



PlayAnalytics

AI-DRIVEN SPORTS MANAGEMENT PORTAL

CSIS4495 APPLIED RESEARCH PROJECT
SECTION 002

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THE PROBLEM IS MORE THAN JUST A GAME



1. How can ML improve injury prediction and performance optimization in sports?
2. What methods can provide data-driven insights for athletes?



RESEARCH DESIGN AND OBJECTIVES



Develop a web-based sports management portal utilizing machine learning to predict injury risks and deliver data-driven insights tailored specifically for basketball athletes.

Objectives

- a. Create a database to store athlete profiles and performance metrics.*
- b. Train a machine learning model to predict injury risks using historical data.*
- c. Build interactive dashboards for visualizing injuries and injury risk level.*



TECHNOLOGY STACK

From backend to frontend, ML to tools, every tech stack has purpose.

Backend: Django

Frontend: Bootstrap 5,
Chart.js

ML: scikit-learn, Pandas,
Numpy, Joblib

DB & Images: SQLite,
Pillow

Tools: GitHub, Jupyter Notebook,
Canva, ChatGPT, YouTube

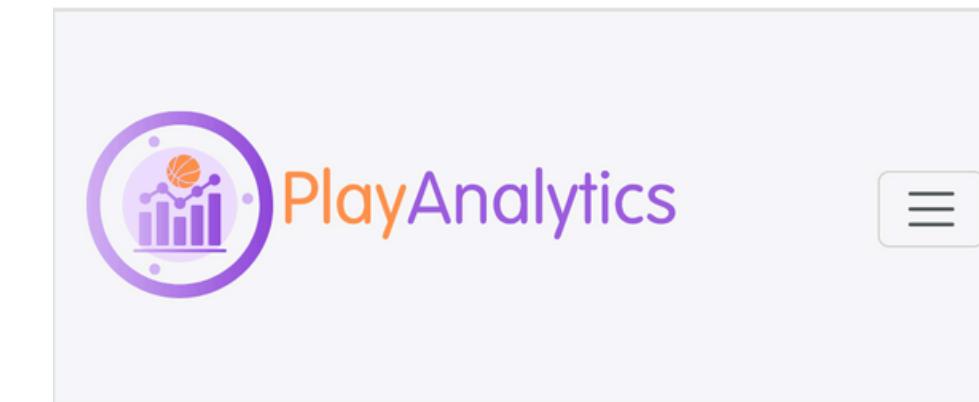




FEATURES OVERVIEW

1. Responsive Web Design

The screenshot shows the homepage of the PlayAnalytics portal. At the top left is the logo 'PlayAnalytics' with a purple circular icon containing a basketball and a bar chart. To its right are links for 'Dashboard', 'Prediction', and 'Profiles'. On the far right are 'Login' and 'Register' buttons. Below the header is a large callout box with a light grey background and a dark grey border. It contains the heading 'AI-Driven Sports Management Portal.' in bold black font, followed by a descriptive paragraph: 'PlayAnalytics is a sports management portal utilizing machine learning to predict injury risks and deliver data-driven insights tailored specifically for basketball athletes. By integrating predictive analytics, PlayAnalytics empowers athletes to proactively minimize injury risks and optimize training effectiveness.' At the bottom left of this box is a blue 'Start' button.



2. User Registration/Login



PlayAnalytics

Login

Username:

Password:

Login

New user? [Register here](#)



PlayAnalytics

Register

Username: Required. 150 characters or fewer. Letters, digits and @./+/-/_ only.

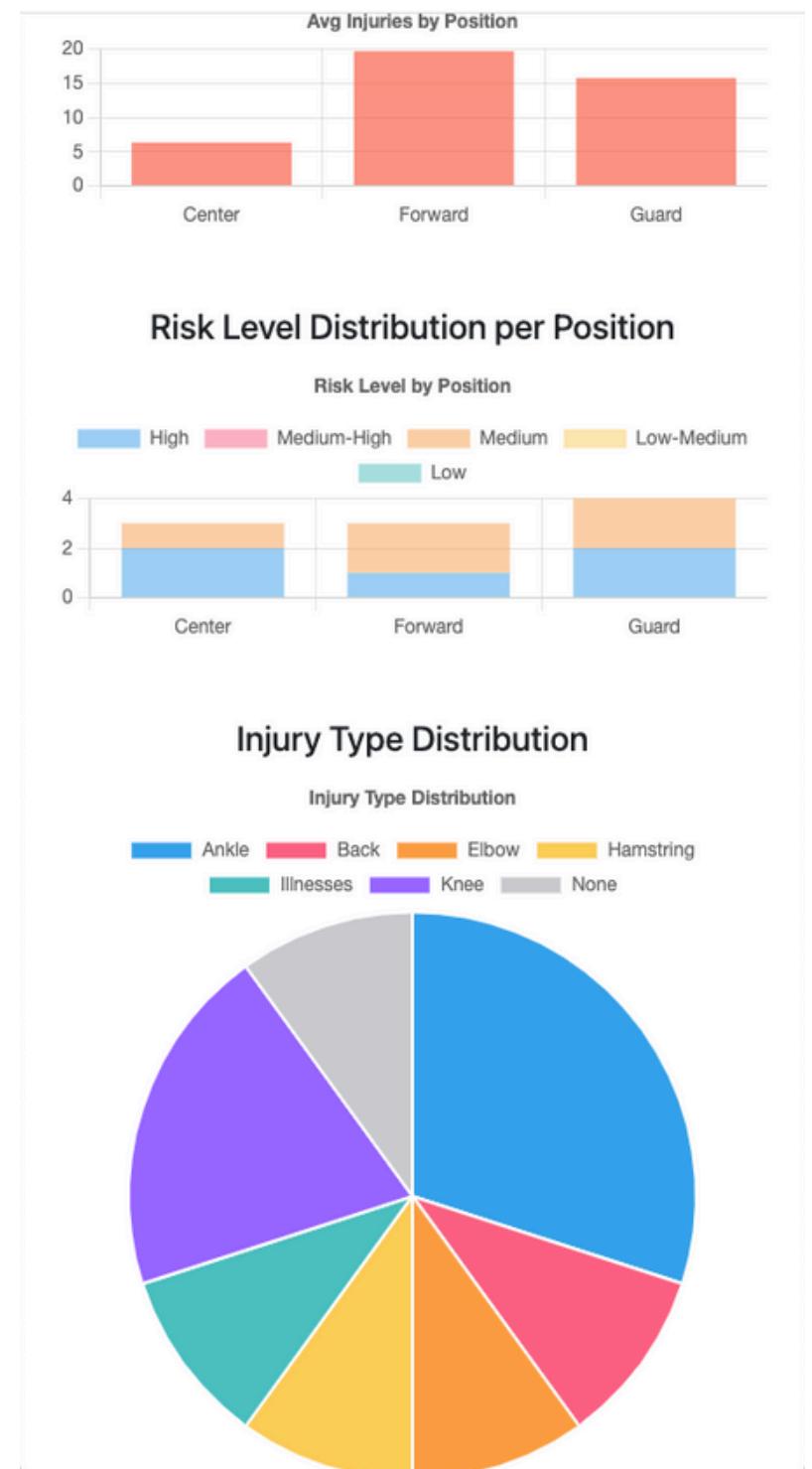
Password:

- Your password can't be too similar to your other personal information.
- Your password must contain at least 8 characters.
- Your password can't be a commonly used password.
- Your password can't be entirely numeric.

Password confirmation: Enter the same password as before, for verification.

Register

3. Dashboard Page



4. Prediction Page

PlayAnalytics

Predict Injury Risk

Name: Juan Dela Cruz

Age: 35

Height in inches: 70

Weight in pounds: 210

Position: Forward

Games played: 250

Minutes played: 700

Field goals attempted: 500

Three point field goals attempted: 350

Free throws attempted: 250

Steals: 100

Blocks: 100

Fouls: 100

Total injuries: 2

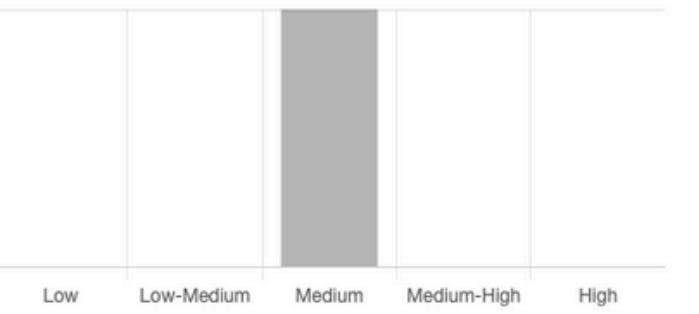
Most common injury: Achilles

Predict

Injury Risk Prediction:
High risk based on player stats.

The most common injury risk in the system is: Medium





Predict **Save to Profile** **New Prediction**

5. Profile Page

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All Player Profiles

Add New Player

| Player | Risk |
|------------------|--------|
| Christian Koloko | Medium |
| LeBron James | High |
| Luka Doncic | High |
| Austin Reaves | Medium |
| Juan Katigbak | High |
| Markieff Morris | Medium |
| Bronny James | Medium |
| Dalton Knecht | Medium |
| Arvi Malixi | High |

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Juan Katigbak

Position: Center
Age: 41
Height: 70.0 inches
Weight: 250.0 lbs
Predicted Injury Risk: High
Total Injuries: 9
Most Common Injury: Ankle

Edit Player Delete Player

Notes:

MACHINE LEARNING MODEL

- Random Forest selected over SVM and XG Boost
- Trained on 1000-player dataset
- Accuracy: 96.5%

Model: Random Forest

Accuracy: 0.965

Classification Report:

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| High | 0.99 | 0.98 | 0.99 | 141 |
| Medium | 0.94 | 1.00 | 0.97 | 51 |
| Medium-High | 0.57 | 0.50 | 0.53 | 8 |
| accuracy | | | 0.96 | 200 |
| macro avg | 0.84 | 0.83 | 0.83 | 200 |
| weighted avg | 0.96 | 0.96 | 0.96 | 200 |



Model: SVM

Accuracy: 0.855

Classification Report:

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| High | 0.83 | 1.00 | 0.91 | 141 |
| Medium | 0.97 | 0.59 | 0.73 | 51 |
| Medium-High | 0.00 | 0.00 | 0.00 | 8 |
| accuracy | | | 0.85 | 200 |
| macro avg | 0.60 | 0.53 | 0.55 | 200 |
| weighted avg | 0.83 | 0.85 | 0.83 | 200 |

Model: XGBoost

Accuracy: 0.965

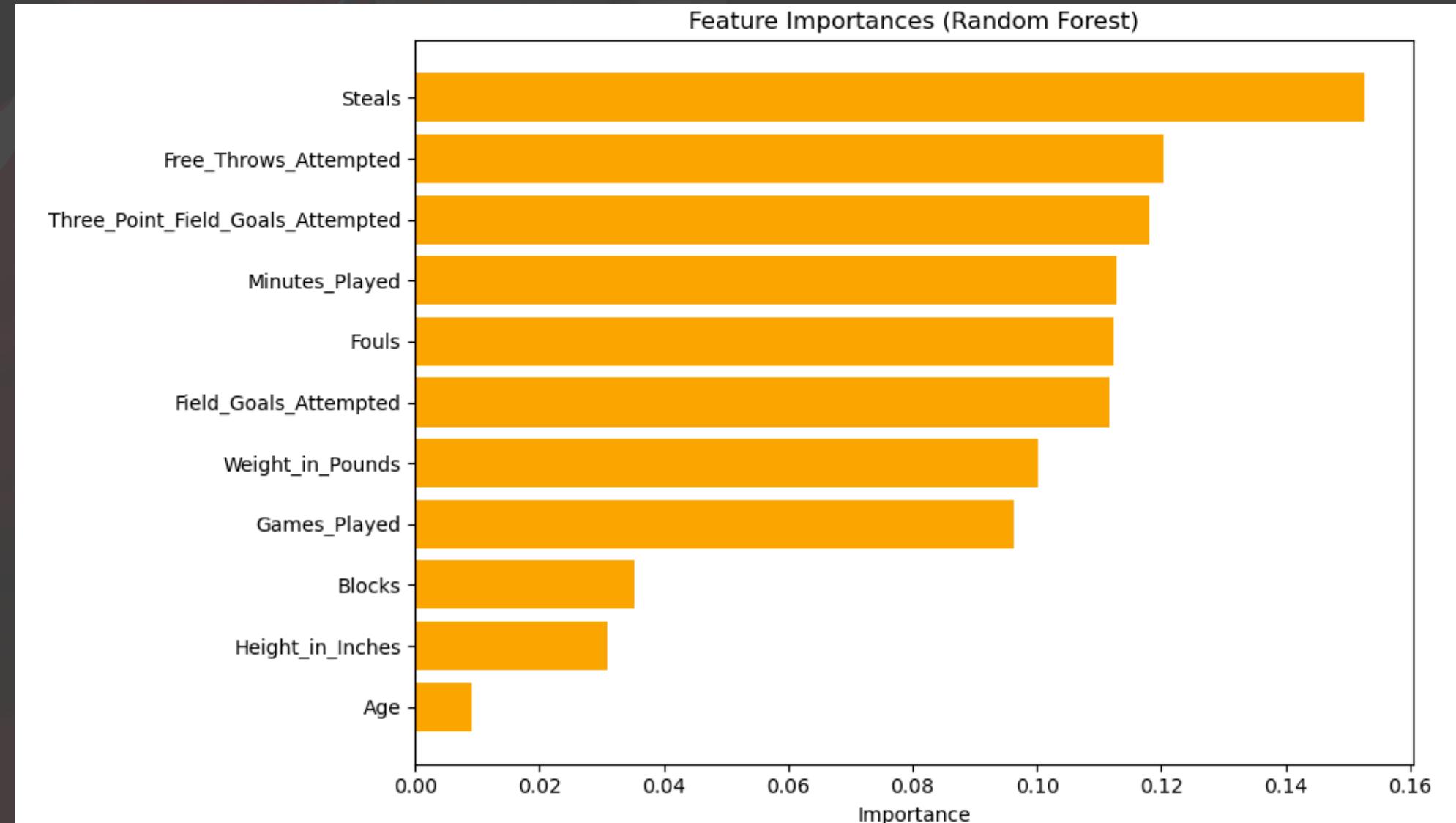
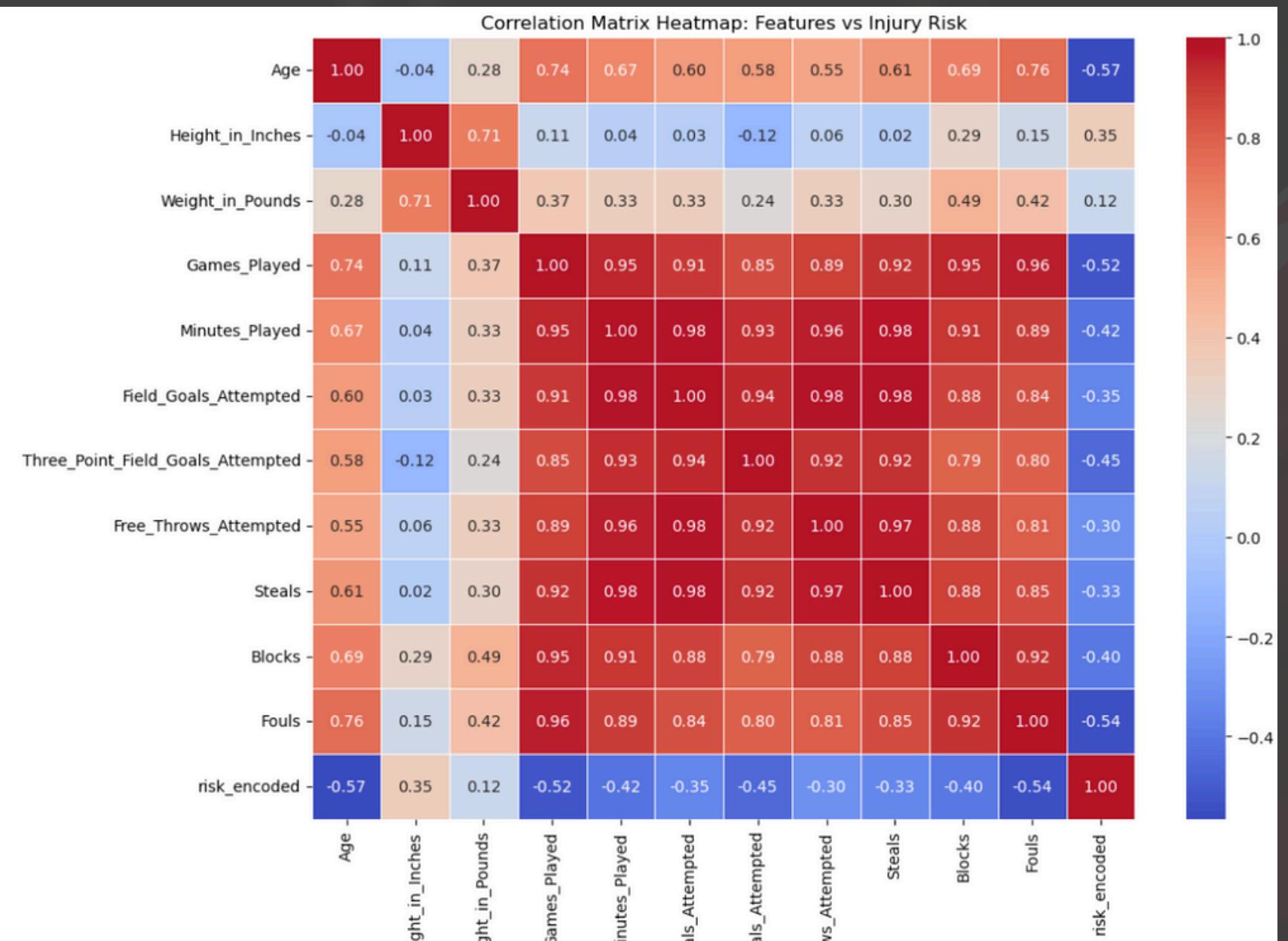
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FEATURES



Key predictors: Steals, 3P Attempts, FT Attempts



USER FEEDBACK SUMMARY



01 Overall rating: 4.65/5

02 Dashboard: 15 of 17 found visuals useful

03 Prediction: 14 of 17 found predictions helpful

04 Profiles: 16 of 17 liked journal & stats



CHALLENGES FACED

- Limited prior ML experience
- Finding clean NBA datasets
- Overfitting and class imbalance
- Rebuilding MVP based on advisor feedback



WHAT I LEARNED

- Full-stack development experience
- ML model building & evaluation
- Survey creation and user testing
- Integrating software engineering and data analytics



CONCLUSION AND FUTURE PLANS



- PlayAnalytics = Successful MVP
- Scalable to more sports and fitness activities
- Future ideas: Training module, more player metrics