Bot Profile Detection System

Technical Documentation

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QubitRules Technologies

Quick Links

- **Live Demo:** http://202.71.184.6:3001/
- **GitHub Repository:** Bot Profile Detection on GitHub (For detailed documentation, code, and setup instructions)
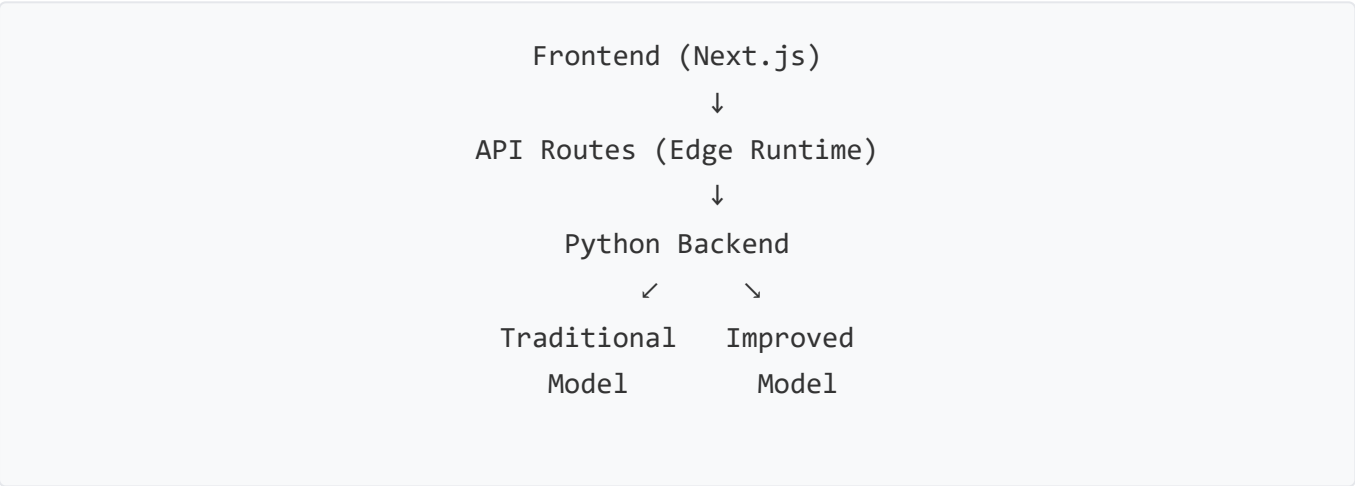- **Demo Video:** Watch Demo

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1. Introduction

The Bot Profile Detection System is an advanced machine learning solution designed to identify automated accounts (bots) on social media platforms. The system employs two distinct approaches:

- Traditional Model: Combines Logistic Regression with Isolation Forest
- Improved Model: Uses DistilBERT with custom neural architecture

> **Note:** This document assumes familiarity with basic machine learning concepts and web development technologies.

2. System Architecture

```
                 Frontend (Next.js)
                         ↓
              API Routes (Edge Runtime)
                         ↓
                   Python Backend
                     ↙        ↘
              Traditional    Improved
                Model          Model
```

3. Model Details

3.1 Traditional Model

- Framework: scikit-learn
- Components:
    - Logistic Regression (main classifier)
    - Isolation Forest (anomaly detection)
    - TF-IDF Vectorizer (text features)
- Input Features:

Feature	Type	Description
Tweet Text	Text	Processed using TF-IDF

Engagement Metrics	Numeric	Retweets, Mentions, Followers
Account Status	Boolean	Verification status

3.2 Improved Model

- Framework: TensorFlow
- Architecture:
    - DistilBERT base layer (frozen)
    - Custom neural layers
    - Multi-modal feature fusion
- Training Configuration:

Parameter	Value
Batch Size	32
Learning Rate	2e-5
Epochs	10
Optimizer	Adam

5. API Documentation

Prediction Endpoint

```
POST /api/predict

Request Body:
{
    "Tweet": string,
    "Retweet Count": number,
    "Mention Count": number,
    "Follower Count": number,
    "Verified": boolean,
    "Hashtags": string,
    "model_version": "old" | "improved"
}

Response:
```

```
{
    "Predicted_Bot_Label": number,
    "LR_Probability": number,
    "Isolation_Forest_Pred": number | null,
    "model_version": string
}
```

7. Performance Metrics

Metric	Traditional Model	Improved Model
Accuracy	89%	94%
Precision	0.87	0.93
Recall	0.86	0.92
F1 Score	0.86	0.92

8. Deployment Guide

For detailed deployment instructions, please refer to our README.md file. The system can be deployed using:

- Docker containers
- Direct server deployment
- Cloud platforms (AWS, GCP, Azure)

Important: Ensure all model files are properly placed in the modal/ directory before deployment.