CSC 180-01 Intelligent Systems (Fall 2022)

Final Project

The goal of this project is to provide you **hands-on experience** of applying AI techniques to one or more large data sets, going through the following steps:

- identifying data set(s)
- deciding on what you want to achieve
- choosing appropriate AI algorithms/models
- implementing your methods/models
- evaluating your methods/models on your data set(s)
- reporting conclusions by writing a paper

1. Deliverables

Here are the project deliverables and due dates:

Project Deliverable	Due Date
1. Project Proposal	10: 00 am Monday, October 31, 2022
2. PowerPoint File for Presentation	10: 00 am Monday, Nov 28, 2022
3. Project Report (ACM format)	10: 00 am Monday, Nov 28, 2022
4. Jupyter Notebook (HTML format)	10: 00 am Monday, Nov 28, 2022

2. Live Zoom Sessions (class time; attendance is required for everyone)

- **Proposal Meeting (class time, Monday October 31, 2022):** You must get my approval during the meeting to proceed to work on your final project. You will need to finish the online topic form before the meeting to reserve your topic to ensure no team conflict.
- **Project Status Meeting (class time, Monday Nov. 21, 2022):** You report your progress to me to make sure you are on the right track.
- **Week 14:** In-class presentation (live zoom sessions)
- **Week 15:** In-class presentation (live zoom sessions)

Each team has **15 minutes** to demo your work for the final in-class presentation. Use **visual aids** to make your presentations clearer and more interesting. The instructor will post presentation schedule on Canvas once receiving all the proposals.

All team members must attend the scheduled demo session. Failure to show up in demo session will result in zero point for the project.

3. **Data Sets:**

You are to find data set(s) for your project. The data set should be reasonably large and for a domain that you know something about or are interested in learning about.

See the separate document for a list of sample data sets.

4. **Types of Projects:**

Here are THREE possible types of projects:

- **Research-oriented** (Type A, difficulty degree = 1): Identify a paper recently published at an academic conference or journal. Read it thoroughly to understand the paper. Improve the solution proposed in the paper. Implement and evaluate (1) your improved solution and (2) the solution proposed in the paper. Your goal here is to evaluate how your improved solution outperforms the original solution proposed in the paper. You must do **feature normalization/encoding and parameter tuning.**

- **Application-oriented** (Type B, difficulty degree = 1): Identify a well-known task or a dataset (e.g., a problem from Kaggle or UCI repository). Implement and evaluate **at least two different models (e.g., a fully-connected neural network, a CNN without transfer learning, or a CNN with transfer learning)** in terms of their performance on the selected task and dataset. Your goal here is to evaluate how well each model performs for your selected task. You must do **feature normalization/encoding and parameter tuning.**

- **Survey-oriented** (Type C, difficulty degree = 0.9):   You write a survey paper to provide reader with a state-of-the-art view of existing work on a particular AI topic. Do the following:
  - Survey the publications within a specific topic in last 5 to 10 years.
  - Summarize major accomplishments
  - Include your own comments on each surveyed paper
  - Summarize future research directions/challenges.

  Requirements and tips on writing a survey:

  - Everything you write in the survey has to be in your own words
  - All other people's idea/words must be correctly attributed to the actual researcher(s) using citations. Cite at least 10 published papers as references.
  - Pick a recent survey of the field so you can quickly gain an overview.
  - Go to the "related work" section of a paper, which serves as "a short survey" and allows you to find more related papers

5. Grading Breakdown

Your score of the project report is calculated as follows:

project score = your rubric score (see the next page for rubric) * difficulty degree

For example, if your rubric score is 90 and your difficulty degree is 0.9, then your project report score is 90*0.9 = 81

6. Where to find papers:

- Various digital libraries on computer science can be found at

  https://csus.libguides.com/az.php?a=i

  including ACM Digital Library, IEEE Xplore and a few more…

- (Quickest way) The most comprehensive CS library:

  DBLP: http://dblp.uni-trier.de/

- Google Scholar

7. Teaming:

Students must work in teams with at most 3 people. Think clearly about who will do what on the project. Normally people in the same group will receive the same grade. However, the instructor reserve the right to assign different grades to team members depending on their contributions. So you should choose partners carefully!

8. Final Report Format:

See the separate final report formatting guideline for more details.

Project Report Rubric

Type Coefficient: A(1)   B(1)   C(0.9)

Team members:

Paper title:

Criterion	Percent	Score
Organization/Presentation: Good organization. Sections are logically ordered. Well-written. Reads with ease. No spelling/grammatical errors.	5 %	
Problem Statement / Motivation: The project's objectives are clearly stated. The motivation is clearly established by relating the project to related work.	10 %	
Design of Approach: Approach is clearly described. Design choices are mentioned and justified. Shows good understanding of material learned from class. **(Note: for survey paper, this counts for 0%)**	30 %	
Experimental Results: Experiments are well-designed and conducted to verify claims made in problem statement. Several baselines are performed to validate improvements. **(Note: for survey paper, this counts for 0%)**	10 %	
Analysis of Results: Thorough analysis of results, presenting not just raw experimental data but also conclusions. **(Note: for survey paper, this counts for 0%)**	5 %	
Related Work: Related work is acknowledged. **(Note: for survey paper, this counts for 35%)**	5 %	
Conclusion: Summarizes the problem statement, solution, and experimental results well to tell an overall story	5 %	
Work Division: Provides reasonable work division. Equal sharing of work.	5 %	
Learning Experience: Well-thought and reflective. Clearly states what you and your group learn from the project or from the class	5 %	
Overall Quality:	20 %	
Total	100%	