CS855: Data Visualization

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Term I: 2014-15: Lecture 00

Agenda

- Administrivia: Handbook
- Assignments: Booklet

Goal: "to provide students with concepts and a firm mathematical foundation, as well as technical aspects of algorithms. Practical skills in programming visualization algorithms, using commercial visualization tools, and applying methodologies and techniques to new problems are taught in accompanying exercises."

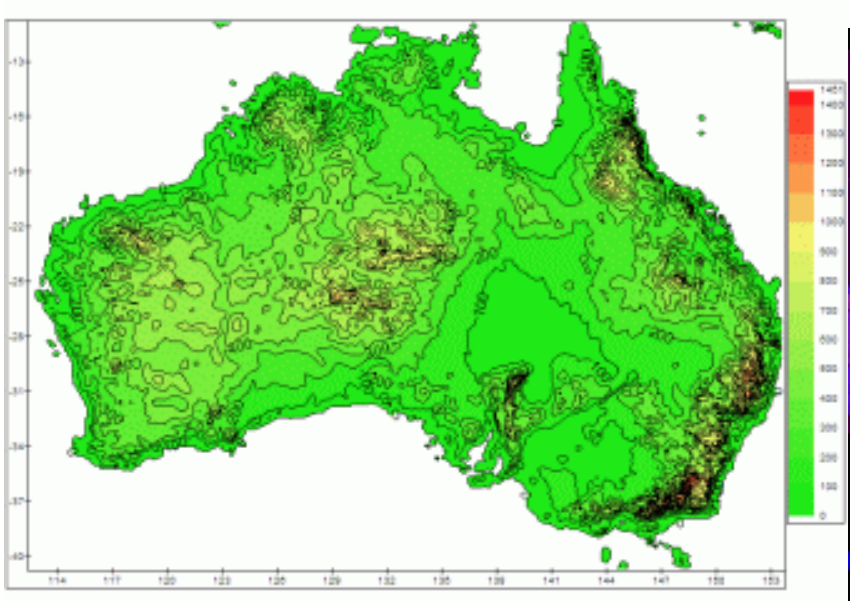
- "Curriculum for a Course on Scientific Visualization," a peer-reviewed paper by Rotard et. al in Proceedings of Eurographics/ACM Siggraph Workshop on Computer Graphics Education, in 2004.

- Scientific Visualization: Icon-based, topology-based, standard techniques/algorithms.
  - Scalar, vector, and 2^{nd} order tensor fields.
  - Volume visualization.
- Information Visualization: parallel coordinates, treemap, etc.
- Visual Analytics
- Perception, and visualization evaluation.

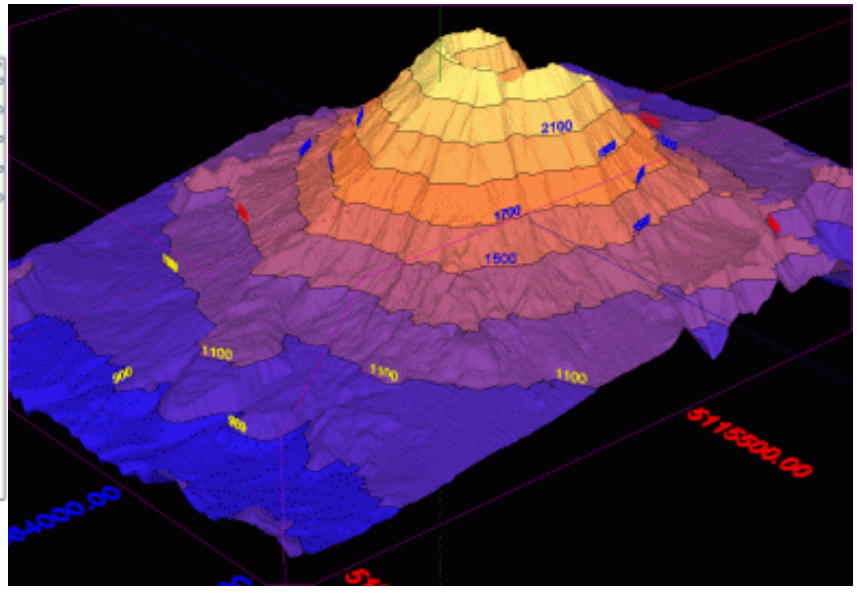
- Assignments: 75% (Individual breakdown given in the assignment booklet).
  - Assignments 1, 7: each is 5% of final grade
  - Assignments 2, 4, 5: each is 10% of final grade
  - Assignment 6: is 15% of final grade
  - Assignment 3: is 20% of final grade
- Midterm: 15%
- Final: 10%

1. Alexandru C. Telea, "Data Visualization: Principles and Practice," A. K. Peters Ltd, 2008.
2. Gerald Farin, Dianne Hansford, "Mathematical Principles for Scientific Computing and Visualization," A. K. Peters Ltd., 2008.
3. Tamara Munzner, "Visualization Analysis and Design," A. K. Peters Ltd, to appear October 2014. (preprint-draft-4 will be used: http://www.cs.ubc.ca/~tmm/courses/533/book/)

Samples: Contouring



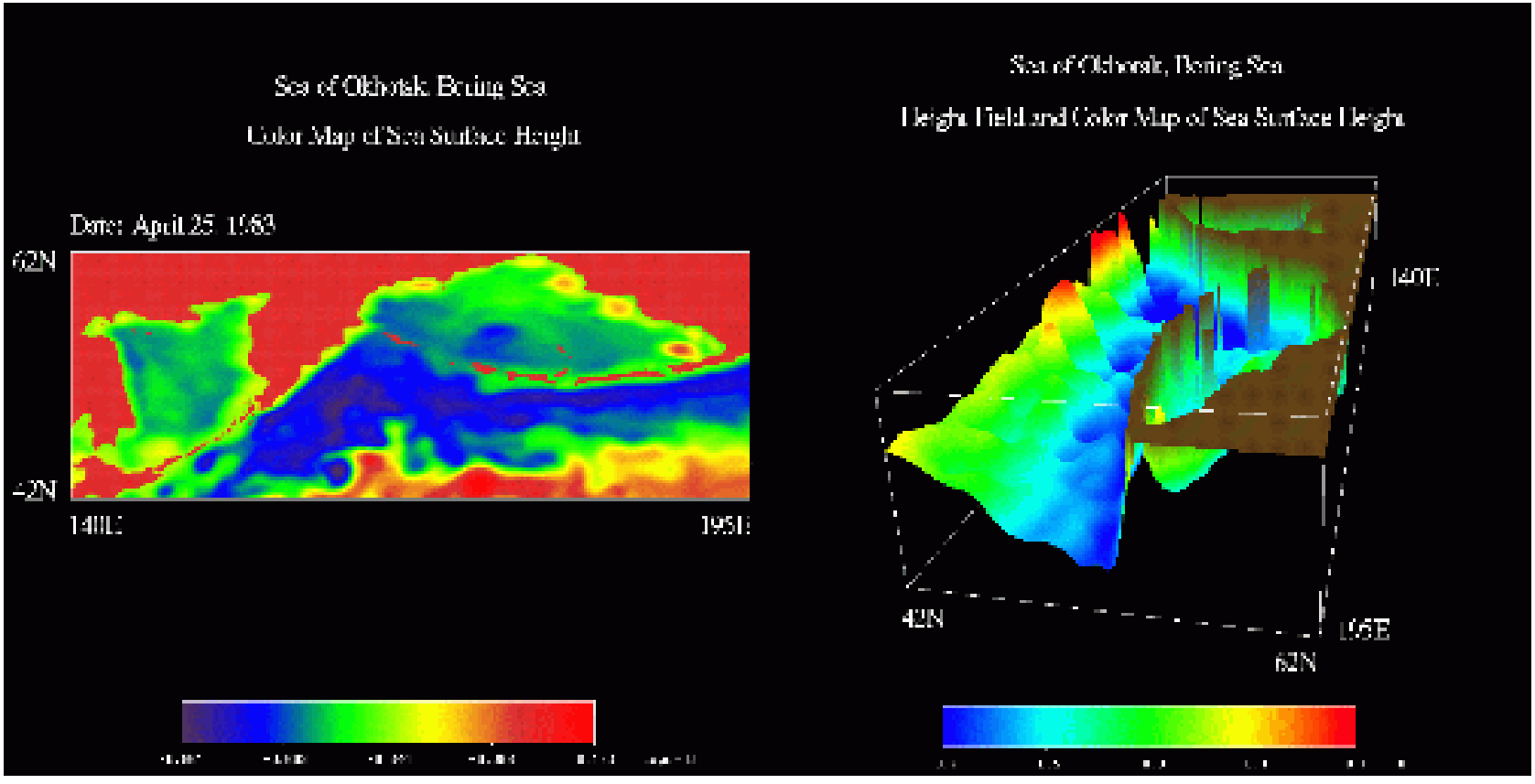
2d



3d

Image courtesy:http://3dfmaps.com/

Samples: Color Maps and Elevation Models/Meshes

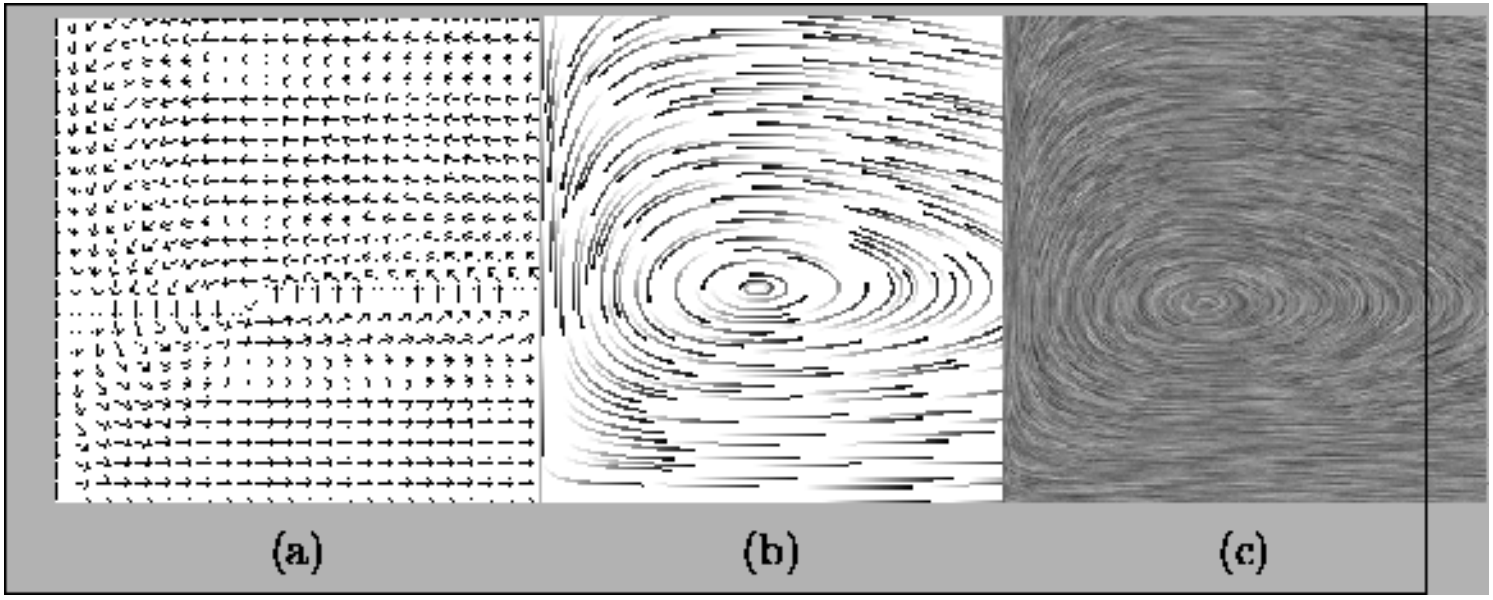


2D Color map

Color map on height/elevation mesh

Image courtesy:https://www.cs.duke.edu/courses/spring03/cps296.8/papers/MoorheadZanSignalProcessingOfSciVis.htm

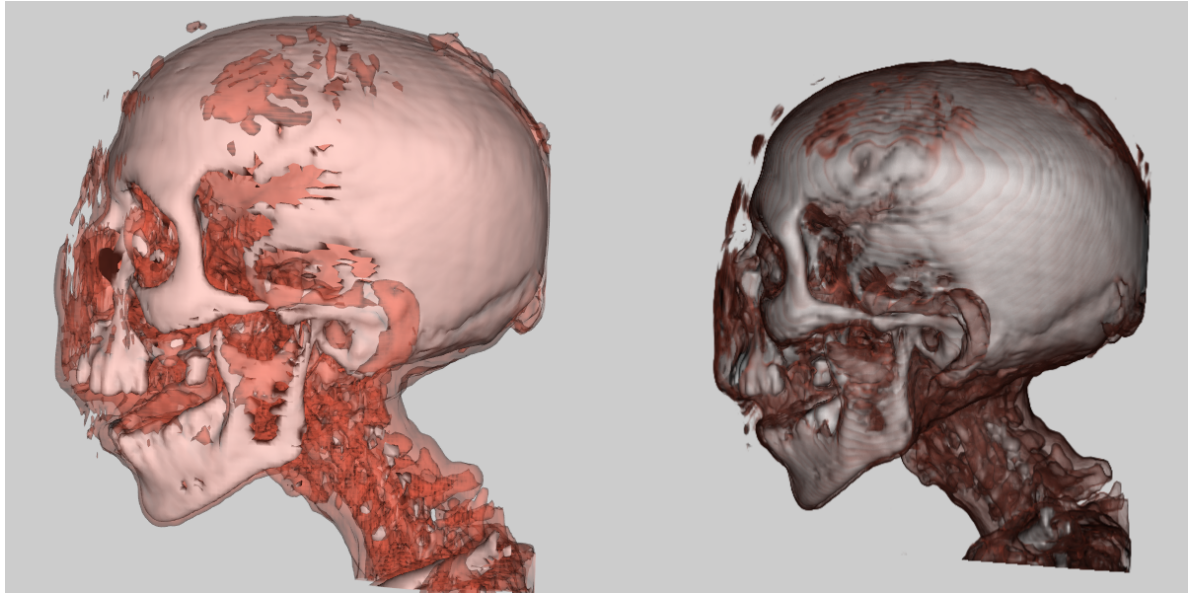
Samples: Vector Flow Visualization



Hedgehog Streamlines LIC

Image courtesy: http://www.cg.tuwien.ac.at/~helwig/diss/

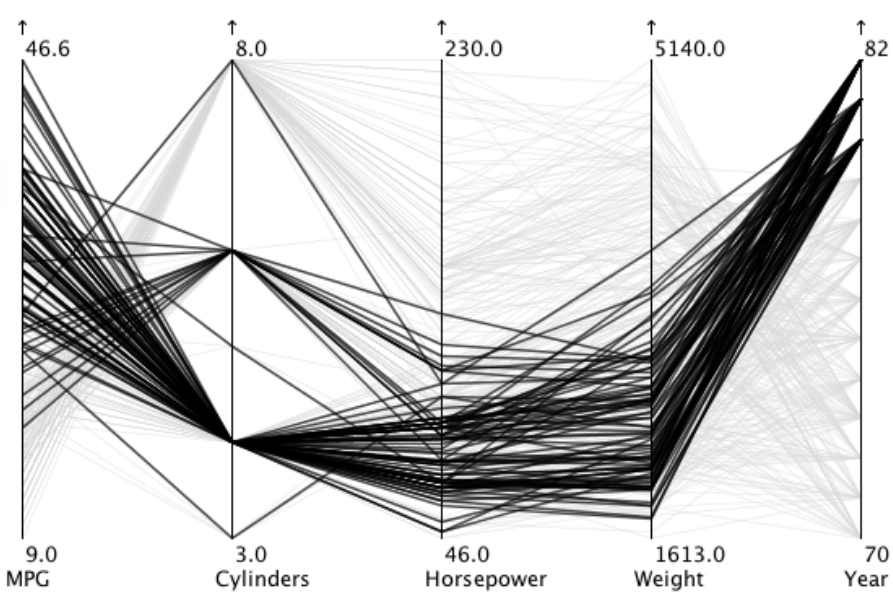
Samples: Volume Visualization



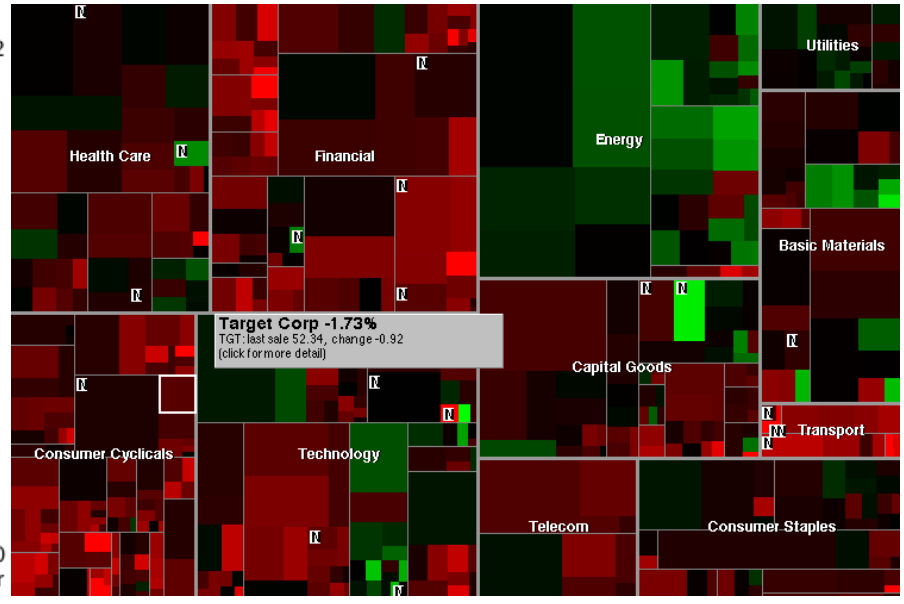
Isosurface Extraction Direct Volume Rendering

Image courtesy: http://www.cs.utah.edu/~kshkurko/classprojects/proj_cs6630.html

Samples: Parallel Coordinates and Treemaps



Parallel Coordinates



Treemap

Image courtesy: http://eagereyes.org/techniques

Samples: Visual Analytics

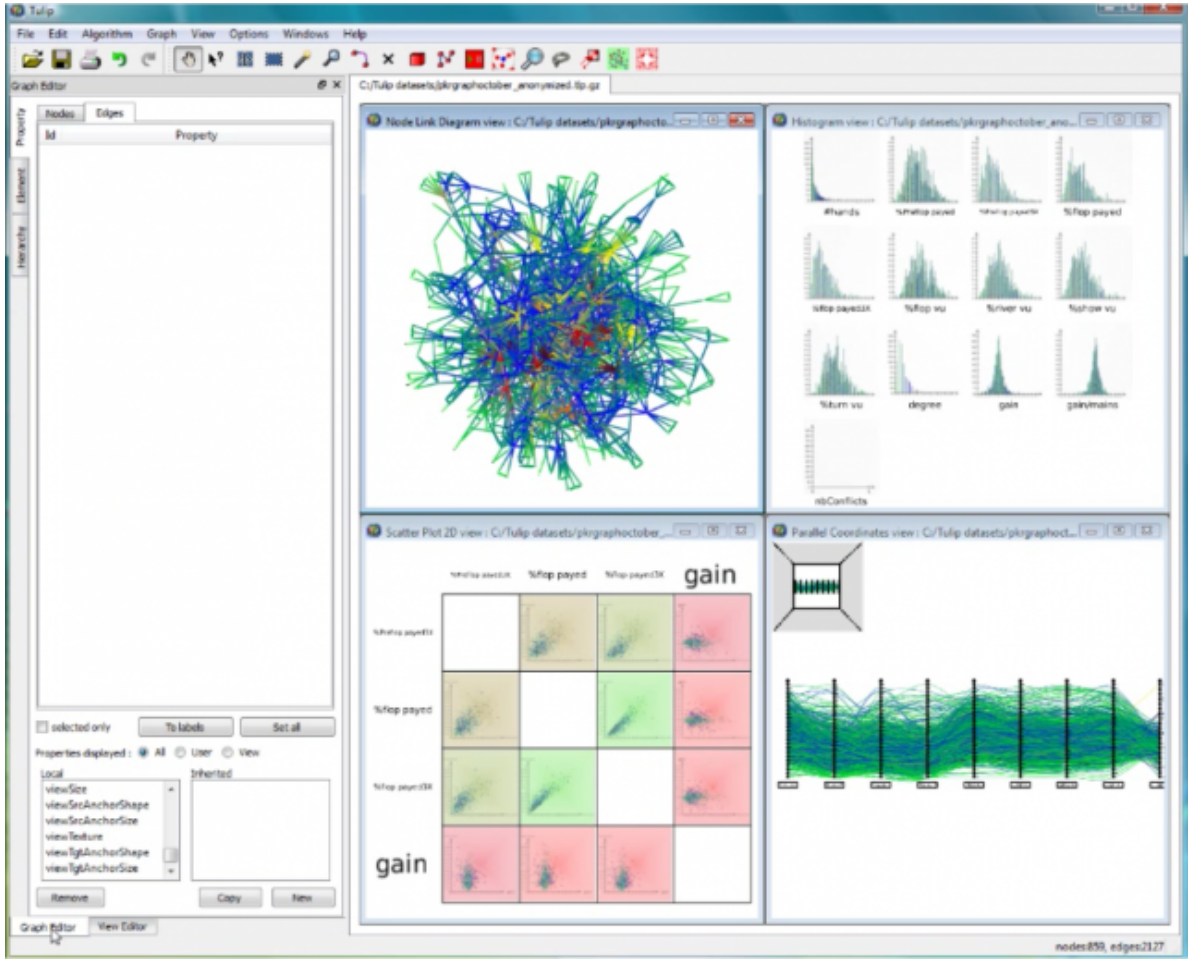


Image courtesy: http://tulip.labri.fr/TulipDrupal/?q=node/601