CS855: Data Visualization
Assignment Booklet

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Important Dates

For all submissions throughout the semester, the deadline will be **11:59 pm (IST) on a designated Sunday**.

- SUBMISSIONS

Assignment 0 due: 11:59 pm, Aug-17-2014; *Assignment 1 due*: 11:59 pm, Aug-24-2014;
Assignment 2 due: 11:59 pm, Aug-31-2014; *Assignment 3 due*: 11:59 pm, Sep-21-2014;
Assignment 4 due: 11:59 pm, Oct-26-2014; *Assignment 5 due*: 11:59 pm, Nov-16-2014;
Assignment 6 due: 11:59 pm, Nov-30-2014; *Assignment 7 due*: 11:59 pm, Nov-30-2014.

- EXAMINATIONS

Mid-term: Sep-25–Oct-01-2014; *Finals*: Dec-08–13-2014.
Mid-term break: Oct-02–12-2014 .

Grading

- Assignments: 75% (Individual breakdown given later in this document.)
- Midterm: 15%
- Final: 10%

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Assignment 0: Introductions

Grading

This assignment will not be graded.

Submission

A single .pdf file named as <RollNumber>_Assignment0.pdf, to be emailed to instructor by *checkpoint-0*.

Description

Submit a 100-200 words professional essay, not exceeding a page, in a .pdf file format. The essay should focus on the following details:

- Name, professional background (education and work experience), stream chosen at IIITB.
- A priori knowledge and practice of visualization, gained from a previous visualization course or projects.
- The expected outcome of this course in terms of knowledge and skills.

Assignments 1-6

Grading

- 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

Submission Instructions

A single .tar.gz file named as <RollNumber>_Assignment*.tar.gz (n= $1, \ldots, 6$) which it decompresses to a folder named <RollNumber>_Assignment*.

- The folder should contain subfolders: src (for source files), bin (for data files), and images (for screen-shots).
- The folder should also contain a Makefile and a README. The README should explain on how to build the program using the Makefile, should indicate the features that work for the assignment, and drawbacks/bugs in the program.
- The folder should contain a file <RollNumber>_Assignment*.pdf with explanations and details on the data, data preprocessing and visualization algorithm used, implementation, and insights of the visualizations, such as, what are the questions your visualization can answer and/or what are the tasks that your visualization enables.
- A demo of the program is mandatory for the grading. The assessment of each programming assignment will be based on the demo and code review, each with equal weightage.

Description

Program using C++ and OpenGL libraries for Assignments 1-3; and Processing for Assignments 4-6.

1. 2D scalar field visualization of Grand Canyon 2D dataset: perform color mapping, meshing using height map, and contour mapping (drawing 4-5 contours). Dataset is available at: http://www.cc.gatech.edu/projects/large_models/gcanyon.html
2. Vector field visualization of wind speed using hedgehog, streamlines, streaklines, and LIC, with color mapping. Dataset is available at: http://vis.computer.org/vis2004contest/data.html
3. Volume visualization using isosurfacing (marching cubes or marching tetrahedra algorithm) and a basic software-based direct volume rendering. Dataset is available at: http://volvis.org
4. Multivariate data visualization using parallel coordinates of bank-note authentication data. Dataset is available at: https://archive.ics.uci.edu/ml/datasets/banknote+authentication
5. Hierarchical data visualization using treemaps: on one of the datasets on http://data.gov.in, e.g. survey of key indicators of district level household and facility.
6. Visual analytics on data set(s) pertaining to a particular domain or scenario from Open Data http://data.gov.in using multiple techniques, open source tools, etc.

Assignment 7

Submission Instruction

A single file in .pdf format: <RollNumber>_Assignment7.pdf, prepared in IEEE conference format using LaTeX style files, to be e-mailed to instructor by *checkpoint-4*.

Description

Choose and read a paper from the list of papers published on LMS. These papers are seminal in the area of visualization.

The technical report and presentation should articulate the background of the problem the paper solves, related work (if any), the methodology used, its impact on the computer graphics community, and the areas that the method affected.