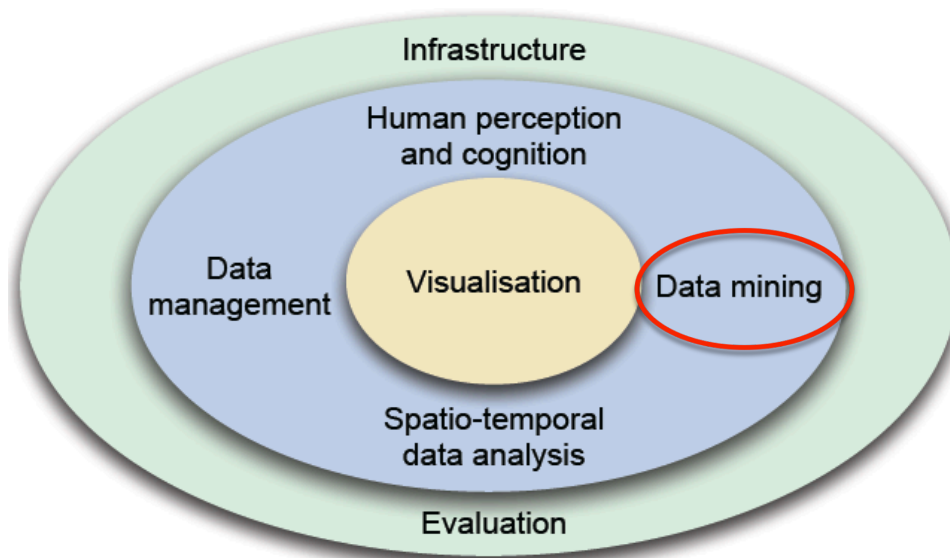


Data Mining

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<http://www.cs.odu.edu/~mweigle/CS796-S11/>

Building Blocks of Visual Analytics Research



Data Mining

- ▶ Information tsunami
 - ▶ capacity for producing data is increasing at a fast rate
 - ▶ our human capacity for understand data has not grown as quickly
- ▶ Massive amounts of data are available
- ▶ New tools and methodologies must be developed to help experts extract the relevant information

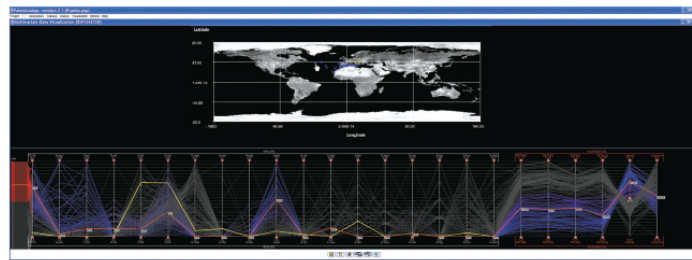
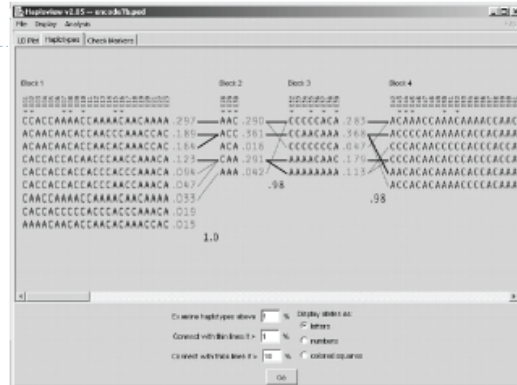
Data Mining and Visualization

- ▶ Knowledge discovery and data mining (KDD)
 - ▶ semi or fully automated analysis of massive datasets
 - ▶ general methodologies
 - ▶ often do not take into account relevant expert knowledge
- ▶ Visualization
 - ▶ use background knowledge, creativity, and intuition
- ▶ Visual Analytics
 - ▶ bring experts' knowledge back into the analysis process

KDD and Visual Analytics

Success Stories

- ▶ **Bioinformatics**
 - ▶ KDD in combination with visualization methods
 - ▶ 10 of the 50 most-cited articles in *Bioinformatics* propose visual analytics tools or methods
- ▶ **Climate change**
- ▶ **Pattern identification**
- ▶ **Spatio-temporal data mining**



▶ 5

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From Mastering the Information Age: Solving Problems with Visual Analytics, Keim et al.

KDD and Visual Analytics

Tussle

- ▶ **Visual Analytics Focus**
 - ▶ interactive visual representation and exploration of data
- ▶ **KDD focus**
 - ▶ developing computational methods that can be used to extract knowledge from data

▶ 6

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KDD and Visual Analytics

Data Mining Tasks

▶ Predictive

- ▶ classification, regression
- ▶ analyze the data to build a global model

▶ Descriptive

- ▶ clustering, pattern mining, association rule discovery
- ▶ summarize the data using local patterns

KDD and Visual Analytics

State of the Art – Tools

Lots of examples in Chapter 4:

- ▶ Statistical and mathematical tools
- ▶ Specific algorithmic tools
- ▶ Visual analytics libraries
- ▶ Visual data mining tools
- ▶ Web tools and packages
- ▶ Scientific visualization tools
- ▶ Combined methods
- ▶ Computational information design

Data Mining in Visual Analytics

Papers – Feb 22, Mar 1

- ▶ Mostly overview/summary papers regarding the combination of KDD and visualization
- ▶ P9 – From Visual Data Exploration to Visual Data Mining: A Survey
- ▶ P10 – Investigating and Reflecting on the Integration of Automatic Data Analysis and Visualization in Knowledge Discovery
- ▶ P11 – Extreme Visualization: Squeezing a Billion Records into a Million Pixels