Temporal Analysis

Introduction to Temporal Analysis and Visualization

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Objective

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Describe temporal analysis

Temporal Analysis

"Time is an outstanding dimension reflected by Shneiderman's Task by Data Type Taxonomy."

W. Aigner, S. Miksch, W. Muller, H. Schumann, C. Tominski, "Visual Methods for Analyzing Time-Oriented Data", IEEE Trans. On Visualization and Computer Graphics, Vol. 14, No. 1, Jan.-Feb. 2008, pp. 47-60.

Time-Oriented Data

- Time oriented data is ubiquitous
  - Stock markets
  - Movie trends
  - Business
  - Medicine

- Each data case is likely an event of some kind, with one variable being the date and time

Time Series

"A random selection of 4000 graphs from 15 newspapers and magazines worldwide showed that between 1974 and 1980, 75% of these graphs were time series."

E. Tufte, "The Visual Display of Quantitative Information," 1983.

Time Series

What questions can we ask of these visuals?

- Does a data object exist at a certain time?
- When does a certain data object exist?
- How long does a data object exist?
- How fast and how much does the data object change?
- What order to objects appear/disappear?
- Is there a cyclical pattern to appearances?
- Which objects exist simultaneously?

E. Tufte, “The Visual Display of Quantitative Information,” 1983.

Time is…

Ordered

Continuous

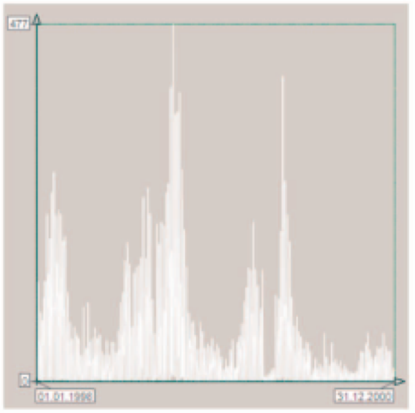
Cyclical

Independent of location

Linear vs. Cyclical Time

Linear time

- One time point precedes another
- Time being ordered is closely bound to notion of causality



Cyclical Time

- The ordering of points in a cyclic time domain would be meaningless
- Winter comes before summer, but also after summer