Final Project Data Science

MATCH PREDICTION ANALYSIS

PREDICTING EPL MATCH OUTCOMES USING MACHINE LEARNING

Muhammad Umar Abdurrahman

TABLE OF CONTENTS

Description

Fokus
- Analisis & prediksi hasil pertandingan EPL (2020–2023).

Tujuan
- Bangun model ML untuk klasifikasi home win, away win, draw.

Target
- Akurasi >60% + insight faktor kemenangan + rekomendasi bisnis.

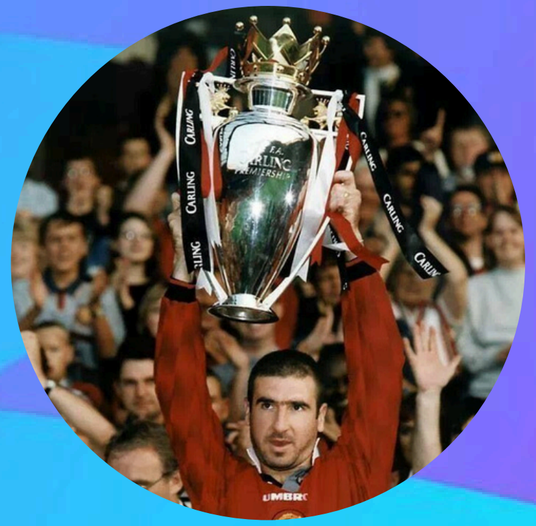
Pentingnya Proyek
- EPL = liga bernilai miliaran dolar.
- Bermanfaat bagi perusahaan taruhan (Bet365), fantasy sports (FanDuel), dan klub EPL.

Problem Statement

- Problem: Prediksi hasil pertandingan EPL hanya akurat ~50%, mendekati random guess.
- Objective: Membangun model prediksi dengan akurasi ⩾60%.
- Impact:
  - 📈 Sportsbook → mengurangi risiko finansial.
  - ⚽ Football Clubs → mendukung strategi tim.
  - 📱 Fans & Fantasy Sports → meningkatkan engagement.

DESCRIPTION

DATA UNDERSTANDING



Match prediction Analysis

Sumber
- English Premier League (2020–2023).

Ukuran
- 1,140 baris × 40 kolom.

Fitur Utama
- Match Info: Date, Home Team, Away Team, Attendance.
- Performance Metrics: Goals, Shots, Shots on Target, Possession, Passes, Corners, Fouls.
- Target: Hasil pertandingan → Home Win, Away Win, Draw.

DATA PRE-PROCESSING

Missing Values

Tidak ada data null atau missing value pada dataframe

Duplicated Data

Tidak ada data duplikat pada dataframe

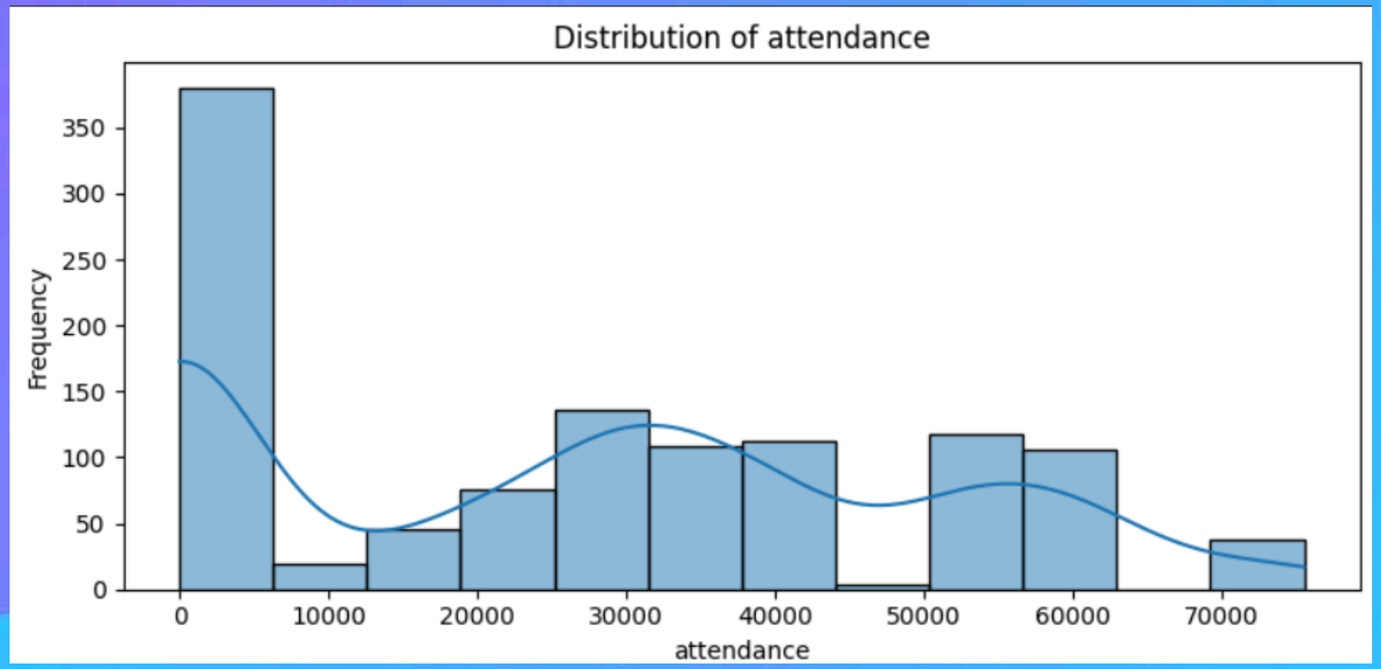
Data Manipulated

Merubah format date yang sebelumnya object menjadi datetime

Feature Engineering

Memilih feature yang akan digunakan untuk EDA dan model machine learning

Attendance Distribution – Majority of Matches <10K

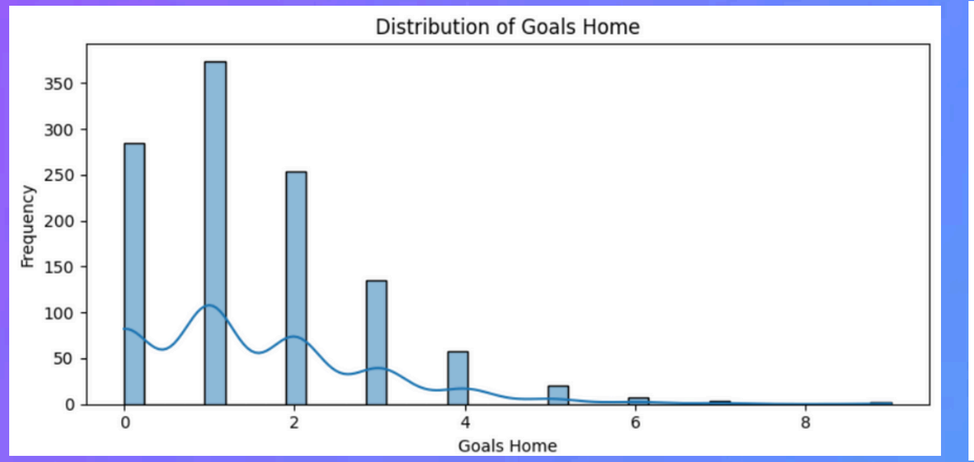


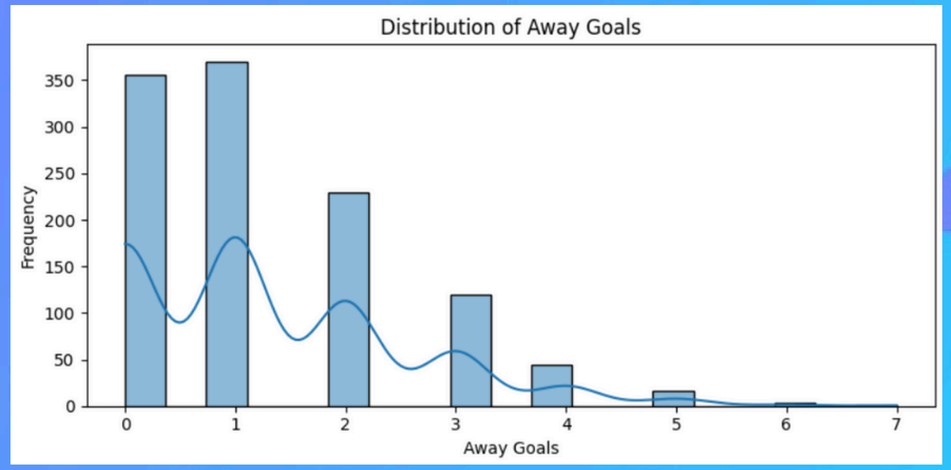
📊 Distribution of Attendance

- Mayoritas pertandingan <10.000 penonton
- Laga bergengsi tertentu >50.000 penonton
- Konsentrasi tinggi pada big match

EXPLORATORY DATA ANALYSIS

Goals Distribution – Home Advantage Evident

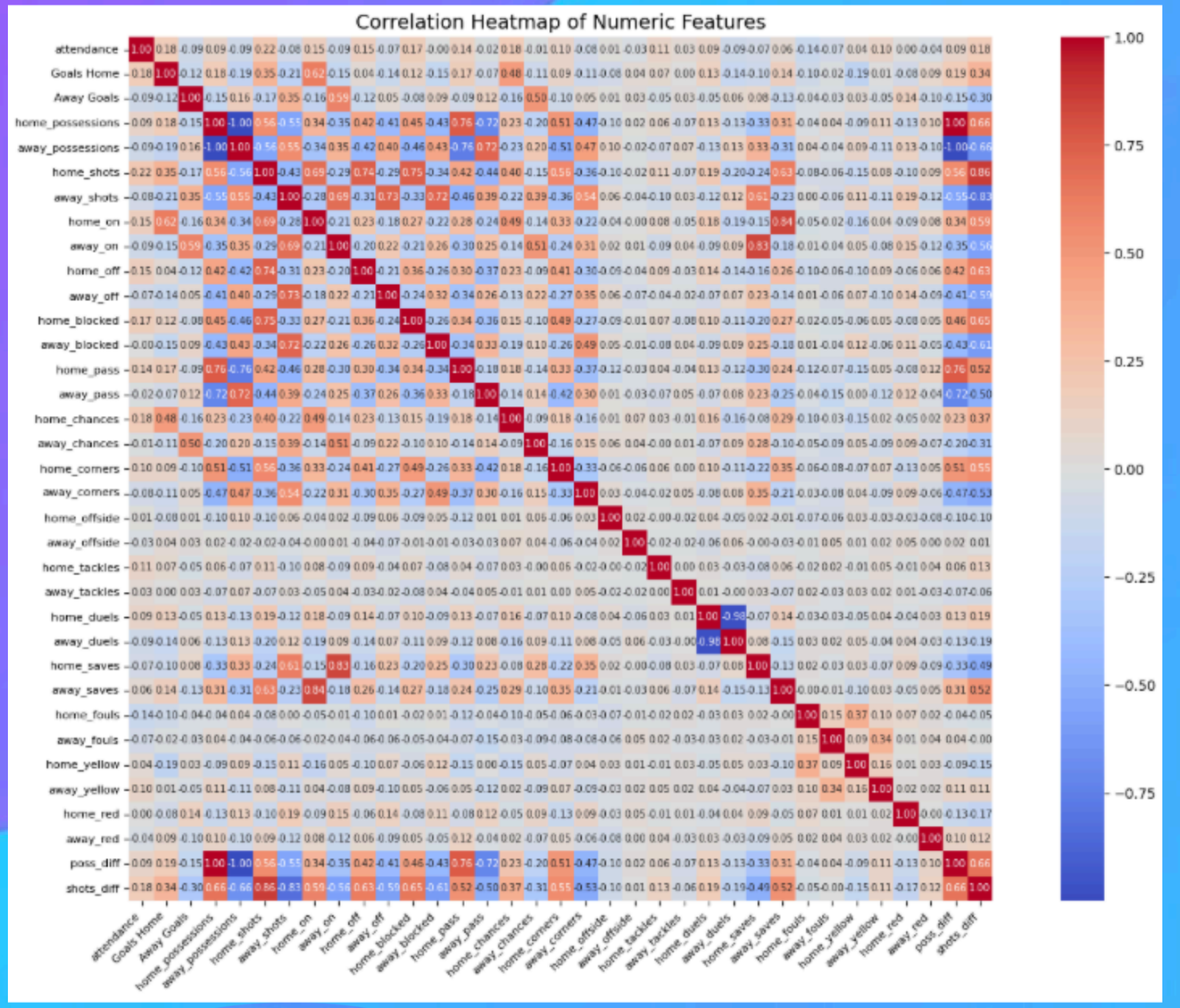




⚽ Distribution of Home & Away Goals

- Umumnya 0–2 gol per pertandingan
- 1 gol paling sering dicetak
- Laga dengan >3 gol jarang terjadi
- Tim tuan rumah sedikit lebih produktif → bukti home advantage

EXPLORATORY DATA ANALYSIS



Correlation Heatmap

📊 Key Insights from Correlation

- Goals dipengaruhi oleh shots & shots on target
- Possession lebih terkait ke passing volume, bukan goals langsung
- Corners & chances mencerminkan aktivitas menyerang
- Defensive metrics & fouls → lebih lemah dalam prediksi hasil
- Selisih gol & selisih tembakan = indikator kuat hasil pertandingan

EXPLORATORY DATA ANALYSIS

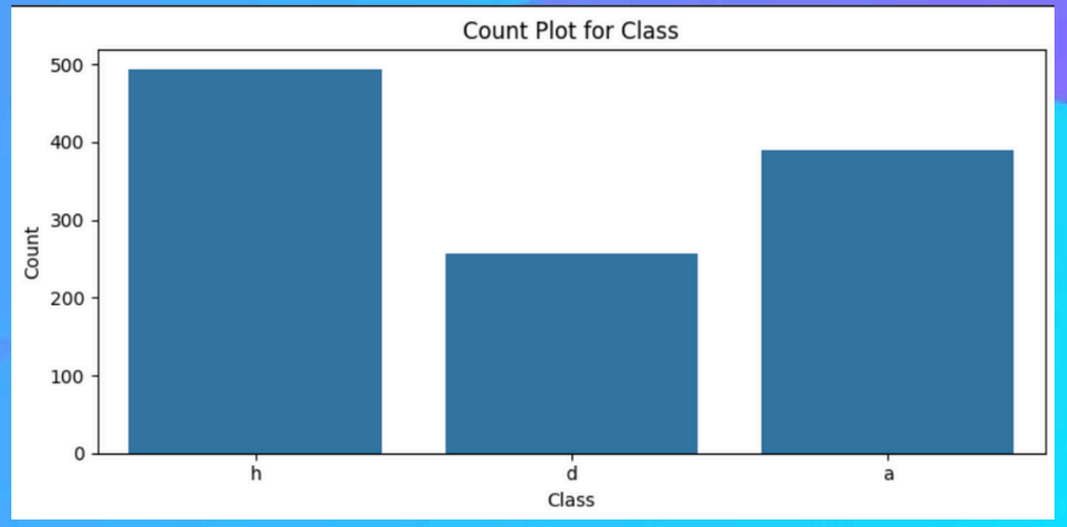
EXPLORATORY DATA ANALYSIS

Home/Away Win, & Draw Class

- Class h ≈ 500
- Class d ≈ 250
- Class a ≈ 390

Total ≈ 500 + 250 + 390 = 1,140

- Class h: 500 / 1140 ≈ 43.9%
- Class d: 250 / 1140 ≈ 21.9%
- Class a: 390 / 1140 ≈ 34.2%



MODEL PREPARATION

Split Train & Test Data

Melakukan split data dan test data

```
Training Accuracy: 0.61
Test Accuracy: 0.60
```

Build Multinomial Logistic Regression Model

Membangun model Multinomial Logistic Regression

Evaluate The Model Using Accuracy Score

Memastikan Accuracy score dari model sesuai yang diharapkan sehingga model bisa digunakan

```
Accuracy of the Multinomial Logistic Regression model: 0.60
```

```
Classification Report:
              precision    recall  f1-score   support

           0       0.62      0.67      0.65        91
           1       0.17      0.07      0.10        45
           2       0.64      0.78      0.71        92

    accuracy                           0.60       228
   macro avg       0.48      0.51      0.48       228
weighted avg       0.54      0.60      0.56       228
```

Final Project Data Science

MACHINE LEARNING MODEL

Plotting The Confusion Matrix

1. Away Win (Class 0)
    - Precision: ~65%
    - Recall: ~65%
    - F1-score: ~65%

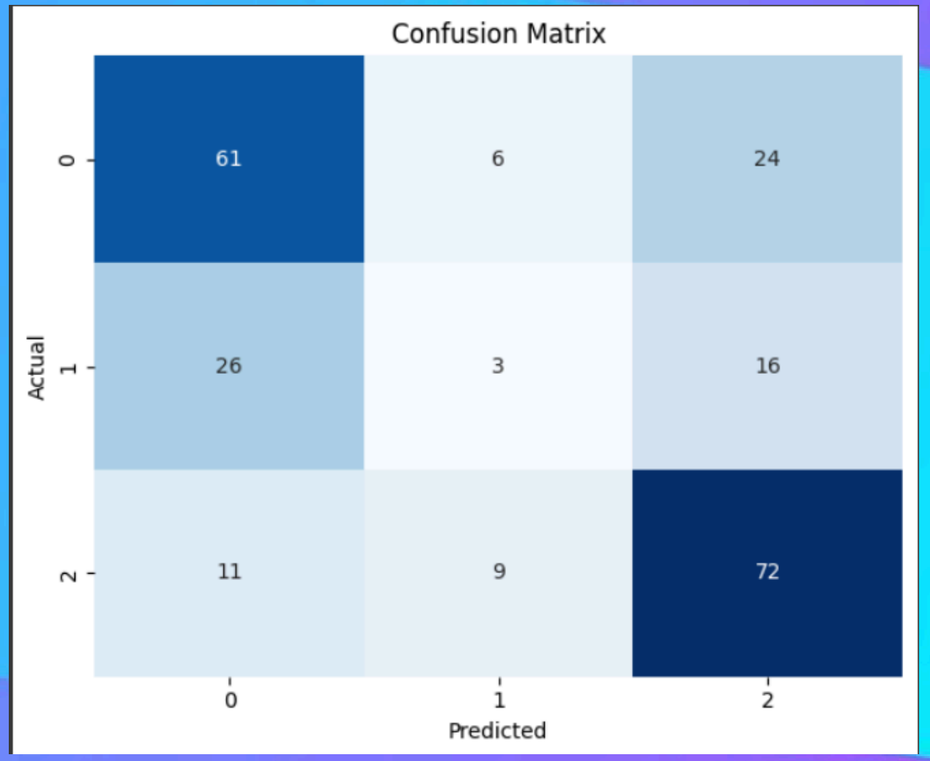
Model cukup stabil, meski masih ada kecenderungan salah mengklasifikasi sebagai home win..

2. Draw (Class 1)
    - Precision: ~20%.
    - Recall: sangat rendah (~5–10%)
    - F1-score: rendah (~8–12%)

Model hampir gagal menangkap pola draw. Ini jelas dampak dari class imbalance dan fitur yang kurang representatif untuk hasil imbang.

3. Home Win (Class 2)
    - Precision: ~70%
    - Recall: ~75%
    - F1-score: ~72%

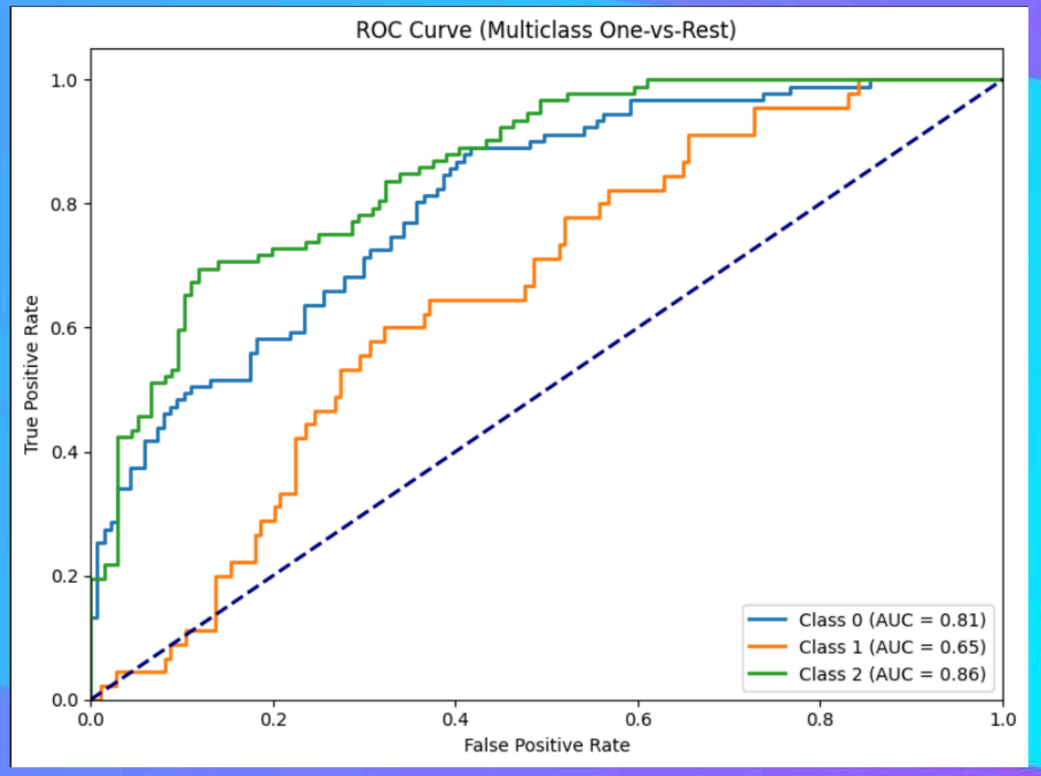
Model paling baik di kelas ini, selaras dengan fenomena home advantage dalam sepakbola.



Final Project Data Science

MACHINE LEARNING MODEL

Plot ROC Curve



📊 ROC Curve (Multiclass One-vs-Rest)

- Class 0 – Away Win (AUC = 0.81)
  - Model cukup andal membedakan kemenangan tim tamu.
  - AUC > 0.8 → prediksi relatif reliabel, meski masih ada ruang perbaikan.
- Class 1 – Draw (AUC = 0.65)
  - Performa terlemah; mendekati random guess (0.5).
  - Sering salah diklasifikasikan sebagai home win atau away win.
  - Menegaskan bahwa hasil draw adalah yang paling sulit diprediksi.
- Class 2 – Home Win (AUC = 0.86)
  - Performa sangat baik, mendekati AUC 0.9.
  - Konsisten dengan fenomena home advantage, sehingga lebih mudah dikenali oleh model.

RECOMMENDATIONS

Sportsbook & Betting ⚽

- Optimalkan odds home/away win (akurasi tinggi).
- Gunakan odds konservatif untuk draw (akurasi rendah).

Sponsorship & Marketing 💼

- Tunjukkan home advantage dalam kampanye sponsor.
- Gunakan data prediksi kemenangan kandang untuk promosi tiket.

RECOMMENDATIONS

Fan Engagement 📱

- Publikasikan prediksi model sebagai match preview.
- Jadikan draw sebagai faktor “unpredictable” untuk meningkatkan rasa penasaran fans.

Future Development 🚀

- Tambah variabel taktis (fouls, cards, expected goals).
- Coba model lebih kompleks (XGBoost, Random Forest, Neural Networks).

THANK YOU

Thank you for your time! Football is more than just a game; it's a global phenomenon that unites people across cultures. Enjoy the game and keep the passion alive!

https://wa.me/6282215082801
www.linkedin.com/in/umarabdurrahman
muhammadumarabdurrahman10@gmail.com