Project Proposal: NFL Game Predictions

Thomas Hervé Muel [1], **Benjamin Kahkeshan**[2]

[1]muel@kth.se

[2]benkah@kth.se

Introduction

The National Football League (NFL) is one of the most followed sports leagues in North America, and predicting the outcomes of games is of great interest to fans, analysts, and sports betting industries. Traditional prediction relies on expert knowledge and historical performance trends, but nowadays because we have access to vast amounts of data, predicting the future games of teams has become easier and more reliable. This is also possible thanks to the recent advances in artificial intelligence that allow for more systematic, data-driven prediction models. Even though AI models are getting better and better it is still very hard to predict the games outcomes only from the data of the previous games because of the weather, supporters, injuries and many more factors. We will try to do our best to do so. [1]

The purpose of this project is to develop a machine learning model capable of predicting NFL game outcomes based on historical match data. Additionally, (if we have time) we will explore the use of Quantum Neural Networks (QNNs) to investigate whether quantum-based models can provide performance improvements in this prediction task. [2]

Background

We have decided to work on this project after watching a video that talked about using AI to predict sports. [3] Since we both like to watch sports and it is fun to try to predict the outcomes of a game we have decided to do this project. If we go a little bit further, if the model is able to predict every game correctly then we have found a money glitch as we are able to place bets on the team with certainty of winning.

In this project, our aim is not to deeply analyze or develop new model architectures, but rather to apply existing machine learning and quantum neural network techniques and evaluate how well they perform when predicting NFL game results. Our focus is on assessing whether these models can produce accurate predictions when trained on past NFL data, rather than explaining or optimizing the internal decision-making processes of the models.

The project will proceed in several phases. First, we will study the necessary foundational concepts, including machine learning, neural networks, and quantum neural networks, and how to implement them in Python. Next, we will collect and prepare a suitable dataset to train the models. We will then test the trained models on past or upcoming games to compare predicted outcomes with real results. Finally, we will explore a quantum-based approach by implementing a quantum neural network model and comparing its performance with the classical machine learning model. You will find this information also in the time schedule table.

Problems and Goal

Problem **:** How can we implement an AI model that predicts NFL game outcomes based on available dataset?
Goal: The goal in this project is to develop a machine learning model that can analyse the historical data set and predict the result of NFL games with high accuracy.

Objectives:

- Collect, analyse and process NFL dataset:
- Develop and train an AI model that is able to predict games outcomes.
- Deploy the model
- (Use quantum neural networks techniques)

Programming Language

This project will be implemented using **Python**, chosen for its support for data analysis and machine learning. We will be using libraries such as NumPy, pandas, TensorFlow or PyTorch for classical techniques and Qiskit or PennyLane for quantum model simulation.

Dataset

The dataset will include historical NFL match data with a lot of interesting data (that we didn't fully exploring yet) about the games played.

The dataset we have chose can be found following this link : https://nflsavant.com/ *(public, valid, structured dataset)* [4]

Contributions

We are expected our model to be able to predict games with more than a 50% chance of winning and we are aiming for 70-80%.

We will divide the tasks equally between each other and help each other to carry out the project in order to respect the time schedule.

Milestone chart (time schedule)

week	Description	w1	w2	w3	W4	w5	w6	w7
Project Proposal		X						
Literature & Concept Study	Learn ML, neural networks, and quantum neural networks		X					
Data Collection + Analyse	Collect data from nflsavant.com and analyze features			X				
Data Preprocessing	Clean, normalize, engineer input features			X				
Model Development	Train initial classic neural network model			X	X			
Half-term project					X			
Model Evaluation	Test accuracy on unseen games, tune model performance				X			
Transfer to quantum world	Implement QNN using quantum simulation frameworks					X	X	
Documentation							X	
Final project								X

Reference(s)

[1] Raut, N., Patil, S.T., Jahagirdar, O., Kokane, P. and Patil, M. (2023) 'Neural Networks in Sports Analytics', *Medium*, 15 October. Available at: https://medium.com/@neha.raut20/neural-networks-in-sports-analytics-4e991970925c (Accessed: 11 November 2025).

[2] Sun, Y. and Chu, H. (2025) 'The Football Prediction War: Quantum Neural Networks Are Calling the Next Goal', *Binary Verse AI*, 10 June. Available at: https://binaryverseai.com/football-prediction-war-quantum-neural-networks/ (Accessed: 11 November 2025).

[3] YouTube. (2025) *I Trained AI to Predict Sports*. Available at: https://youtu.be/LkJpNLIaeVk (Viewed: 10 November 2025).

[4] NFLsavant.com. (n.d.) *Advanced NFL Statistics*. Available at: https://nflsavant.com/ (Accessed: 11 November 2025).