AI-BASED NETWORK INTRUSION DETECTION SYSTEM

Vidyadheesha M Pandurangi

AICTE INTERNSHIP ID: STU667711a678b251719079334

INTERNSHIP ID: INTERNSHIP_176234372690b3b31bb89f

APPLY ID: APPLY_17628726369134d39759c4

PROBLEM STATEMENT

- Modern computer networks generate large volumes of traffic, making manual monitoring impractical.
- Traditional security mechanisms such as firewalls and signature-based IDS are ineffective against new and evolving cyber attacks.
- Many existing intrusion detection systems suffer from high false positives, poor scalability, and lack of real-time response.
- Security analysts require a system that can intelligently analyze network traffic, identify intrusions accurately, and provide quick, actionable alerts.
- There is a need for an AI-based, automated, and user-friendly intrusion detection system that can detect malicious activities efficiently and assist in proactive network security management.

PROJECT DESCRIPTION

- This project presents an AI-Based Network Intrusion Detection System (NIDS) that uses machine learning to identify malicious network activities.
- A Random Forest classifier is trained on network traffic data to distinguish between benign and intrusive behavior.
- The system performs robust data preprocessing and selects the most important network features to improve detection accuracy and interpretability.
- A Streamlit-based web interface allows users to simulate live network traffic and receive real-time intrusion predictions.
- Detected intrusions are automatically logged to support monitoring and security analysis.
- The solution demonstrates the effective use of AI in cybersecurity for automated, scalable, and real-time intrusion detection.

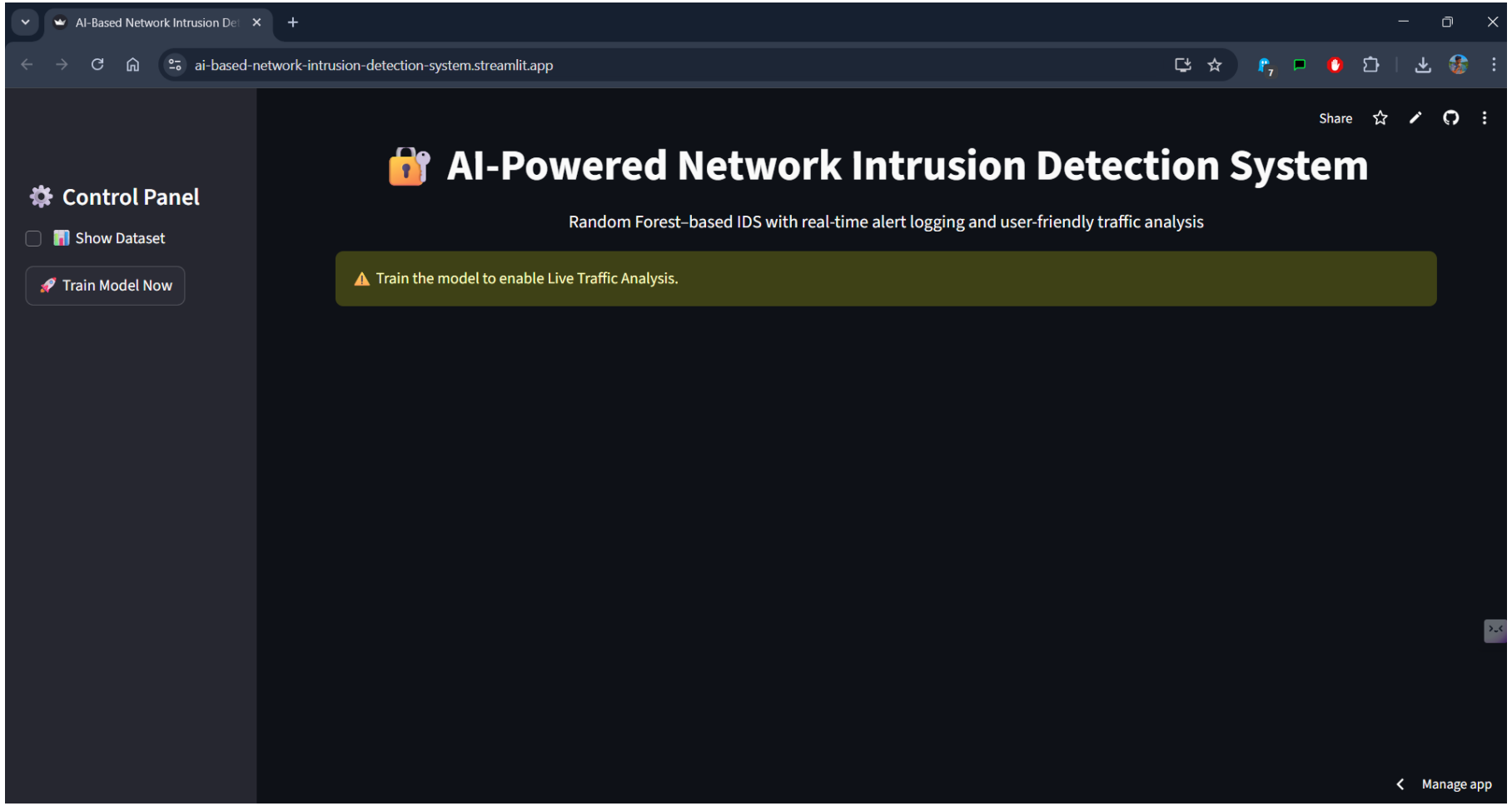
WHO ARE THE END USERS?

- **Network Security Administrators** – To monitor network traffic and identify potential intrusions in real time.
- **Cybersecurity Analysts** – To analyze suspicious activities and improve threat detection strategies.
- **IT Infrastructure Teams** – To enhance the security of enterprise and organizational networks.
- **Educational Institutions & Researchers** – For learning, experimentation, and research in network security and intrusion detection.
- **Students & Trainees** – To understand the practical application of AI and machine learning in cybersecurity.

TECHNOLOGY USED

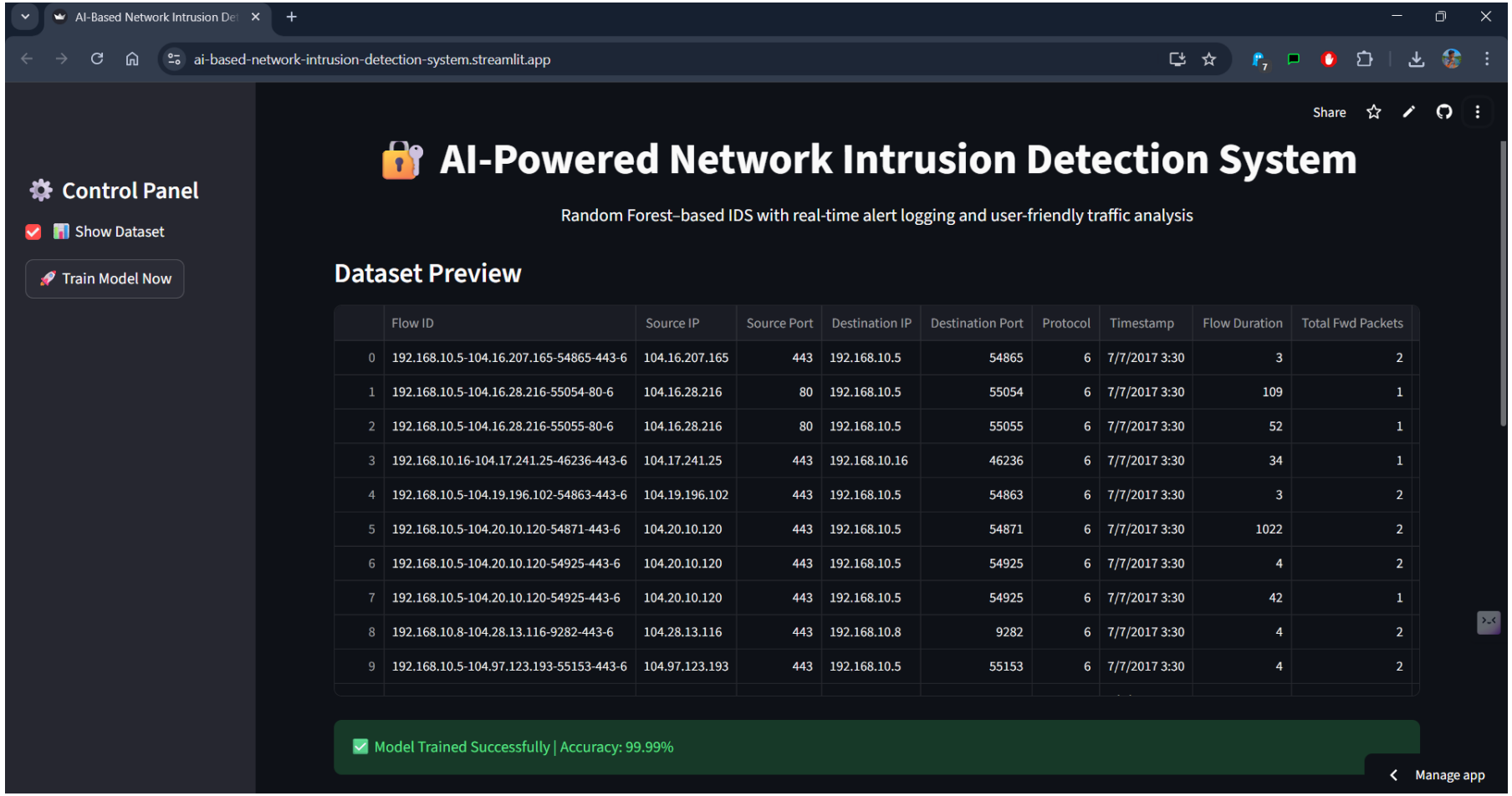
- **Python** – Core programming language for data processing, model development, and application logic.
- **Scikit-learn** – Used to build and train the Random Forest machine learning model for intrusion detection.
- **Pandas & NumPy** – For data preprocessing, feature handling, and numerical computations.
- **Streamlit** – Web framework used to develop the interactive user interface for live traffic analysis.
- **Matplotlib & Seaborn** – For visualizing feature importance and model performance metrics.
- **Git & GitHub** – For version control, collaboration, and project deployment.

RESULTS



Website UI – Deployed using Streamlit

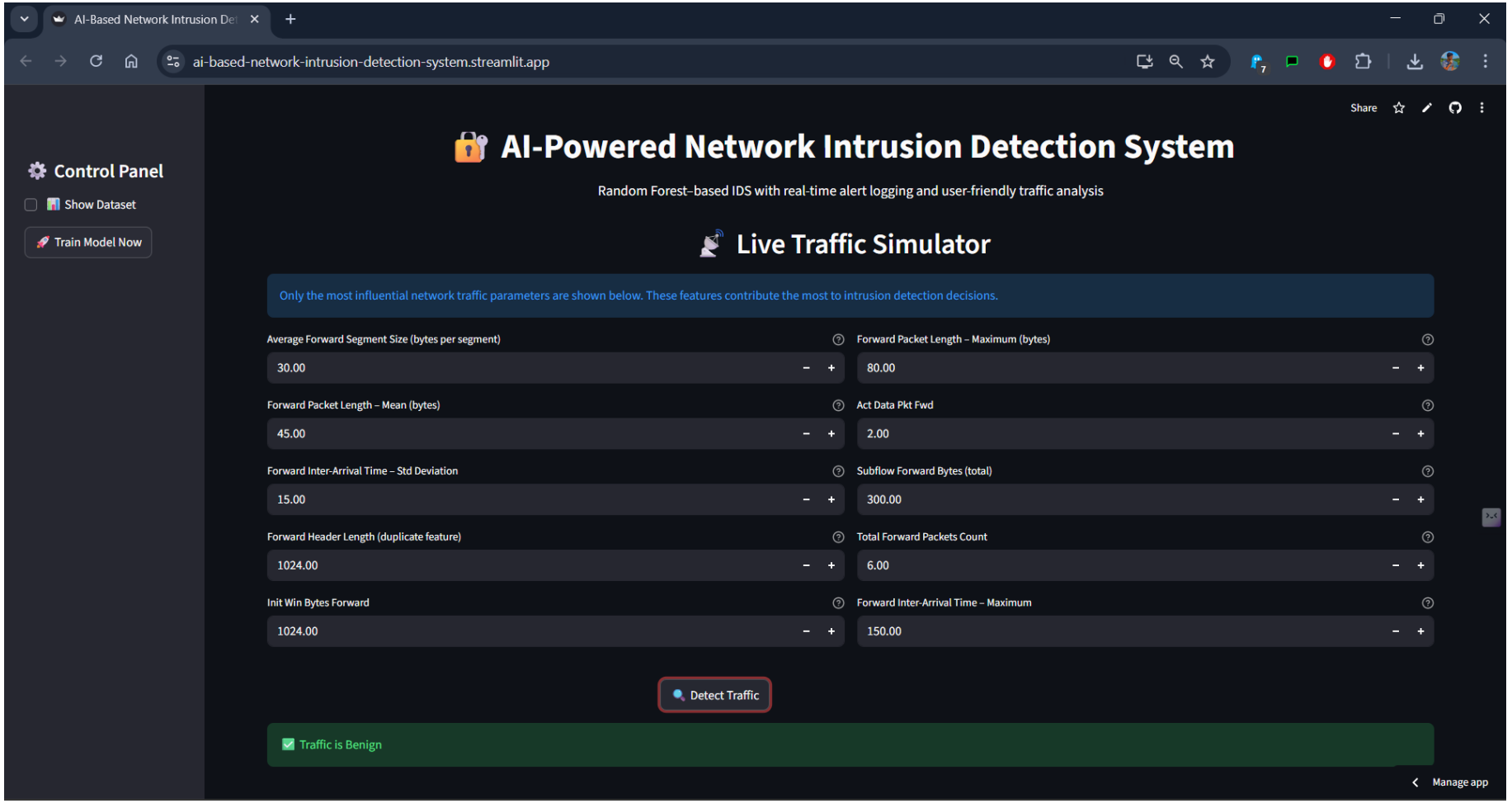
RESULTS



	Flow ID	Source IP	Source Port	Destination IP	Destination Port	Protocol	Timestamp	Flow Duration	Total Fwd Packets
0	192.168.10.5-104.16.207.165-54865-443-6	104.16.207.165	443	192.168.10.5	54865	6	7/7/2017 3:30	3	2
1	192.168.10.5-104.16.28.216-55054-80-6	104.16.28.216	80	192.168.10.5	55054	6	7/7/2017 3:30	109	1
2	192.168.10.5-104.16.28.216-55055-80-6	104.16.28.216	80	192.168.10.5	55055	6	7/7/2017 3:30	52	1
3	192.168.10.16-104.17.241.25-46236-443-6	104.17.241.25	443	192.168.10.16	46236	6	7/7/2017 3:30	34	1
4	192.168.10.5-104.19.196.102-54863-443-6	104.19.196.102	443	192.168.10.5	54863	6	7/7/2017 3:30	3	2
5	192.168.10.5-104.20.10.120-54871-443-6	104.20.10.120	443	192.168.10.5	54871	6	7/7/2017 3:30	1022	2
6	192.168.10.5-104.20.10.120-54925-443-6	104.20.10.120	443	192.168.10.5	54925	6	7/7/2017 3:30	4	2
7	192.168.10.5-104.20.10.120-54925-443-6	104.20.10.120	443	192.168.10.5	54925	6	7/7/2017 3:30	42	1
8	192.168.10.8-104.28.13.116-9282-443-6	104.28.13.116	443	192.168.10.8	9282	6	7/7/2017 3:30	4	2
9	192.168.10.5-104.97.123.193-55153-443-6	104.97.123.193	443	192.168.10.5	55153	6	7/7/2017 3:30	4	2

Dataset Preview & Training of Model – For Live Traffic Simulator

RESULTS



Testing of the Model – Using Live-Traffic Simulation Data

CERTIFICATE - PROTECTION FROM BROWSER ATTACKS

CERTIFICATE - INTRODUCTION TO SYSTEM SECURITY

CERTIFICATE - SECURING ANDROID DEVICES

GITHUB REPOSITORY LINK

Github Repo Link: https://github.com/Vidyadheesha-M-Pandurangi/Cyber-Security/tree/faf0025610bdc9f785ae82120a2e943419966d80/AI-Based%20Network%20Intrusion%20Detection%20System

WEBSITE URL

Website Link: https://ai-based-network-intrusion-detection-system.streamlit.app/

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THANK YOU