

# Player Behavior Analysis and Dropout Prediction in Digital Games

USING DEEP NEURAL NETWORKS  
WITH STEAM PLAYER DATA

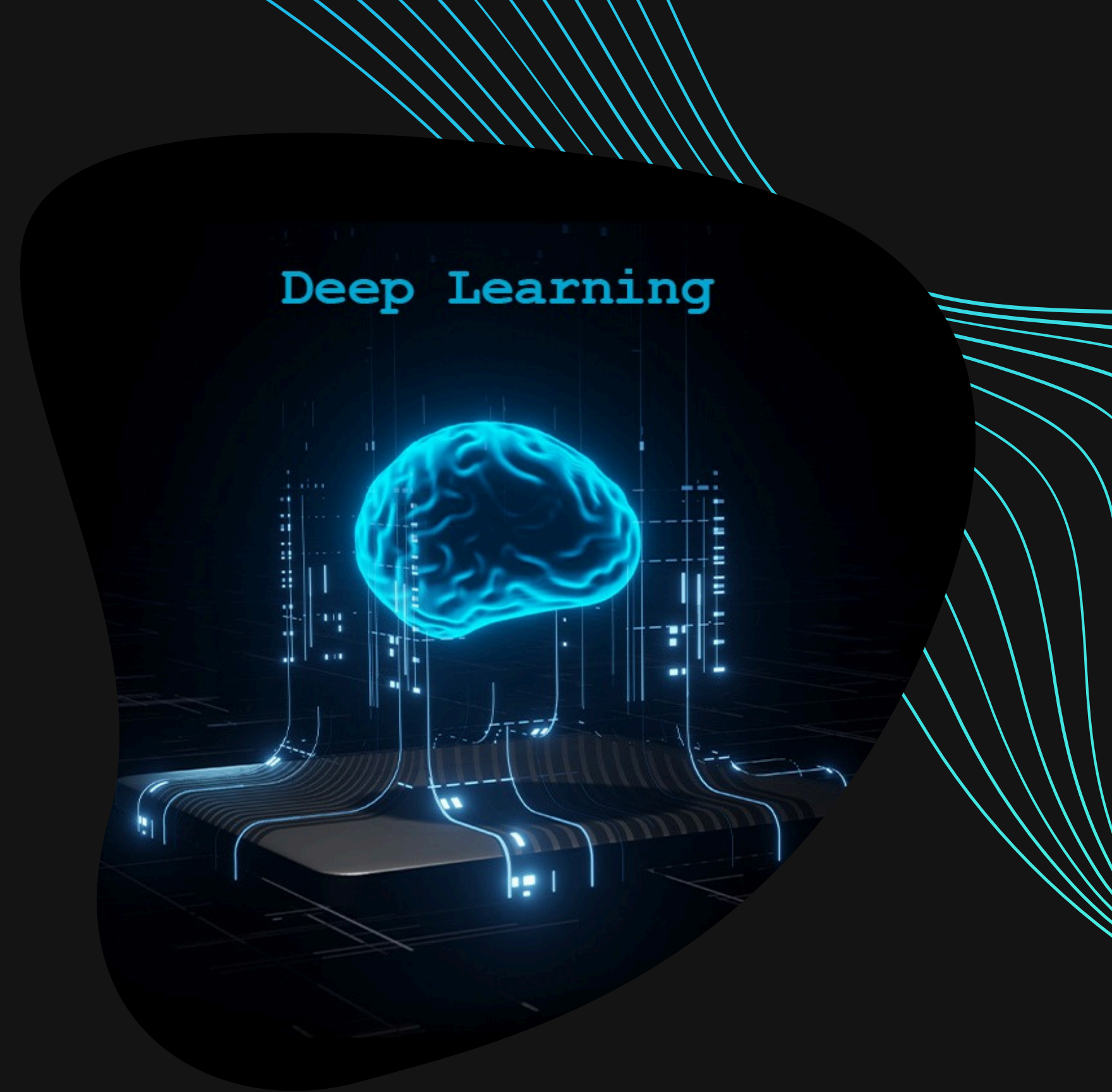
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# Introduction

• **PLAYER CHURN IS A KEY ISSUE IN DIGITAL GAMES.**

**Goal:** Predict if a player will drop out based on usage trends.

**Dataset:** Monthly Steam player statistics.



# Dataset Overview



## SOURCE

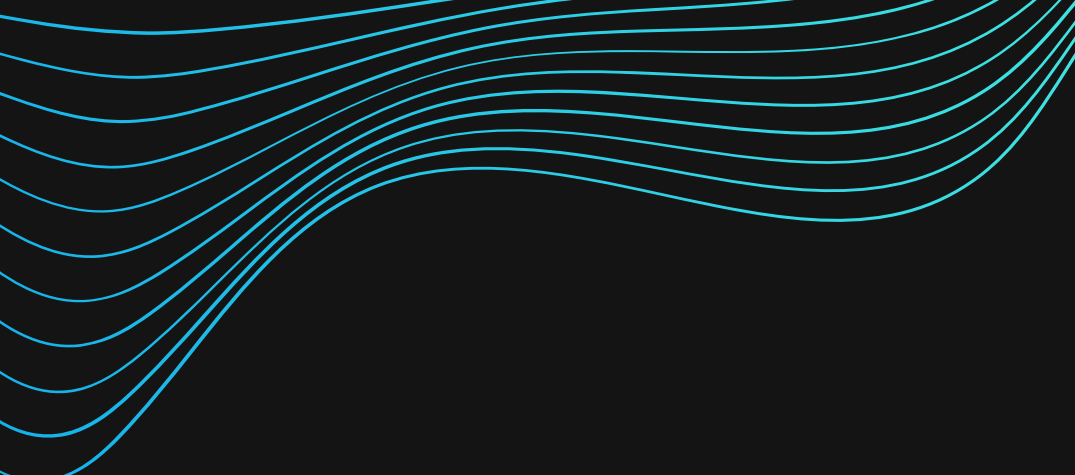
- SteamCharts.com (monthly records)

## FEATURES

- Avg\_players, Gain, Percent\_Gain, Peak\_Players, etc.

## CHURN LABEL

- Based on Percent\_Gain direction.



# Feature Engineering



## GAIN\_RATIO

Percent change in players.

## GAIN\_DIRECTION

Positive/negative gain.

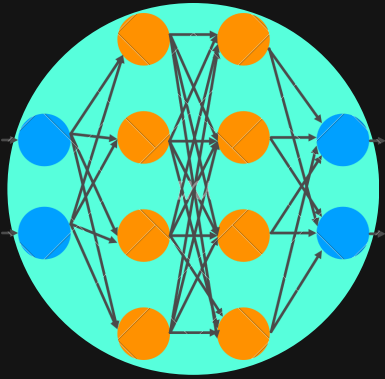
## VOLATILITY

Absolute relative change.

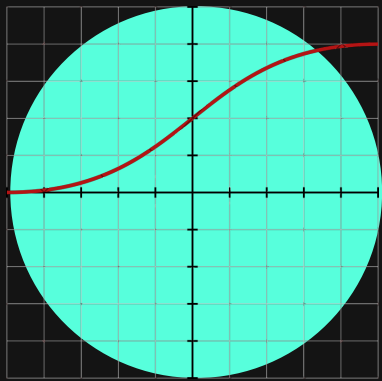
## LABEL

churn = 1 (drop), 0 (retain).

# Model Architecture

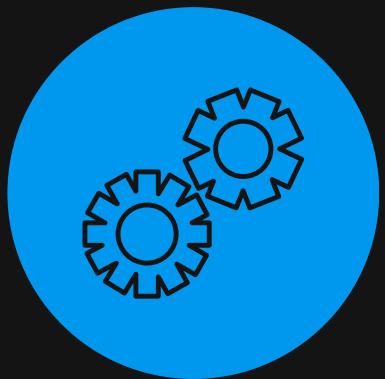


**Deep Neural Network (DNN)**  
with 3 hidden layers.



**Activation: ReLU**  
**Output: Sigmoid**

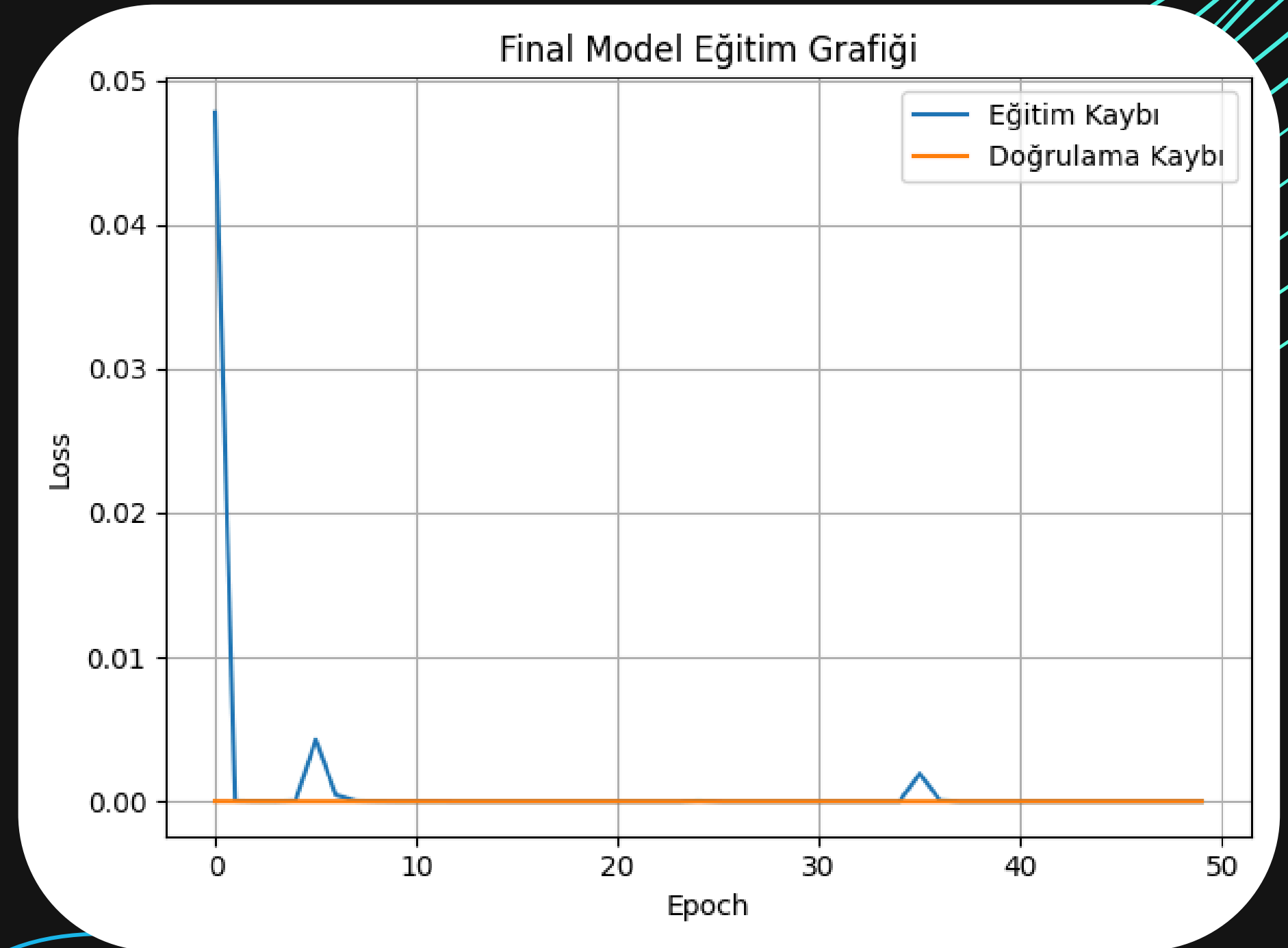
```
model = Sequential()  
model.add(Dense(64, input_dim=X_train.shape[1], activation='relu'))  
model.add(Dropout(0.3))  
model.add(Dense(32, activation='relu'))  
model.add(Dense(16, activation='relu'))  
model.add(Dense(1, activation='sigmoid'))
```



**Optimizer: Adam**  
**Loss: Binary Crossentropy**  
**Epochs: 50**

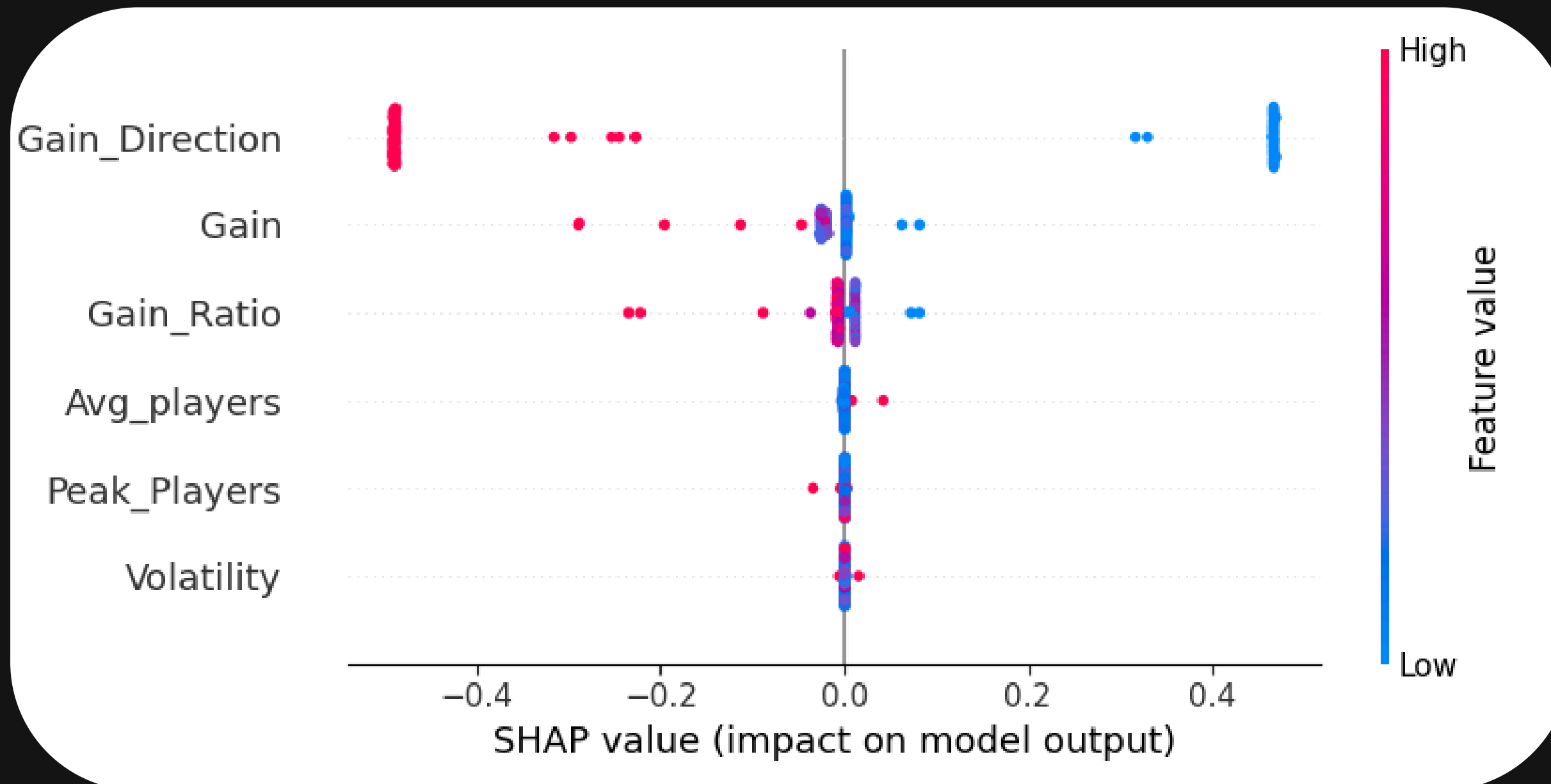
# Training Results

- Test Accuracy: 100%
- Confusion Matrix:  
[[512, 0], [0, 520]]
- Loss curve shows perfect convergence.





# SHAP Explainability



- Explains why model made each prediction.

- Top features: **Gain\_Direction, Gain, Gain\_Ratio.**

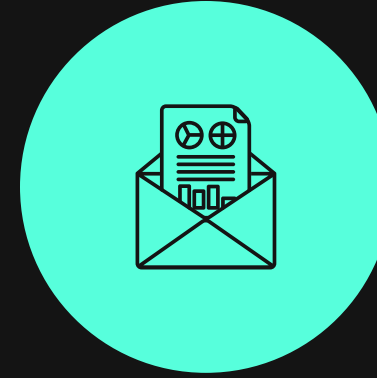
Visual: SHAP summary plot used.

# Conclusion & Future Work

- ACCURATE CHURN PREDICTION WITH SIMPLE FEATURES.
- FUTURE: USE IN-GAME METRICS, EXTEND TO OTHER GAMES.
- TRY LSTM OR TEMPORAL MODELS.

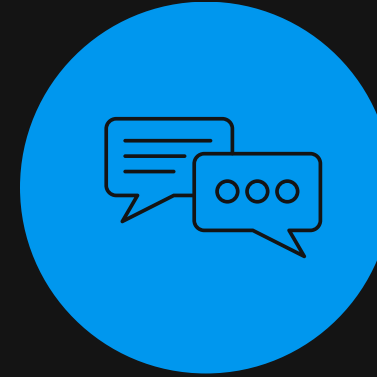


# Thank you !



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