MINI PROJECT REPORT

ON

MMA FIGHT PREDICTOR

BY
SIDDHARTH KSHIRSAGAR

Course: MCA I Sem.: II
Roll No.:24055

PRATIBHA INSTITUTE OF BUSINESS MANAGEMENT
CHINCHWAD, PUNE-411019
2024-2025

DECLARATION

I hereby declare that this project report titled **"MMA fight predictor"** is a result of my work and has not been submitted for any other degree or award. This report is submitted in partial fulfillment of the requirements for the **Master of Computer Applications** degree at **Pratibha Institute of Business Management Studies**.

I confirm that the information presented in this report is accurate and complete to the best of my knowledge. I acknowledge that any assistance from others has been duly acknowledged in this report.

I understand that, plagiarism will be dealt with seriously, and I assure you this work is entirely my own.

Date: 31-03-2025

Place: Pune

Signature: ___SiddharthKshirsagar_____

Name: Siddharth Kshirsagar

Roll Number: 24055

ACKNOWLEDGMENT

I would like to express my sincere gratitude to all those who have contributed to the successful completion of this project titled **" MMA fight predictor "**. First and foremost, I would like to thank my supervisor, **Ashwini Joshi Ma'am**, for their invaluable guidance, support, and encouragement throughout this project. Their insights and expertise have been instrumental in shaping my understanding and approach to the work.

I am also grateful to my professors and faculty members at **Pratibha Institute of Business Management Studies** for providing me with the knowledge and skills necessary to undertake this project. Their teachings have laid a strong foundation for my academic growth.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

The **MMA Fight Predictor** is an advanced system that utilizes machine learning and statistical analysis to predict the outcomes of Mixed Martial Arts (MMA) fights. The system considers various factors like fighter statistics, previous match data, fight styles, and external conditions to generate accurate predictions.

1.2 Existing System and Need for System

he existing MMA fight prediction systems primarily rely on manual analysis and basic statistical methods. These systems consider historical fight records and fighter statistics, but they do not incorporate advanced data processing techniques or machine learning algorithms. As a result, the accuracy of predictions remains limited, and the system fails to account for dynamic factors such as fighter injuries, fight camps, weight cuts, and recent performance trends.

A machine learning-based MMA fight predictor is needed to:

- Efficiently process both historical and real-time fight data.
- Use ML models (Random Forest, Decision Trees, etc.) to improve prediction accuracy.
- Support automated feature extraction and data normalization for better decision-making.
- Provide a user-friendly UI (via IPython widgets) to enhance accessibility for non-technical users.

This new system will offer higher prediction accuracy, automation, and an improved user experience, making it significantly superior to traditional methods.

1.3 Limitations of the existing system

Some major limitations of the existing systems include:

- **Limited Data Processing:** Traditional methods analyze past fight records without deep feature extraction or pattern recognition.
- **No Real-time Insights:** Current systems do not update predictions based on the latest fight developments, such as injuries or last-minute changes.
- **Lack of Automation:** Most predictions rely on manual analysis, which is time-consuming and prone to human error.
- **Basic User Interface:** Existing tools are often spreadsheet-based or text-heavy, making them less interactive and user-friendly.

CHAPTER 2: PROPOSED SYSTEM

2.1 Problem statement

In the modern era of combat sports, Mixed Martial Arts (MMA) has gained immense popularity, with fans and analysts constantly debating fight outcomes. However, predicting MMA fight results remains a challenge due to the unpredictable nature of the sport, various fighting styles, and numerous influencing factors like fighter records, weight classes, and recent performances.
Currently, there is no accessible and reliable AI-based tool that allows users to analyze fight predictions based on historical data. Most predictions rely on personal opinions, betting odds, or expert analysis, which may introduce bias and inconsistency. A data-driven approach using machine learning can provide a more structured, unbiased, and statistically backed prediction system to help fans, analysts, and even bettors make informed decisions.

2.2 Objectives of the proposed system

The MMA Fight Predictor aims to solve these issues by leveraging machine learning algorithms to analyze past fight data and predict the probable winner of a fight. The key objectives of this system are:

- **Develop a Machine Learning-Based Fight Prediction Model**
  - Utilize historical fight data to train a classification model.
  - Implement RandomForestClassifier for accurate predictions.
- **Provide a User-Friendly Prediction Interface**
  - Use IPython Widgets (ipywidgets) for an interactive experience.
  - Offer a simple dropdown-based fighter selection system.
- **Ensure Reliable and Explainable Predictions**
  - Display win probability percentages to indicate prediction confidence.
  - Implement data pre-processing techniques to clean and standardize input data.
- **Improve Accuracy with Future Enhancements**
  - Implement trend analysis of last 5 fights to enhance predictions.
  - Expand the dataset with real-time fight statistics for better performance.

2.3 Scope of the system

The scope of the Electroconnect system includes:

- **Modules**: The system consists of one module only:
  - **User Module**: For user to predict the fight matchup between two fighters
- **Limitations**: The Traditional methods analyze past fight records without deep feature extraction or pattern recognition.

2.4 Module specifications

User Module

- **Fighter selection**: Two dropdown menus allow the user to select two fighters for comparison.
  The same fighter cannot be selected in both dropdowns to maintain logical accuracy.
- **Prediction execution**: Once fighters are selected, the user clicks the "Predict Winner" button.
  The machine learning model (RandomForestClassifier) processes historical fight data to predict the likely winner.
  The system provides a confidence score (probability) indicating prediction reliability.
- **Data Visualization**: Fighter images are displayed using requests.

2.5 Detail Description of Technology Used

The MMA Fight predictor is developed using the following technologies:

- **Python:** The entire script is written in Python.
- **Pandas:** For data manipulation and analysis, including handling missing values and converting data types.
- **scikit-learn:** For machine learning tasks, including preprocessing (MinMaxScaler) and modeling (RandomForestClassifier).
- **Joblib:** For saving and loading the trained machine learning model.
- **NumPy:** For numerical operations, such as converting time strings to numerical values.
- **IPython Widgets (ipywidgets):** For creating interactive UI elements like dropdowns, buttons, and displaying outputs.
- **Requests:** For making HTTP requests, e.g., to fetch images from URLs.

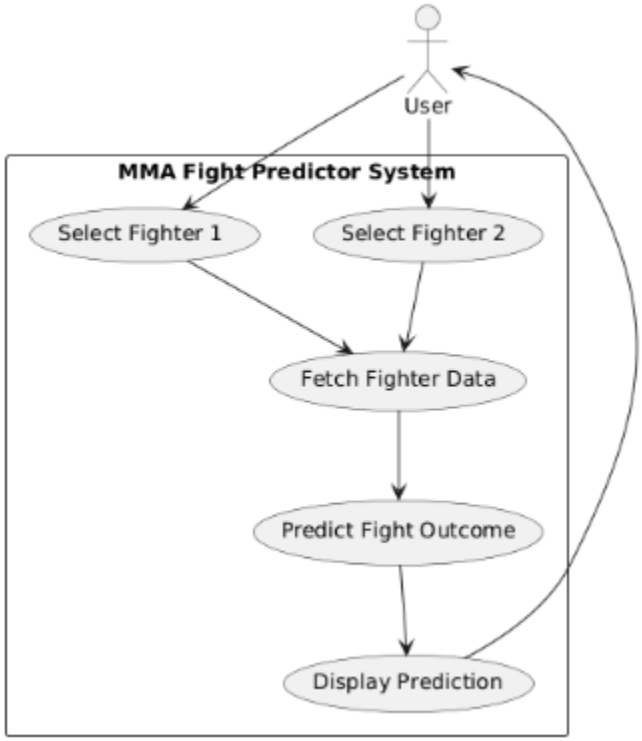
2.6 Operating environment

The MMA Fight Predictor is designed to operate in the following environment:

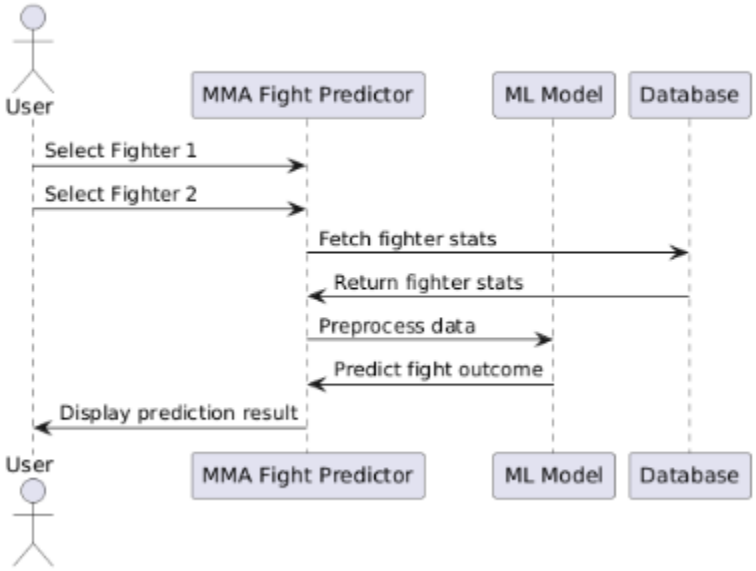
- **Web-based Application**: Accessible through modern web browsers on desktop and mobile devices.
- **Network Requirements**: A stable internet connection is required for accessing data, and generate the prediction
- **Hardware Requirements**: Any device capable of running a web browser will suffice.

CHAPTER 3: SYSTEM ANALYSIS & DESIGN

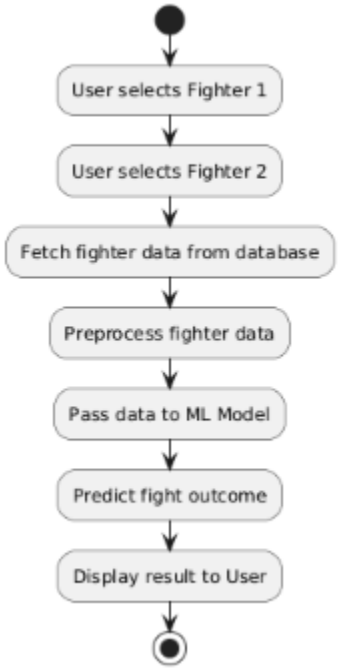
3.1 Use Case Diagrams



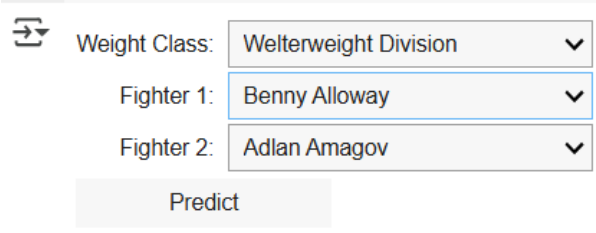
3.2 Sequence Diagram



3.3 Activity Diagram



3.7 User Interface Design (Input Screens etc.)



CHAPTER 4: USER MANUAL

4.1 User Manual

The **MMA Fight predictor** System is designed to be user-friendly and intuitive. This section provides detailed instructions on how to use the software model.

4.1.1 Getting Started

1. Open **Google Colab** in your browser.
2. Upload the provided .ipynb (Jupyter Notebook) file or open it from Google Drive.
3. Ensure all necessary libraries (pandas, numpy, scikit-learn, ipywidgets, etc.) are installed.

4.1.2 Running the prediction model

1. Click on **Runtime** > **Run all** in Google Colab.
2. This will load the model, UI components, and necessary datasets

4.1.3 Selecting fighters

- To select a fighter:
    1. Two dropdown menus will appear, labeled **"Fighter 1"** and **"Fighter 2"**.
    2. Choose the fighters from the provided UFC fighter list.
    - Note: **The same fighter cannot be selected in both dropdowns** to prevent errors.

4.1.4 Generating prediction

- To track your orders:
    1. Click the **"Predict Winner"** button.
    2. The model will process the input data and display the predicted winner.
    3. Confidence percentage may also be shown based on the model's probability calculations.

Drawbacks and Limitations

Limited Dataset and Historical Data Dependency:

- The model relies on past fight statistics, which may not always reflect a fighter's current form, injuries, or training improvements.
- External factors like fight camps, weight cuts, or last-minute opponent changes are not considered.

No Real-time Data Integration:

- The system does not fetch live fight statistics or betting odds, which could enhance prediction accuracy.
- Fighters' real-time conditions, like weight-cut efficiency or injuries before a fight, are not accounted for.

No Consideration of Fight Styles & Game Plans:

- The system does not evaluate specific fighting styles (e.g., striker vs. grappler) and how they match up against each other.
- Strategy changes between fights (e.g., adopting a wrestling-heavy approach) are not factored into the prediction.

No Consideration of Mental and Physical Factors:

- Attributes like a fighter's mindset, motivation, or external pressures (e.g., personal issues) are not considered, which can impact performance.

Proposed Enhancements

- **Improved Fighter Selection Logic:**

  Currently, both dropdowns allow selection of the same fighter. In the enhanced version, once a fighter is selected in one dropdown, they will not appear in the second dropdown to prevent duplicate selections.
- **Incorporating Fight Trends:**

  The next model iteration will analyze the last **five fights** of each fighter to identify trends such as winning streaks, finishing methods (KO/TKO, submission, decision), and overall fight performance. This will improve prediction accuracy.

Conclusion:

The **MMA Fight Predictor** bridges the gap between subjective analysis and data-driven decision-making. With AI and machine learning, it ensures accurate, reliable, and fast predictions, making it a valuable tool for MMA fans, analysts, and bettors alike.

Bibliography

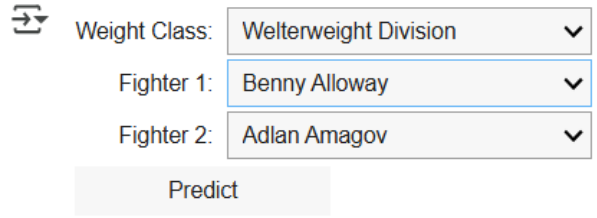
1. **UFC Official Website:**
   UFC Stats: https://www.ufcstats.com/

2. **GitHub Copilot:**
   GitHub Copilot AI Assistance: https://github.com/features/copilot

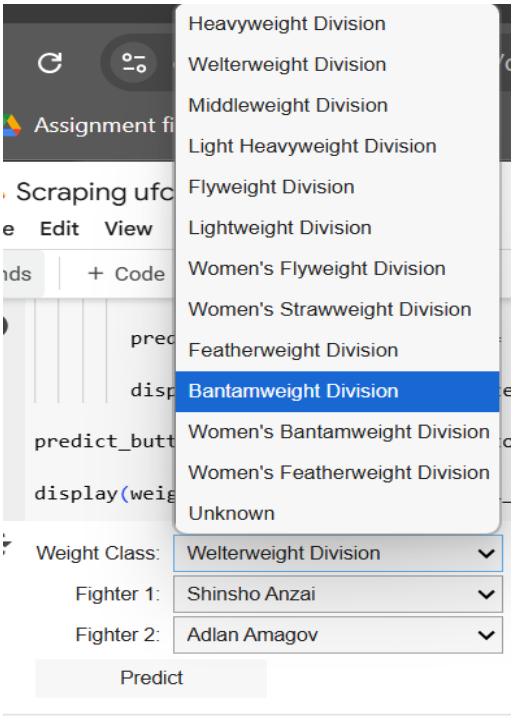
ANNEXURES

ANNEXURE 1: USER INTERFACE SCREENS

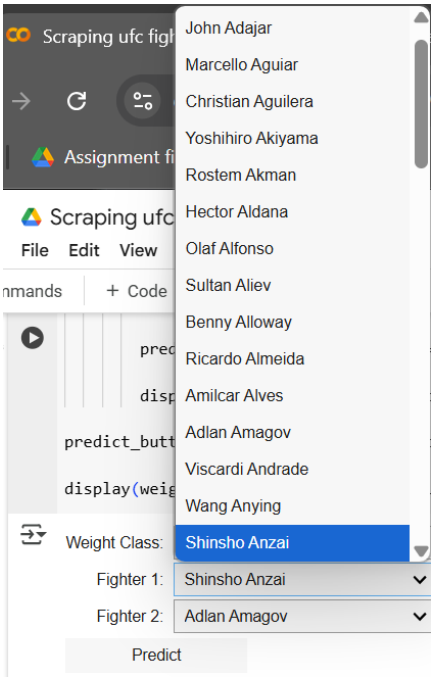
INPUT SCREEN:



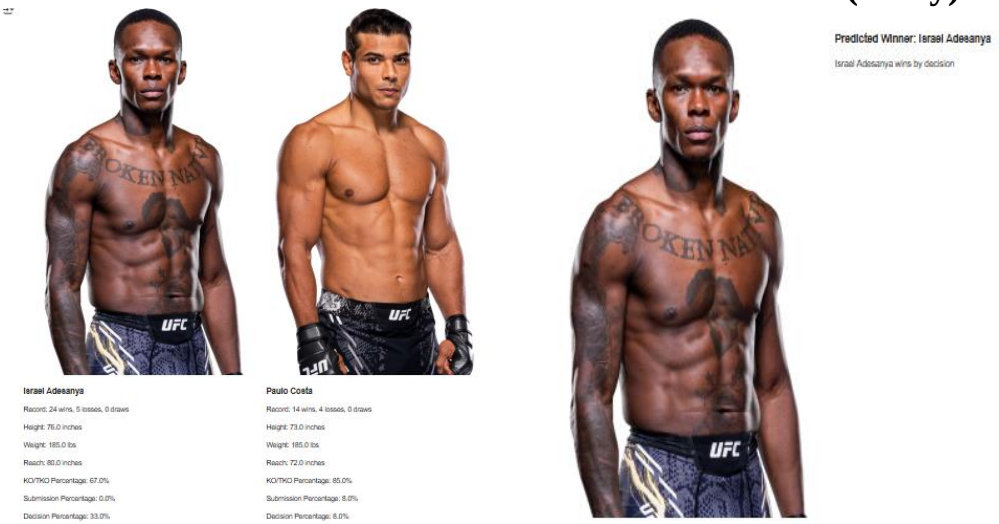
SELECTING A WEIGHT CLASS:



SELECTING A FIGHTER:



ANNEXURE 2: OUTPUT REPORTS WITH DATA (if any)



ANNEXURE 3: SAMPLE PROGRAM CODE / Project Demo (which will prove sufficient development is done by the student)

```
# Function to determine the win method
def determine_win_method(winner_data, loser_data):
    ko_diff = winner_data['KoTkoPercentage'] - loser_data['KoTkoPercentage']
    sub_diff = winner_data['SubmissionPercentage'] - loser_data['SubmissionPercentage']
    dec_diff = winner_data['DecisionPercentage'] - loser_data['DecisionPercentage']

    if ko_diff > sub_diff and ko_diff > dec_diff:
        return 'knockout'
    elif sub_diff > ko_diff and sub_diff > dec_diff:
        return 'submission'
    else:
        return 'decision'
```