

CS732/DS732: Data Visualization -- Course Evaluation Guide

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Grading scheme, as announced on August 3, 2021:

- 15% of final grade for each of 4 assignments (A1, A2, A3, A4)
 - Each of the assignments has a demo for 5%, submitted as video
- 10% for reading-writing assignment (RWA)
- 10% for mid-term
- 10% for end-term
- 10% for class attendance

Submission instructions:

- Programming assignments and RWA: 70% of the final grade
 - It is compulsory to attempt all 4 assignments and the RWA.
 - The assessment of programming assignment is based on deliverables, i.e. code+report+demo (video) for each assignment.
 - The report is where one can elaborate on the data used, hypothesis, analytical methodology, and inferences.
 - The code submissions must be source code in text format, say python code in .py text file format, and not as Jupyter notebooks.
 - The video must indicate how you have been able to demonstrate visualizations, interactions with the application, and other inferences that can be pointed out/highlighted/annotated.
 - All submissions must be done on LMS.
 - If your entire submission is larger than the permissible size for LMS submissions, upload your submission on Google Drive or Outlook OneDrive; and submit a document containing the URL to the submission.
 - It is the onus of the student to ensure the correct access permissions are provided in the repository, if the submission files reside outside of LMS, so that there is no difficulty in accessing the files for assessment. In such

¹ [This is the first version, and will have new versions as new assignment descriptions are added.]

cases, these repositories have to be accessible until the course grades are announced.

- The scheduling of assignments provides 2 weeks to complete each of [A1, A2], 3 weeks to complete each of [A3, A4], and 6 weeks to complete RWA.
 - Assignment announced by Monday midnight IST.
 - All assignment submission by Monday midnight IST, as per scheduled.
 - Assignment announcement date and submission deadline:
 - A1: Aug 16, Aug 30;
 - A2: Aug 30, Sep 13;
 - A3: Oct 11, Nov 01;
 - A4: Nov 01, Nov 22;
 - RWA: Oct 04 (paper selection by Oct 16), Nov 29
 - 2 written exams - 20% of the final grade
 - Possibly, proctored exams during mid-term and end-term weeks.
 - Open notes.
 - 1 report-writing - 10% of the final grade
 - This can be based on a research paper or a theme. It will be allocated by first-come-first-serve.
 - The topics will be published on October 04, 2021.
 - The choice of topic/paper by the student must be communicated by October 16, 2021. If not received by the deadline, a randomly picked topic/paper by the instructor by October 18, 2021.
 - The report is due on November 29, 2021.
 - If it is based on a research paper, the report must say why the method is important, and its impact on the research community (using the papers that have cited the paper, a state-of-the-art paper that explains the value of the paper), etc.
 - The technical report is to be written in the IEEE conference paper format.
 - This also includes references to papers/articles/etc. by citing them appropriately in-place in the report. There will be negative points for not doing citation references within the article and bibliography properly.
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A1:

Date of announcement: 11:59 pm IST, August 16, 2021 (Monday)

Date of submission: 11:59 pm IST, August 30, 2020 (Monday)

Summary: The assignment is on 2D scalar and vector field visualization.

Dataset: IEEE Visualization 2008 Design Contest dataset

(<http://sciviscontest.ieeevis.org/2008/data.html>)

The dataset description is given in the dataset website. The datafiles are available at

https://cloud.sdsc.edu/v1/AUTH_sciviscontest/2008/data_files/

The scalar field datasets are multifield.xxxx.txt.gz and vector field as velocity.xxxx.txt.gz, where xxxx refers to the timestep. There are 200 timesteps.

Tasks:

1. **Choose sufficient timesteps** to visualize the progression of the simulation. Use the same time-steps for both multi-field and velocity files.
 - Write in the assignment report -- how did you arrive at the timesteps?
Data-driven methods are encouraged.
2. For the files chosen, identify one 2D plane you will be studying. The 2D plane can be x-y plane at a constant z value, y-z at constant x, and z-x plane at a constant y value.
 - Write in the assignment report -- how did you arrive at which plane you are going to explore?
3. For the multi-field files, choose 3-5 scalar fields you will be studying.
 - Write in the assignment report -- what is your rationale for the selection of variables?
4. For the vector field, use the curl as the vector field to visualize, as given in the data description webpage.
5. **Outputs:**
 - For scalar field visualization, use color mapping and contour mapping (or contour fill) for 5 contours; for vector field visualization, use quiver/arrow plots. Address the following in your report:
 - For contours, will you use the same contour values for all time steps?
 - For color-mapping, will you use the same min-max values to generate the color palette?
 - Experiment with different types of color palettes/spectrum (sequential, diverging, qualitative) using colorbrewer/matplotlib predefined palettes.
 - Write in the report - did any color palette outperform the others? How would you rationalize the performance?
 - Experiment with combining 2 visualization techniques in a single view.

- Did such a visualization enable you to make joint inferences of different fields?
- Generate demo videos of the animation of change in scalar and vector fields over time.
- Write in your report -- do your visualizations help you infer the shadow instability as shown in the image in the contest website (and Fig.1)? What in your choice of the data for visualization allowed you to see the moving front?

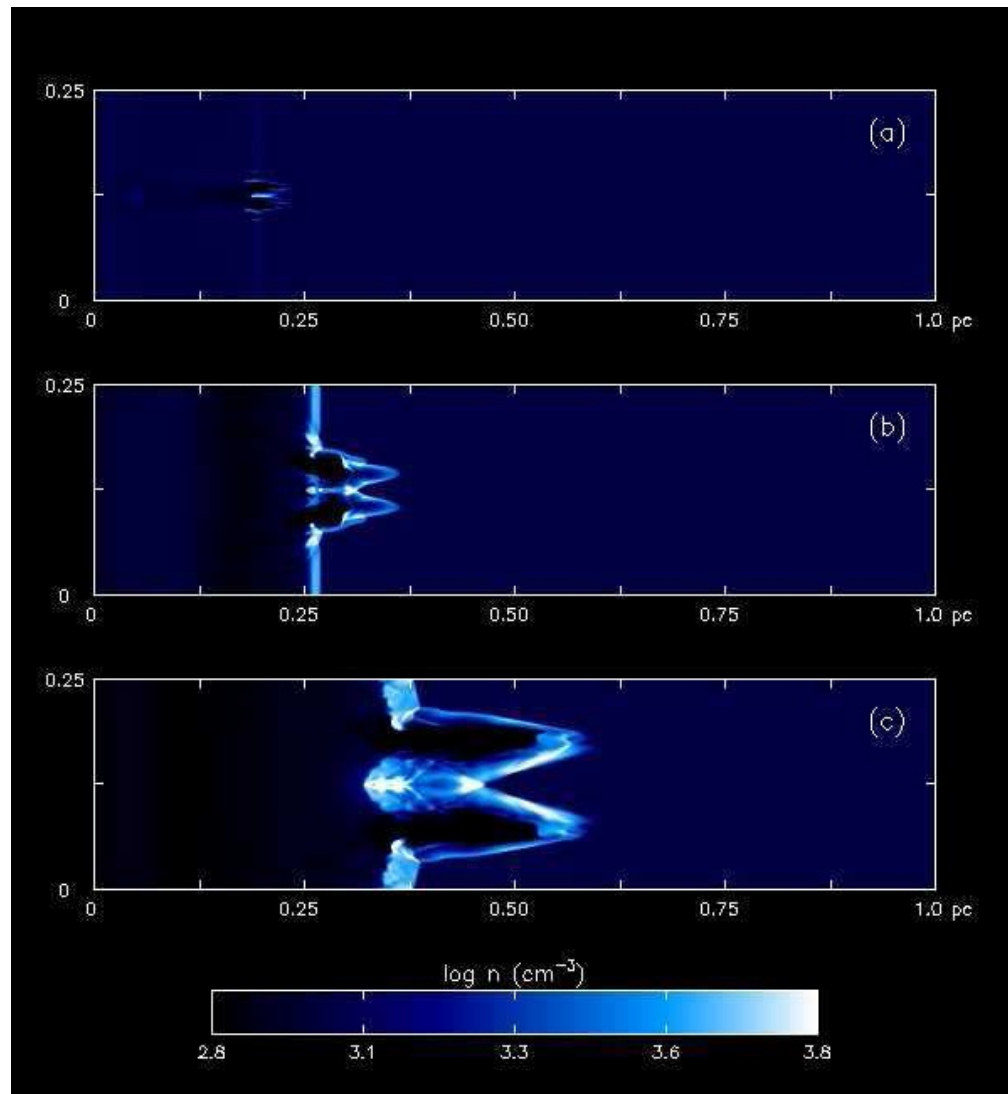


Figure 1: A shadow instability forming in one 2D slice through the data set over time
(Source: <http://sciviscontest.ieeevis.org/2008/>)