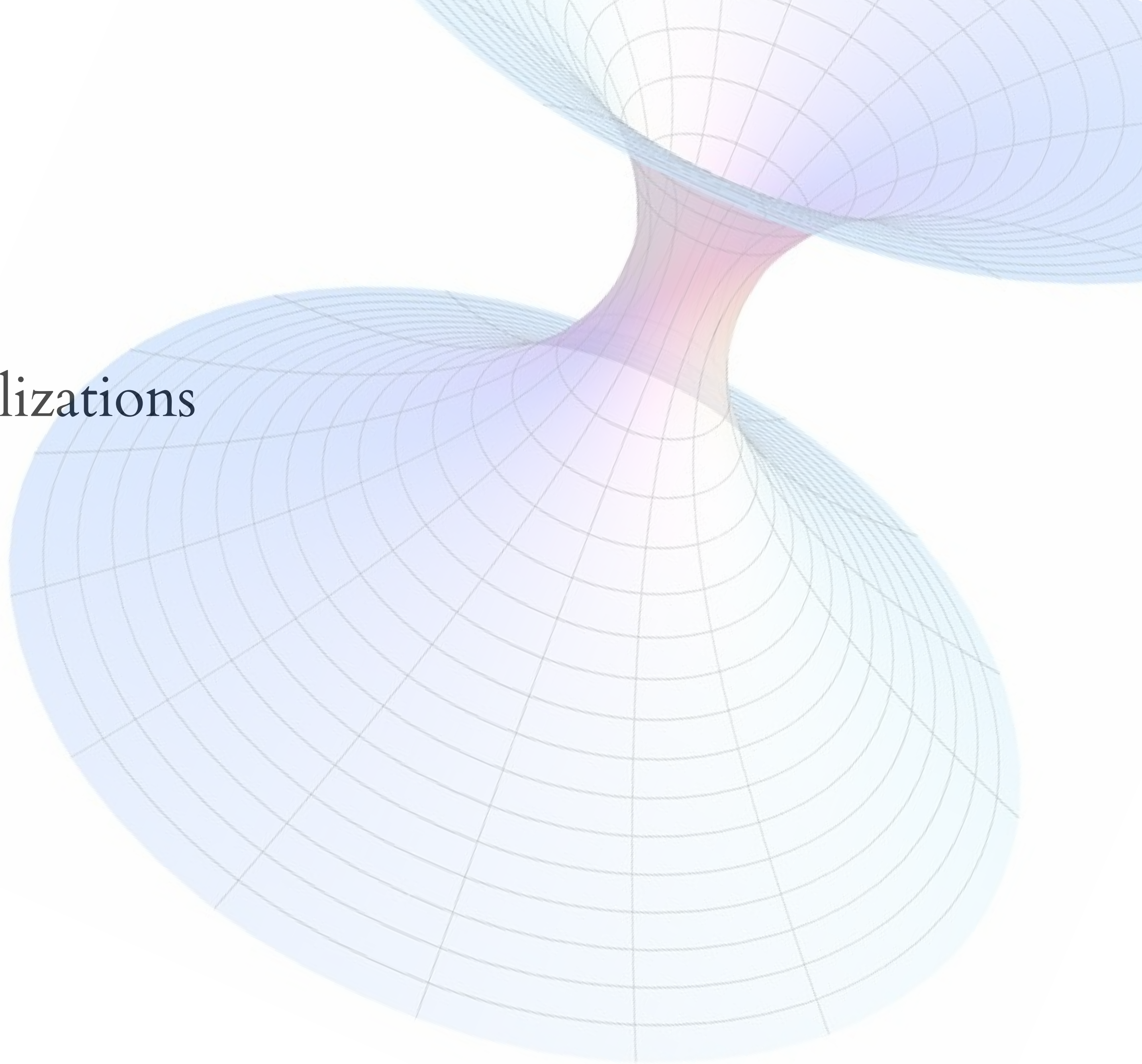
3D Scatter Plot
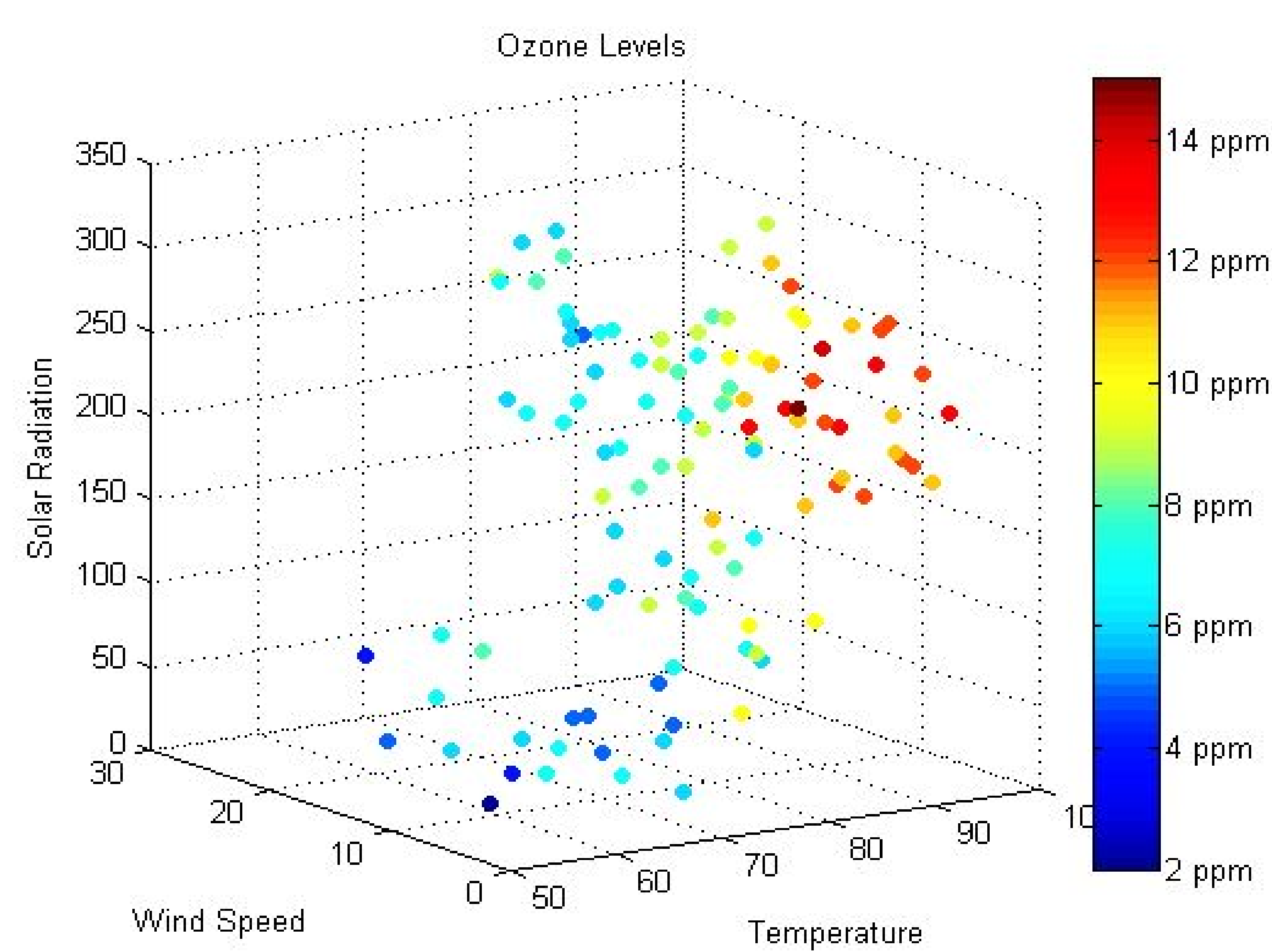
A three-dimensional scatter chart is perhaps the most natural way to visualize multidimensional data. However, with three-dimensional scatter charts we're limited to representing data along the three physical axes and a handful of additional channels, such as color or shape. It is difficult to visualize datasets with four or more dimensions with this method.

In this chart

★ Color encodes the ozone particles per million molecules of different air quality samples taken on different days.
★ Position along the three physical axes represents Temperature, Wind speed, and Solar Radiation
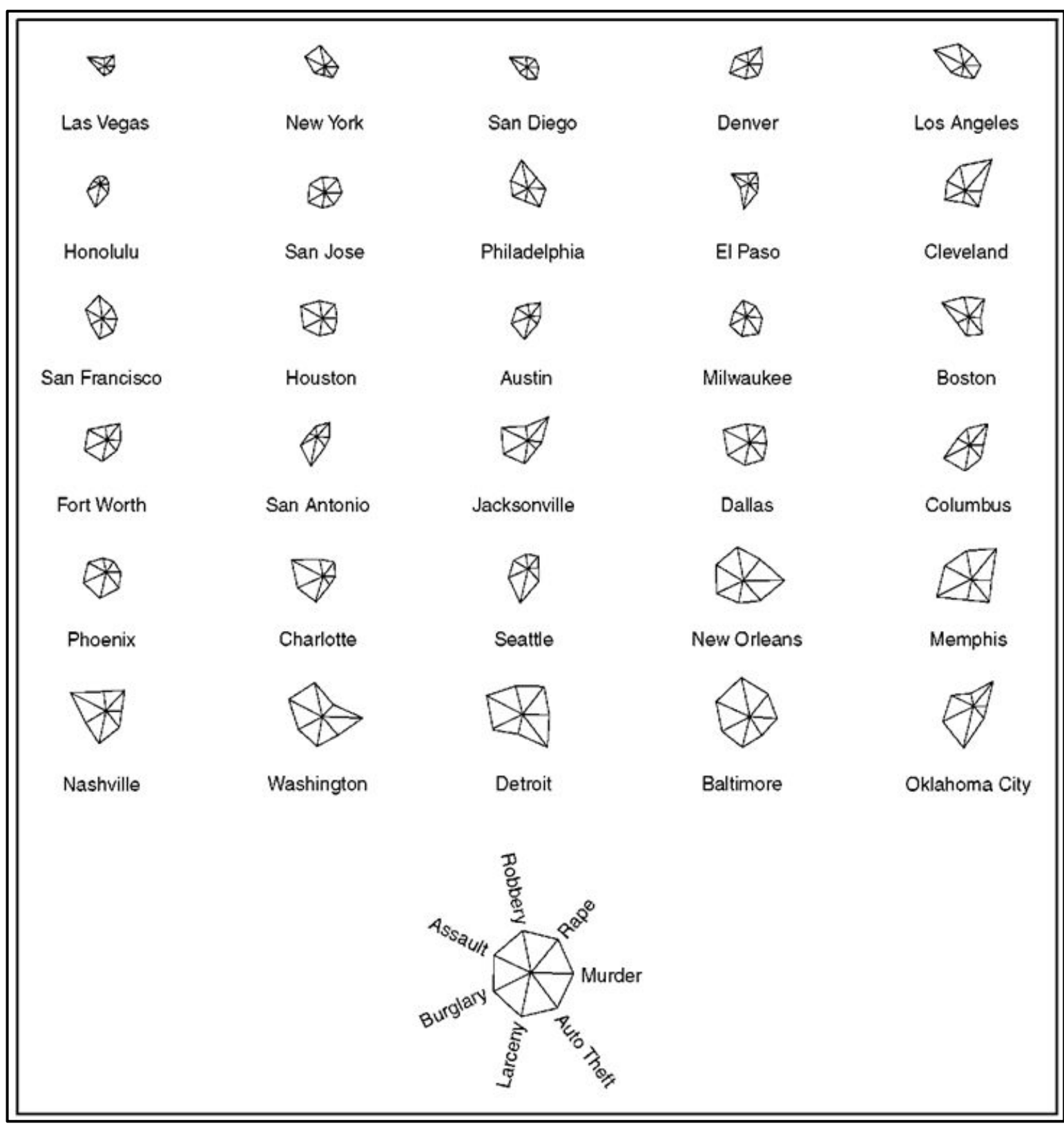
Star Charts
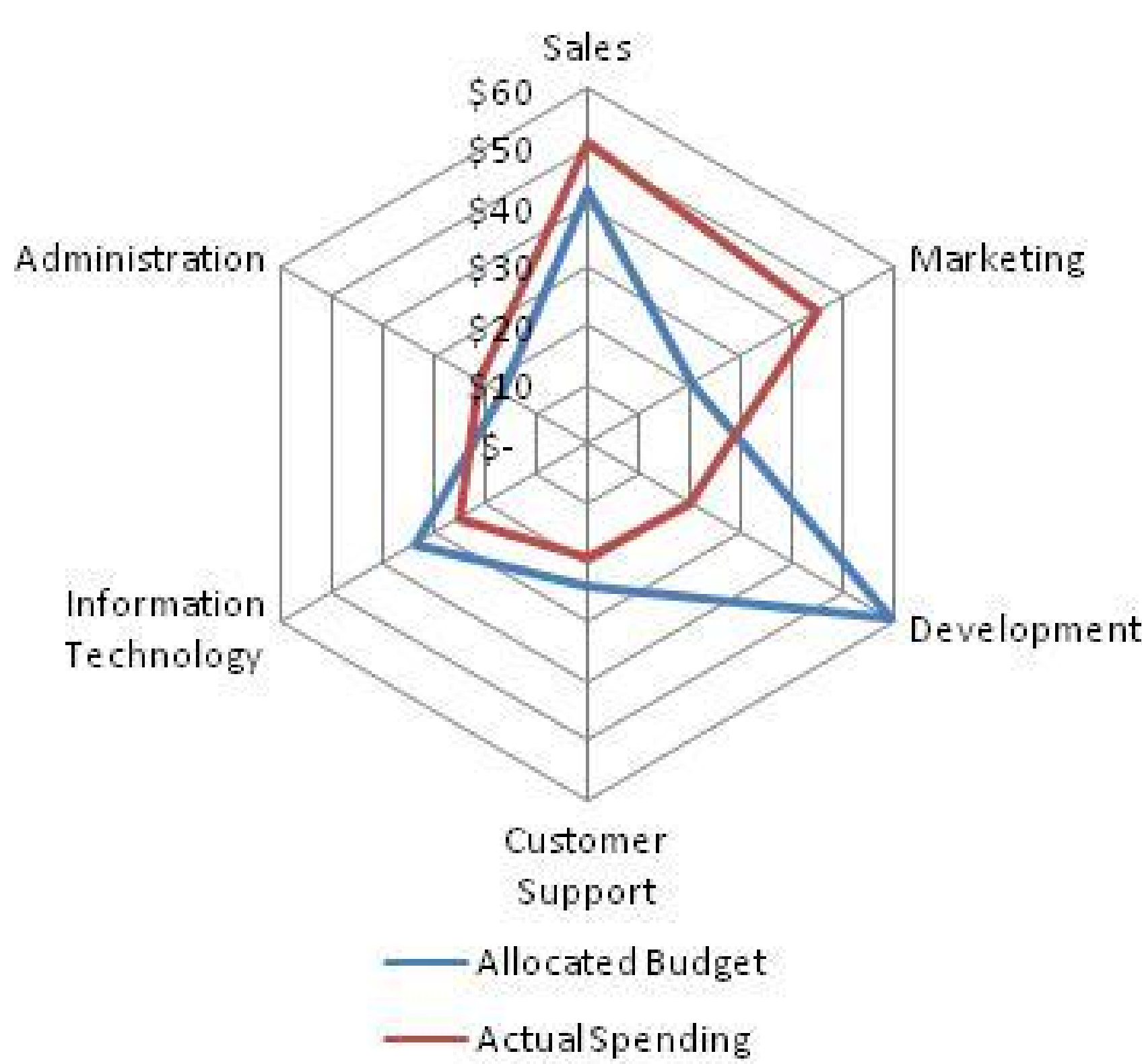
This star chart uses multiple small star plots to convey high dimensional information. This chart can be interpreted on two levels Larger plots represented cities with worse crime, while each spoke represents a specific type of crime. A bulge or spike in a single shape suggests an uneven distribution of types of crimes.

In this chart

★ Each 'spoke' represents a different spending categories within a company
★ Position encodes quantitative dollar amounts within a given category along each 'spoke'
★ Color encodes spending in the six different categories between what was budgeted for and what was actually spent.
★ The area (shape) of the plot conveys information about the total spending

Glyph Plots

This glyph plot uses multiple small star plots to convey high dimensional information. This chart can be interpreted on two levels: larger plots represent cities with worse crime, while each spoke represents a specific type of crime. A bulge or spike in a single shape suggests an uneven distribution of types of crimes. On a more detailed level, the viewer can also analyze each shape to tease out details about the incidence rate of different crime types in each city.

In this chart

★ Each star plot represents a different American City
★ Within the star charts, position encodes quantitative counts of one of six different types of crime
★ The area (shape) of the plot conveys information about crime in general: a larger shape represents cities with more crime overall, and smaller shapes represent cities with less crime

Bonus Visualizations

These unusual visualizations were too cool not to mention.

Chernoff Faces
Uses the nose, mouth, eyes, head etc. to encode data
https://goo.gl/jvsMa7

Data Projector
Visualize hundreds of dimensions in an interactive 3d space
http://goo.gl/wwjR4Y

Parallel Coordinate
Parallel coordinates and colors represent transit time, location, train line, and train schedule in a single 2d plot
http://goo.gl/wwjR4Y