CS 3793/5233 – Artificial Intelligence Group Research Project

Overview

- Total 300 points = 30% of grade
- Groups of 5 students with one Graduate student leading the group
- Topic
  - Any AI research topic in recent AI-related conferences / journals (e.g., CVPR, ICCV, WACV, 3DV, NIPS, AAAI, IJCAI, ICIP, etc.).
    OR
  - Any AI challenges / competitions. Following are some places to find them:
    - https://www.kaggle.com/competitions
    - https://eval.ai/web/challenges/list
    - https://codalab.lisn.upsaclay.fr/
    - https://www.aicrowd.com/challenges
    - https://www.drivendata.org/competitions/
- Some examples of high-level research topics:
  - Body / Hand / Object pose estimation (2D or 3D)
  - Face / Smile / Emotion detection and recognition
  - Object detection and recognition
  - Sentiment analysis – reviews, news, messages, tweets, etc.
  - Fake images / videos – detection and generation
  - Medical image analysis
- The project work **does not** have to be of publishable quality. However, students are **highly encouraged** to utilize the time spent on this project as actual research. *You are encouraged to submit revised versions of these projects to research conferences or as white papers on arXiv*.

Project Work

- Understand the research problem in detail and provide a comprehensive "Introduction".
- Conduct further literature survey for the research problem and find out 15-20 recent methods that have tried to solve the problem. Create a short summary for all of these methods. This will serve as the "Related Work" section for the final research paper.
  - Each student must pick 3-4 research papers.
- Finalize a list of 8-10 methods that provide the best results. These will be used in your "experimental analysis" section.
  - Each student must pick 1-2 research papers.
- Come up with a novel method to solve the problem and describe that in detail.
  OR Implement at least 5 state-of-the-art methods (one per group member) and explain them with enough details. This will serve as "Methods" section for the final research paper.
  - If not designing a new method or participating in a competition, each student must implement 1 research method.
- Make sure to maintain your GitHub repo throughout the process.

Project Timeline

Group & Topic – DUE: 02/06

- Decide the research topic (at least at a high level) and finalize the group.

Proposal – DUE: 02/27

- Conduct a brief literature search to understand the topic being solved.
- Create a **1-page** document describing the research problem for the project. You can divide the document into the following parts:
    - Problem Statement: Clearly state the research problem that is being addressed.
    - Methods: Conduct a quick literature search and list a few methods that will be explored. This does not have to be the final list or a detailed review.
    - (Optional) New Approach: If you are planning to come up with a novel idea, provide a rough outline of the research approach.
    - Experimental Setup: Describe the experimental setup by listing which metrics and datasets will be used for evaluation.
    - GITHUB: Set up a GitHub repository where all the implemented methods will be hosted. Add me to the repo - https://github.com/kevinpdesai

Midterm Update – DUE: 04/03

- Each group must set up a short meeting with the instructor and provide a midterm update.
- This update is meant to keep students on track for the project work.

Final Project Webpage & GitHub – DUE: 05/01

- Design a professional webpage showcasing the entire project using GitHub Pages.
- Here are some example research project webpages:
    - https://github.com/jin-s13/COCO-WholeBody
    - https://github.com/shreyashampali/HOnnotate
    - https://github.com/LyuJ1998/HandTailor
    - https://github.com/facebookresearch/VideoPose3D
    - https://github.com/mkocabas/VIBE
    - https://github.com/facebookresearch/pifuhd
    - https://github.com/mks0601/3DMPPE_POSENET_RELEASE
    - https://github.com/gulvarol/surreal

Final Poster Presentation – DUE: 05/01

- Design a research poster for the work done. Here is the UTSA poster template if you would like to use.
- Create a 15-20 min video presenting the research project. Upload this video directly on the GitHub repo using GitHub Pages.
- Side Note – UTSA undergraduate research office (https://provost.utsa.edu/undergraduate-research/) and the UTSA graduate school (https://graduateschool.utsa.edu/current-students/category/graduate-student-professional-development/) provide opportunities for students to showcase their research work. This may be something that can be a goal for students this year.