cs512 f24 - Final Project

Proposal due by: 10/17/2024

Project due by: 11/13/2024

Project Description

The final project is a two-student group project. The required project deliverables are a presentation, software implementation, and a written report. All the components should be submitted together by the due date. Late days are not allowed. To sign up for a topic, make sure that the topic is available and submit a project proposal as described below. There is a 5% penalty for not signing up for a project or not submitting the project proposal on time.

The goal of the project is to deepen your understanding of computer vision or apply it in new applications. You will need to explore recent research papers and select a paper that interests you. Based on the paper you choose, you have two options:

1. **Implement the paper** by writing your own code to execute the concepts discussed. This option strictly prohibits copying or using the source code shared by the paper's authors or any third-party sources.
2. **Modify a significant component of the paper** that you believe can improve the work. Improvement may relate to accuracy, speed, or any other metric you find relevant. Although the aim is to improve upon the original work, your rationale will be more important than the outcome. Successful improvements may earn bonus points. For this option, you can use the author-released source code, but any modifications must be substantial, clearly stated in your proposal, and highlighted with inline comments in the source code.

When selecting a topic, you must identify a paper describing the core approach you will be implementing and the data you will use. The selected paper should contain material different from what was covered in class. Valid project topics include computer vision techniques and applications of computer vision techniques.

Below is a detailed description of the main components of the project.

Project Proposal

The project proposal should contain a short (2 pages) description of the problem you plan to address, the methods you plan to apply, and the data (source) you plan to use. The proposal must rely on one or more recent and published research papers and should include details of these papers. Additionally, include the names of all team members and their respective responsibilities.

The proposal and relevant paper(s) should be submitted via Bitbucket, as in the other assignments. Each team member must make a separate submission of the documents. Relevant research papers can be found by searching the online database of the Galvin Library (ACM/IEEE) or using other web resources.

In-Class Presentation (5% of the Final Grade)

To prepare your presentation, follow the research paper you selected in your proposal and, if necessary, other sources. You must clearly indicate the sources used for your presentation and specify their details. Your presentation should be prepared in PowerPoint, HTML, or PDF formats. Please do not plan to use the whiteboard; all necessary figures and diagrams should be part of the presentation file.

Each presentation is allocated approximately 10-15 minutes. In a group project, all group members must present. Time constraints will be strictly enforced to allow sufficient time for other presenters.

Your presentation should include:

- Problem statement and background material.
- Description of the proposed solution.
- Implementation details.
- Discussion of the obtained results.

It is highly recommended that you include a short demonstration of your implementation (recorded as video). Part of the presentation grade will be based on peer review. The evaluation criteria will include the following components:

- Facts presented.
- Clarity of the presentation.
- References used.
- Quality of slides.
- Presentation flow.

Report and Software Implementation (15% of the Final Grade)

You need to write a Python program (inside a Python notebook) to implement the algorithms you chose and write a concluding report. Provide instructions on how to use the program you wrote, and supply appropriate test data and configuration files for using it. Ensure that the program allows modification of parameters and the examination of intermediate results.

In writing the program, you may use external modules as needed, provided you cite their origin and clarify that these were not written by you. External modules should not implement the main functionality of your algorithm, which must be written by you.

The report should follow the same structure as the presentation. You need to describe the problem you addressed, the method you took to solve it, the data you used, and the results obtained by the program you wrote. You must evaluate and discuss the results. The report should be written in the format of a research paper, be at least 8 pages long, and does not need to follow a two-column format.

The sources used in your work should be clearly indicated in the bibliography section, including web resources and software libraries you used. Cited references should follow IEEE/ACM conventions. At the beginning of the report, include the title of the project, the names of team members, and a description of what each member accomplished.

Sign-up Instructions

- Find a topic and verify that it is not already taken using the following link:
  https://docs.google.com/spreadsheets/d/1AhAfvFH9Z63GAc26-0Ken-yn7ofgeGSib7xe188-EEY/
  It is your responsibility to select a topic (and paper) that has not already been chosen by other students. It is acceptable to sign up for a topic selected by another student, but make sure the paper you are selecting is not too similar to the one chosen by the other person.
- Sign up by filling the form using the following link:
  https://forms.gle/7xyqLiJbrqZ6Aijc8
  Only one form needs to be submitted per team.
- Prepare a two-page project proposal including the following components, and upload it to Bitbucket (into a `proposal` folder). Each team member must submit a copy of the proposal. The proposal should include:
  - Name(s), student ID(s), title of the project.
  - The name of the main paper that will be used and its publication details.
  - Problem statement: What is the problem that needs to be solved?
  - Approach: How will the problem be solved?
  - Data: What data will be used?
  - References: Include relevant papers, web sources, software, and data sources.
  - Team member responsibilities.

  Upload the paper(s) you plan to use with the proposal.
- You will receive an email if there are any problems with your proposal. Proposal approvals will be indicated on Canvas.
- To fill the form to sign up for a project, you must be logged into your IIT Google account (through MyIIT). Pay attention to the instructions at the beginning of the form. If you have trouble accessing the form (e.g., getting a "link not published" error), log out of any non-IIT Google account and log into your MyIIT account. If you need to request that we share the document with you, you are not using your IIT Google account correctly.

Submission Instructions

- Follow the electronic submission instructions provided in the assignments. The project should be submitted in a folder named `project` in your Bitbucket repository.
- In addition to the `src`, `doc`, and `data` folders, create the following folders:
  - `presentation`: Contains the presentation files and a 4/6 slides-per-page PDF handout.
  - `sources`: Contains any sources you used in the project (e.g., papers and any external code/libraries).
- Do not upload large datasets (>10MB) to Bitbucket. For large datasets, place the data on Google Drive and provide the link in the report.
- Submit a fully executed Python notebook with no gaps in execution. To receive full credit, please ensure the following:
  - The notebook includes all cell outputs and contains no error messages.
  - Re-run your notebook before submitting to ensure that cells are numbered sequentially, starting at [1].

- Late days are not allowed for the final project. If you cannot complete the project by the due date, submit whatever you have available by the deadline.