**Proposal: Utilizing Neural Networks to Predict Men's 100m Rankings at the Paris Olympics**

**1. Introduction**

The objective of this project is to develop a neural network model that predicts the rankings of male athletes in the 100m sprint at the Paris Olympics. By leveraging historical performance data, physiological metrics, and other relevant factors, we aim to create a robust and accurate predictive model.

**2. Background and Motivation**

The 100m sprint is one of the most anticipated events in the Olympic Games, showcasing the fastest athletes in the world. Predicting the outcomes of such high-stakes events can provide valuable insights for coaches, athletes, and sports analysts. Neural networks have shown great potential in handling complex, non-linear patterns in data, making them suitable for this task.

**3. Objectives**

1. **Data Collection:** Gather historical performance data of male 100m sprinters, including past Olympic results, World Championships, and other major athletic events.
2. **Feature Engineering:** Identify and preprocess relevant features such as wind conditions, elevated conditions and the probability that an athlete may cause a false-start.
3. **Model Development:** Design and train a neural network model to predict the rankings of athletes based on the input features.
4. **Evaluation:** Validate the model using various performance metrics and cross-validation techniques.

**4. Methodology**

1. **Data Collection and Preprocessing:**
   * y: Predicted rankings for the Paris Olympics (0 is not in, 1-8 is ranked)
   * Consideration Factors (X)

Physiological Indicators: Age

Historical Performances: Best performance of the year (net); Best performance international ranking of the year; Best net performance international ranking of the year; Championship Year (0/1); Average of top 10 performances of the year; International ranking of average top 10 performances of the year; Variance of top 10 performances of the year; Personal average of top 10 performances; Personal variance of top 10 performances; Number of times participated in championships; (Number of false starts)

* + Data preprocessing: eliminating the effect of wind speed; processing each year's data of the athlete to obtain one value for each factor.

1. **Feature Selection:**
   * Conduct exploratory data analysis (EDA) to identify significant features.
   * Utilize techniques such as Principal Component Analysis (PCA) to reduce dimensionality if necessary.
2. **Model Architecture:**
   * Design a neural network architecture suitable for regression tasks, incorporating layers such as Dense, Dropout, and Batch Normalization.
   * Experiment with different activation functions, optimizers, and loss functions to improve model performance.
3. **Training and Validation:**
   * Split the data into training, validation, and test sets.
   * Train the model using the training set and tune hyperparameters using the validation set.
   * Evaluate the model on the test set using metrics such as Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and R-squared.

**5. Expected Outcomes**

* A well-trained neural network model capable of accurately predicting the rankings of male 100m sprinters at the Paris Olympics.
* Insights into the most influential factors affecting sprint performance.

**6. Timeline**

**A screenshot of a graph

Description automatically generated**

**7. Conclusion**

This project aims to leverage the power of neural networks to predict the rankings of male 100m sprinters at the Paris Olympics. With a well-defined methodology and a clear timeline, we are confident in our ability to deliver a robust predictive model that can provide valuable insights to athletes, coaches, and sports analysts.