Nikhil Gupta

Prof. Yu Zhao

CS5001 - CS SENIOR DESIGN I

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Individual Capstone Assessment

## Introduction: Senior Design Project Overview

Our team’s senior design project applies machine learning to sports betting, using players’ and teams’ statistics to predict their performance and display them in a user-friendly format. This project goes back to the fundamentals of machine learning beyond the scope of LLM’s and AI. Using raw numbers from public data from sports players, we want to find a pattern to recognize how players and teams will perform in the season. The project will likely be scoped around a single sport, and we aim to either make it a web app or a phone app. I look forward to this project as it involves relevant experience with machine learning, which is a course I am also taking this semester which I could apply what I learn concurrently with the project work. It’s also an idea that could have practical use to many users since online sports betting culture is so popular now with fantasy football, draft kings, etc.

## Curriculum and Academic Preparation

Throughout the course of my academic career, several courses have been crucial to taking on this project. The foundational courses that I took early on, like CS 1100 INTRO TO COMPUTER SCIENCE and CS 2028C DATA STRUCTURES, are vital to the base-level programming skills required to develop this project. Learning the programming concepts of iteration, OOP, pointers, etc. in C++ from CS 1100 are applicable in some way no matter what language we use for our project. The same can be said for CS 2028C, where understanding the various data structure concepts are vital in how we work with and manage the data we work with. More advanced courses like EECE 3093C SOFTWARE ENGINEERING have helped me understand how to tackle the larger scope of the project from a management perspective; organizing tasks, Gantt charts, and having a defined set of requirements and architecture before implementing will prove useful in drafting how to approach the problem before we solve it. Finally, a course that I am currently taking this semester is CS 5137 MACHINE LEARNING, which is directly applicable to this project given the main idea of it, and learning the skills necessary to achieve the goal concurrently with working on the project can enhance my understanding and internalize what’s being taught.

## Co-op Experiences and Skill Development

My co-op experience is comprised of all 5 semesters working at Siemens DISW. Siemens DISW (Digital Industries Software) is a software company that specializes in 3D & 2D Product Lifecycle Management software, with their mCAD software Designcenter (formerly NX) and Teamcenter which manages products’ lifecycle from design to disposal. I worked in both departments as a Software Developer Intern/Co-op, four rotations in Designcenter and one rotation in Teamcenter. The technical skills I developed ranged from programming languages to project management. I developed C++, C, and Java experience primarily from both my time in Designcenter and Teamcenter through PR (problem report) fixes and project work.

I also developed experience with project management as I worked with Polarion, Siemens’ product management software, to track my progress on my project, as well as contributing to design meetings and updating my actual project manager. The non-technical skills I developed through all 5 rotations were in communication with other co-ops and my team members, and organization and thoroughness through my project work to ensure first-time quality and working smoothly around errors by organizing notes. I expect to apply my technical knowledge to the project by using my programming experience for implementing and coding, and using project management as a way to keep track of our team’s progress to make sure we finish the project in time. I plan to apply my non-technical skills to make sure that I effectively contribute my fair share towards completing the project by communicating issues, organizing my tasks, etc.

## Motivation for the Project

I am excited to participate in this project primarily for the machine learning aspect of it. As of now, we have entered a new age in the technological era where artificial intelligence is all around us. With that in mind, computer scientists and software engineers alike must adapt to that to keep up by learning how to work on and apply it, regardless of the discipline they take on in the field. What excites me with this project specifically is that it takes us back to the base understanding of how machine learning works, and the underlying concepts that build up AI chatbots, assistants, etc.

This is because we’re using machine learning as it was intended, a way to recognize patterns and learn from them to improve how it predicts outcomes. I respect that about this project because it goes beyond the repetition we see with replica’s of OpenAI and ChatGPT using wrappers to essentially copy-paste the same chatbot and assistant under a different name, whereas we’re applying and understanding the foundational architecture that makes those AI models learn and work the way they do; on top of that, we’re applying it to a practical problem of helping projecting players’ and teams’ performance in sports betting.

## Preliminary Project Approach and Expected Outcomes

The preliminary approach we’re thinking of is first assessing how we want to scope the problem. We will most likely choose a single sport to focus on like baseball in order to maintain consistency of the data we’re working on. Additionally, if we were to commit to using baseball data, we would need to assess how to choose which data is relevant since the statistics for it can be incredibly specific, making it hard to encapsulate all of it to each projection. The two biggest expectations we have for the results and accomplishments from this would be accuracy and user-friendliness, as accuracy has to be built up and trained into the model to make reliable predictions, and user-friendliness would have to be implemented to make it clear which players and stats support good vs bad performances in games, possibly through a ranking system.

Achieving these two metrics would serve as the basis for what I consider a “job well done”, as they capture our vision on what the working project looks like and shows that we achieved its purpose. I would evaluate my own contributions by asking if I took on the same amount of work as my team members: taking initiative to start and complete tasks and calling for meetings and such. Additionally, if I face certain issues that I cannot solve on my own, evaluating if I did everything I could to research the problem before asking for help from my teammates and making it a known roadblock to them so we can adjust timelines accordingly as it could cause delay.