LiveDrive

NFL Pass/Run Predictions Using Multimodal Analysis

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OBJECTIVE

Predict whether an NFL team is going to run or pass the ball given a game situation

DATA COLLECTION

- **NFL Big Data Bowl:** Used For Acquiring Play and Tracking Data
- **NFL+:** Obtaining Play Screenshots Data

ALGORITHMS

- **ResNet-50 CNN Model:** Predictions For Offensive Formation From Image Data
- **Random Forest Classifier:** Predictions For Offensive Formation From Tracking Data
- **Random Forest Classifier:** Pass/Run Predictons From Game Situation Data

METHODOLOGY

- **Trained Pass/Run Prediction Model Using Game Situation Data**
- **Identified Offensive Formation as the Only Unknown Categorical Variable in the Game Situation Data**
- **Created an Image Based and Tracking Based Approach To Predict Offensive Formation**
- **Merged Offensive Formation Predictions with the Game Situation Data**

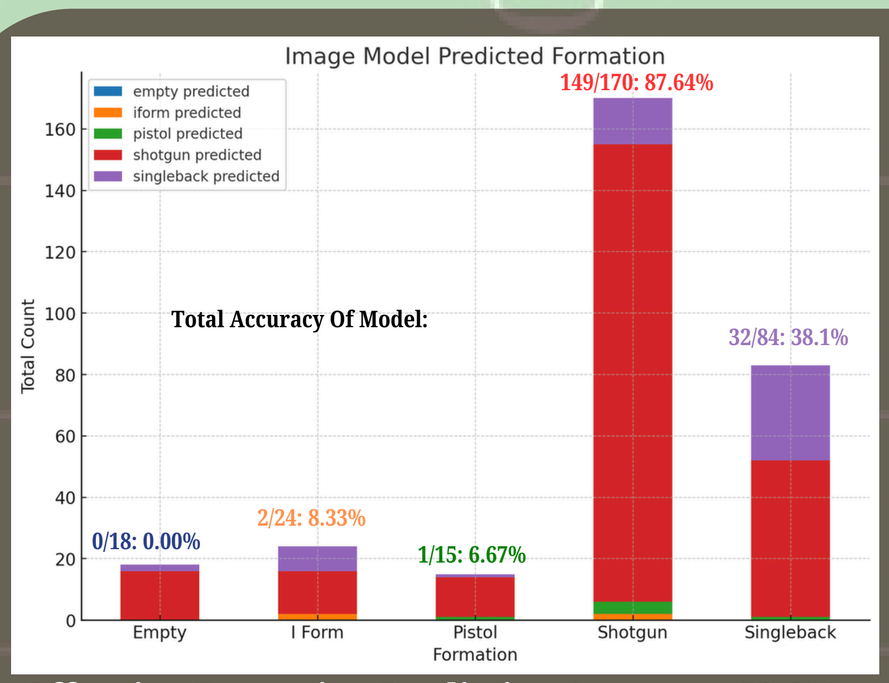
LiveDrive Life Cycle

Approach 1

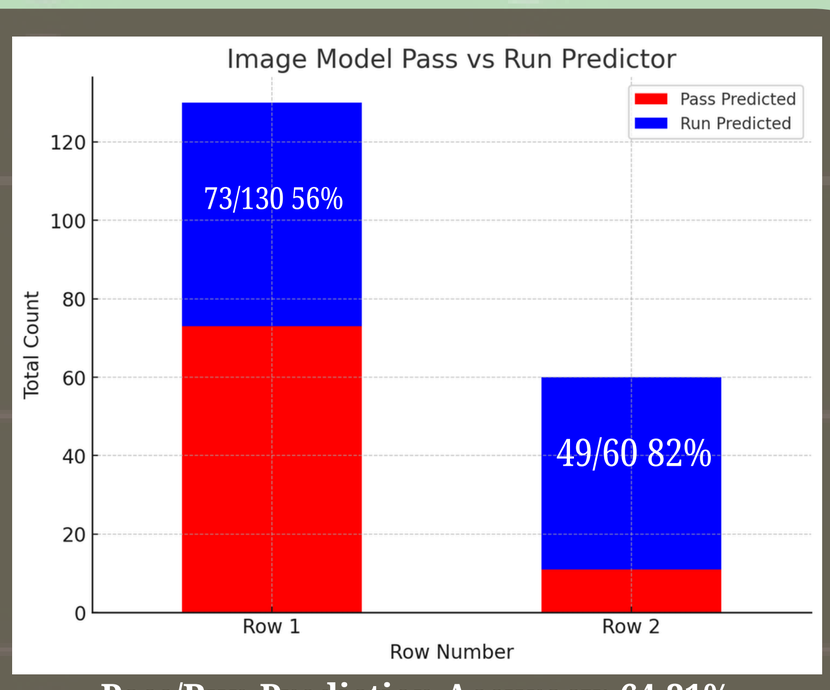
Tracking Data For All Players → **Random Forest Classifier Model Predicts Offensive Formation** → **Predicted Offensive Formation Merged With Play Data** → **Play Data Used by the Game-Situation Model For Prediction** → **Run**

Approach 2

Screenshot Of Player Formation Before Play → **ResNet-50 CNN Model Predicts Offensive Formation** → **Predicted Offensive Formation Merged With Play Data** → **Play Data Used by the Game-Situation Model For Prediction** → **Pass**



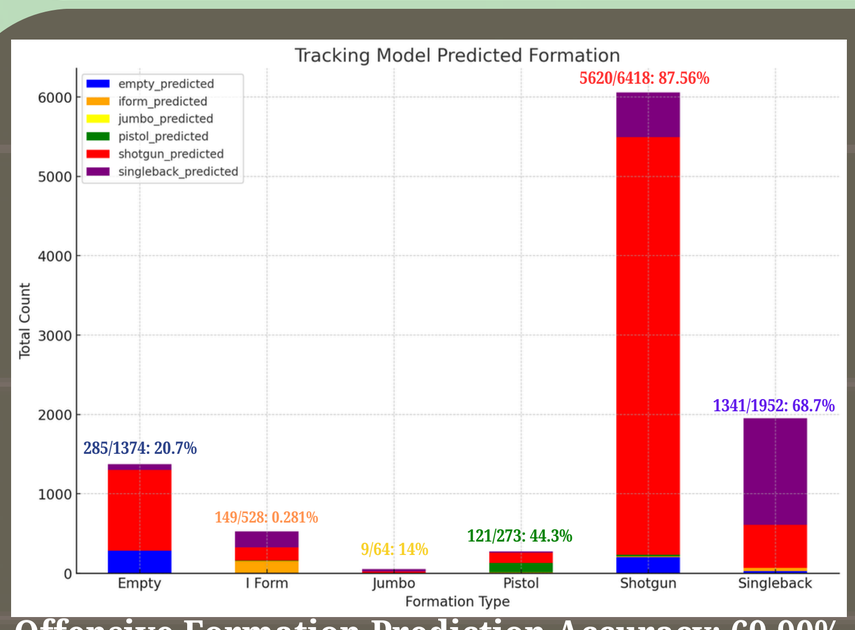
Offensive Formation Prediction Accuracy: 53.04%



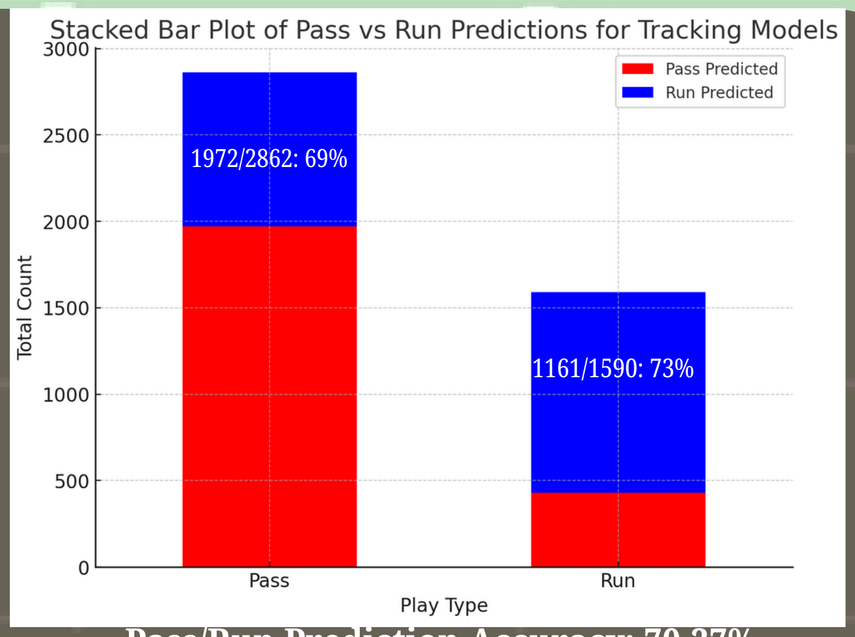
Pass/Run Prediction Accuracy: 64.21%

Analysis

- **Our Image Based Model Excelled At Shotgun Plays**
- **Our Image Based Model Struggled With Empty, I-Form, and Pistol Formation Due To Distribution Of The Data**
- **Our Image Based Model Performed Better At Run Predictions: 82% vs Pass Predictions: 56%**



Offensive Formation Prediction Accuracy: 69.90%



Pass/Run Prediction Accuracy: 70.37%

Analysis

- **Our Tracking Based Model Excelled At Shotgun Plays as well**
- **Our Tracking Based Model Struggled I-Form, and Jumbo Formations Due To Distribution Of The Data**
- **Our Tracking Based Model Performed Better At Run Predictions: 73% vs Pass Predictions: 69%**