

## **9. Summary**

Where to find definitions, and explanations.

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## **Introduction**

- Conceptual approaches to multivariate visualization
- Tour methods
- Notation for projection methods
- Linking views
- XGobi
- Inputting data into XGobi
- Variety of applications
- Why graphics adds value to data analysis

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## **Presence of Missing Values**

- Approaches to handling missing values in graphics
- Setting up missing value files
- Work efficiency case study
- Parallel coordinate plots
- Comparing imputation methods and results

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## **Clustering and Classification**

- Visualizing cluster structure with and without known groups
- Australian crabs case study
- Using a scatterplot matrix in XGobi
- Tour controls: grand, guided, manual
- Projection pursuit
- Visualizing dendrograms in XGobi
- Breast cancer case study: binary response, mosaic plots, jittering
- Italian olive oils case study: assessing neural net output
- Particle physics case study

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## **Presence of Space/Time Variables**

- Treatment of space and time, creation of linked views
- COADS case study: multivariate gridded spatially-referenced data, ArcView-XGobi link, treatment of angular/modular variables
- Tao buoy case study: spatial variability, on-the-fly conditional plots of time series, spatial dependence
- Linking points in one XGobi view to lines in another XGobi view: variogram cloud to raw data and location

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## **Categorical Variables and ANOVA**

- Algal growth case study: multiresponse ANOVA
- Yeast fermentation case study:  $2^5$  factorial experiment
- Coronary heart disease case study: graphical models, log contingency tables

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## Proximity Analysis and Graph Layout with MDS

- Find a map of objects based on distance/dissimilarity
- XGvis: XGobi takes continuous updates from the algorithm, and acts as a visual monitor
- Computer usage case study: characterizing users based on command usage
- Telephone calls case study: representing the telephone network or who calls who
- Co-authorship of CHI case study: characterizing small communities of collaborators
- Nanotubes case study: molecular graph

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## Inference for Data Visualization

- What does it mean to be “really there” ?
- Null data comparisons
- Visual permutation test

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## Large Data

- Problems with large  $n$  and large  $p$
- Some solutions
- Modifications for linked brushing actions
- Tour efficiency
- Speech case study: subsetting tools