Project Title: ProCompare

Project Summary: It should be a 1-2 paragraph description of what your project is.

Our project is an American football application that allows users to follow and compare players based on their statistics and recent news headlines. For each comparison of one player to another, we will compute scores via deep learning for each player based on their stats. Users can also favorite players, add their own personal notes to favorited players, and get notified whenever a new article is posted surrounding their favorite players.

Description of an application of your choice. State as clearly as possible what you want to do. What problem do you want to solve, etc.?

American football fans love to compare. Fans of one team or one player take pride in making comparisons to other teams or players and arguing why theirs is better. In line with their competitive nature, many fans play a game known as fantasy football, where they build teams using players from around the league, and score points depending on the real in-game performance of those players. Fans then compete with other fans' teams to see whose team scores the most points.

However, it can be difficult to know which players to pick for your team. A more casual fan who may not have time to watch all the games or look at the statistics may want an easier way to weigh their options for which players to pick. Thus, we are building an application that will score players based on their past statistics and allow users to compare two players. Along with a generated score, users will be able to see player information, aggregate statistics, and news headlines to help make their decisions in fantasy. With our application, the goal is to have one place where users can see which players are better than others both quantitatively with statistical analysis and qualitatively with news headlines, which can help fantasy football enjoyers and regular football fans alike.

What would be a good creative component that can improve the functionality of your application? To get a better sense of what a creative component is, these are technically challenging features that improve the user experience of your application. Some examples include interactive visualization (using several packages with some level or engineering), using several APIs to support some information presentation or using smart transformations to process data. Some examples that are NOT creative components include: software features that are completed with a few lines of code (e.g. adding a google maps iframe). Again, if you are unsure, discuss with your project TA.

A large part of our application hinges on the ability for users to compare players, giving users a numerical measure of a player's potential as well as helping make a decision on who would be the better for the team. In order to facilitate player comparison, we plan to run a neural network that takes in a player's statistical profile and returns their expected production for the season. The model would be trained on a player's existing statistical history and would also incorporate other important variables such as games missed and years of experience.

Usefulness. Explain as clearly as possible why your chosen application is useful. What are the basic functions of your web application? (What can users of this website do? Which simple and complex features are there?). Make sure to answer the following questions: Are there any similar websites/applications out there? If so, what are they, and how is yours different?

Our application is useful for football fans to see which players are playing better than others, and specifically for fantasy players to determine which players to pick for their teams. The simple functionalities of the website include player information display (team, stats, articles), player favorites list, and user notes on players in the favorites list. More complex functionalities include comprehensive search, filtering, and sorting of players (by name, position, aggregate statistics, etc), ML-scoring of players based on statistics, as well as notifications for new articles.

Modern fantasy apps do show statistics and generate a projected fantasy score for each week. However, many lack the functionality to directly compare two players, which would be incredibly helpful for users to pick players for their teams. Additionally, existing fantasy applications do not allow users to add personalized notes to the players, which we believe can help users keep track of why they have players in their favorites list.

Realness. We want you to build a real application. So, make sure to locate real datasets. Describe your data sources (Where is the data from? In what format [csv, xls, txt,...], data size [cardinality and degree], what information does the data source capture?). It would be hard to satisfy stage 2 requirements with one dataset. Thus, we strongly recommend identifying at least two different data sources for your project.

We will be using two data sources for this project. The first is Pro Football Reference, a comprehensive database of all past and current football players, including player information and statistics per game. Because they do not officially provide full datasets for download, we will scrape from the active player list into several tables.

The first table will consist of all active players within the past 10 years and their respective positions. This table will only include players who have the quarterback, running back, wide receiver, or tight end position because those are the most relevant positions in fantasy football. The second table will consist of all players with the quarterback position and all relevant associated statistics. The third table will consist of all skill position players (positions other than quarterback) and their relevant statistics. Finally, the last table will consist of all these players and their fantasy points scored for each given year.

Our second data source is ESPN's NFL news archive, which we scraped to get NFL headlines from the last 3 years (2022 to 2024). For each headline we've pulled the year, month, and title (so degree of 3) into a csv. From the last 3 years we have 14,194 tuples.

A detailed description of the functionality that your website offers. This is where you talk about what the website delivers. Talk about how a user would interact with the application (i.e., things that one could create, delete, update, or search for). Read the

requirements for stage 4 to see what other functionalities you want to provide to the users. You should include:

1. **A low-fidelity UI mockup: What do you imagine your final application's interface might look like? A PowerPoint slide or a pencil sketch on a piece of paper works!**
2. **Project work distribution: Who will be responsible for each of the tasks or subtasks?**
   Explain how backend systems will be distributed across members. Be as specific as possible as this could be part of the final peer evaluation metrics.

Our UI mockup is included below

On the homepage, users are presented with a search functionality for players. Users will be able to search by name, as well as filter by team and position. Users can also sort the players by select aggregate statistics (likely to be determined by position; eg. for QBs we can sort by total passing yards).

The users can use this search functionality to select two players to compare. Once two players are selected, users are taken to a comparison page. The application will output a score for each player and display the two players side by side including their player info, aggregate statistics, and recent headlines. The score is pre-generated per player using deep learning on their past statistics.

Users will also be able to add and remove players from their favorites list. Users can also add, edit, and remove notes from players on their favorites list, which satisfies the CRUD requirement.

Work distribution:

Whole team: DB design (UML diagram, advanced queries, index design, etc)

- Nathan: DL model for scoring, data scraping
- Evan: frontend design and implementation
- Anthony: DB implementation, link backend with frontend
- Marvin: backend implementation

Link: https://excalidraw.com/#json=On7MyQKpWAugxsHYv6eMs,P4lZ8iw2q6upGiSzSmGayg