

CS 534 Group Project Description

Project Objectives: For this project, you will pick a topic of your choice related to **Artificial Intelligence** based upon your field and interest. You will work in a team and should start with a small topic focusing on something specific, which can be completed in the coming 10 weeks and can be expanded later if you have more time. Ideally, this project should be something that you can use with your current work in your field and study. This project is a critical part of the course and a significant factor in determining your final grade. **The scope of your project should be scaled linearly to the number of students in your team.**

Note:

- (1) *This project is to be done by **EACH GROUP**. No help besides the textbook, materials, and the instructor/TA should be taken. Copying any answers or part of the answers from other sources, including your classmate groups, will earn you a grade of zero.*
- (2) *Your program must be developed and implemented in the PyCharm-like IDE, or 10% of the graded score is deducted. Please check and choose the one from here: <https://realpython.com/python-ides-code-editors-guide/> as the suggestion. Note that we **DO NOT** use Jupyter as the IDE.*
- (3) *Assignments are accepted in their assigned Canvas drop box without penalty if they are received by 11:59PM EST on the due date, or 10% of the graded score is deducted for the late submission per day. Work submitted after one week of its original due date will not be accepted.*

Project Categories: There are two topic areas described as follows. Other suggested topic areas are welcome.

1. **Option 1 - State-Of-The-Art AI Project:** Your team will apply the existing state-of-the-art (SOTA) methods, such as math models, data structures, algorithms, logic, machine/deep learning, natural language processing, computer vision, etc., to name a few, to solve a prevalent and important problem in a specific domain (e.g., Transportation, Healthcare, Education, Entertainment, Finance, Business, etc., to name a few). Specifically, students will be able to complete a project to develop a process pipeline that should include data pre-processing, model developments, model comparisons, experimental evaluations (e.g., accuracy, speed, and/or other related performance metrics), etc., to name a few, to show that these existing SOTA approaches in this pipeline are able to solve the real-world problem.
2. **Option 2 - Innovative/Advanced AI Project:** Instead of just applying the existing SOTA methods to solve a domain specific problem, your team will develop a novel/advanced approach that **EITHER** has not been proposed and developed yet by any researcher **OR** will advance/expand the capability of the current SOTA methodology to solve a prevalent and important problem in a specific domain. Such a novel approach or an advanced/expanded method, e.g., mathematical/data models, computational algorithms, system architectures, etc., to name a few, must be able to address the domain problem more effectively and efficiently than the current SOTA methods. More specifically, in addition to including the above process pipeline stated in **Option 1**, students need to show their proposed methodology that will outperform the existing SOTA approaches to solve the real-world problem in terms of accuracy, speed, and/or other related performance metrics.

Note: "Novel/Advanced methodologies" means that they cannot be found in any existing SOTA approaches or any advancement/enhancement that you can make on top of any existing SOTA approaches after doing the literature review. Fine-tuning model parameters, training more datasets, applying current SOTA methods on a different domain dataset, etc., by using the same, existing approaches are not counted towards in this category.

10% bonus points (extra credits) will be added to your **final project score** by the end of the semester if your team chooses this project category, **Option 2**, and show that your proposed methodology will outperform the existing SOTA approaches to solve the real-world problem in terms of accuracy, speed, and/or other related performance metrics.

Project Requirements: For this semester-long project, you will be required to work with other students in a team formed by yourselves in a group to complete the project. The amount of work for this project should be scaled linearly based upon the number of members in your team. This project is a critical part of the course and a significant factor in determining your final grade.

There are four phases of this project. The score distribution of each phase is listed as follows. Please feel free to discuss your project with me before you submit your **Phase 1 – Project Proposal**. The due date of each phase can be found in the course schedule. The requirement of each phase will be found in the separate document on Canvas. Each team member's final score in each phase will also be impacted by your teammates' peer review assessments.

- 1. Project Proposal, Slides, and Video (10 Points)**
- 2. Project Progress Report, Slides, and its Video (35 Points)**
- 3. Project Final Presentation and Slides (20 Points)**
- 4. Project Final Paper and its Product (35 Points)**

Note that the paper and material readings for the above two project types should be **in the past five years from 2020 to present**. Your team should be able to find many recent papers using Google Scholar (<https://scholar.google.com/>) and State-of-the-Art Page at Paper with Code (<https://paperswithcode.com/sota>), as well as other materials from public websites that you have planned to read and learn about for your AI project.

Project Follow-up: Depended on the quality and/or novelty of your final paper and product accomplished in this spring, you are welcome to work with me for a potential publication in the coming spring and/or summer.