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Department of Computer Science & Engineering

Project Phase-2 Presentation on

"Deep Learning Framework to detect Cyber-Attacks in IoT Network"

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ABSTRACT

* The Internet of Things(IoT) is a network of interrelated devices that connect and exchange data with other IoT devices and the cloud.
* These devices represent a vast attack surface for cyber-attacks.
* With the increase in the IoT devices being connected to the internet the chances of the cyber-attacks have increased .
* Hence the KDD network dataset was used to train the models to detect and classify the attacks.

INTRODUCTION

* The Internet of Things (IoT) is a paradigm that refers to the interconnected network of physical devices and other objects embedded with sensors.
* The connection of IoT devices to the internet has lead to the lack of security as the systems get attacked and the data is lost.
* The ‘Generative Deep Learning to Detect Cyber attacks for the IoT-23 Dataset’ paper has been referred.
* The deep learning methods are effectively used in the detection of the attacks in the IoT devices.

LITERATURE SURVEY

Slno.	AUTHOR	METHOD	ATTACKS ADDRESSED	DATASET	RESULT
1	Shire	Angle-Based Outlier Detection , Principal Component Analysis, Minimum Covariance Determinant , ARIES GAN.	Man In The Middle attacks,Ping Distributed DoS attacks,	Modbus/TCP network flows,DNP3 network flows, operational data	The accuracy of the proposed mechanism reaches 91%.
2	Saharkhizan	Modbus IoT environments, RNN Long-Short-Term-Memory, MENSA model.	TCP SYN DoS attacks, Modbus query flood attacks.	Simoes, CICFlowMeter	Compared to the existing anomaly-based IDS, MENSA addresses efficiently the FP.
3	Shafi	Virtual Honeypot Devices, Markov models,BlackBox IDS	DoS attack,privacy,eavesdropping,backdoor attacks.	IoT testbed	Detects both known and unknown attacks with high detection rates & low false-positive alerts

LITERATURE SURVEY Contd..

4	Shire	DL-based detection method, State Vector Estimator, DL-Based Identification , MENSA	False Data Injection, DoS attacks.	Modbus/TCP,DNP3	MENSA achieves the best performance either for detecting operational anomalies or discriminating the Modbus/TCP and DNP3 cyberattacks
5	Imtiaz Ullah	Transfer learning, RNN, CNN	Replay, Flooding and DoS attacks	BoT-IoT, IoT Network Intrusion, MQTT-IoT-IDS2020,	Proposed binary and multiclass classification models showed high accuracy, precision, recall, and F1 score

PROBLEM STATEMENT

* The aim of our project is to design a framework to detect cyber attacks using Deep-Learning models.

OBJECTIVES

- To implement an efficient network intrusion detection system.
- To implement a multi–class classification to identify different types of attacks.
- To design an intelligent intrusion detection and prevention system.
- To compare various ML algorithms to detect intrusion detection system.

REQUIREMENTS ANALYSIS

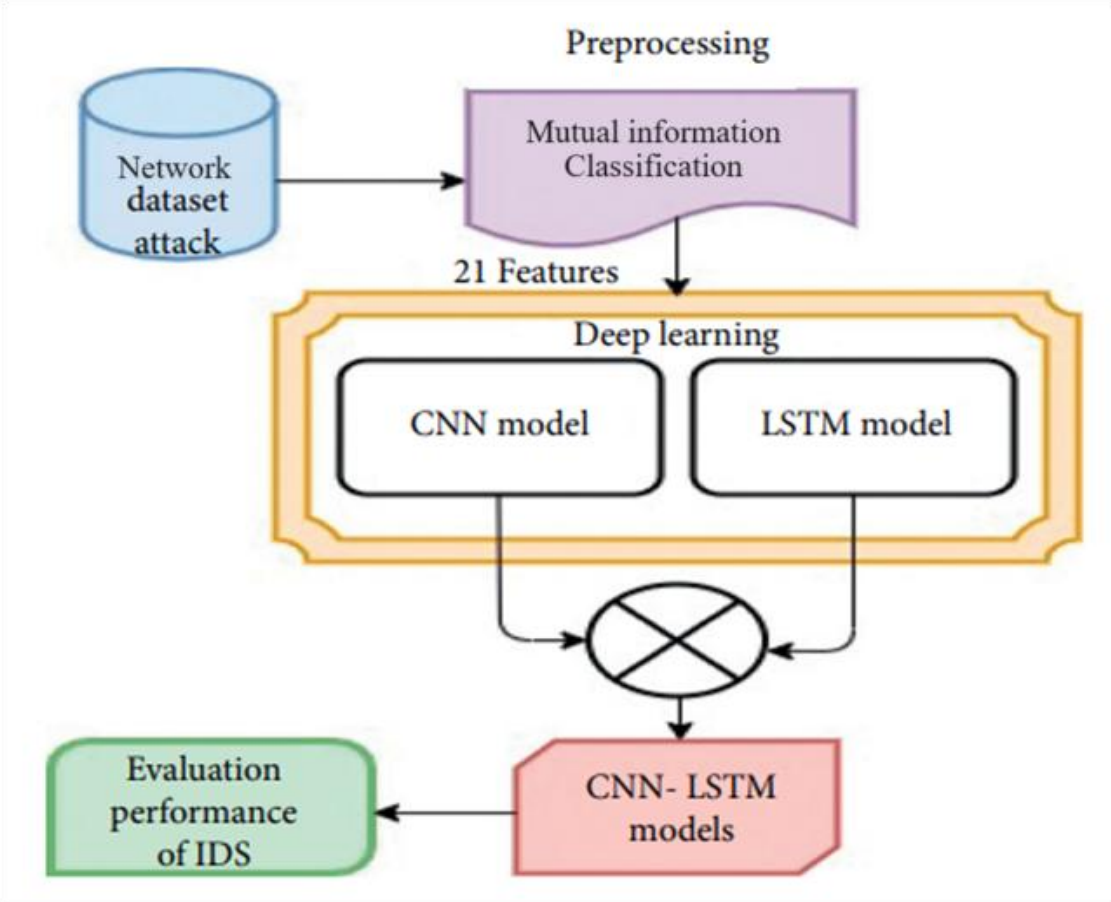
Hardware Requirements

* Processor Type : Intel CORE i5
* Speed : 2.4 GHz
* RAM : 8GB
* Hard Disk : 80GB HDD

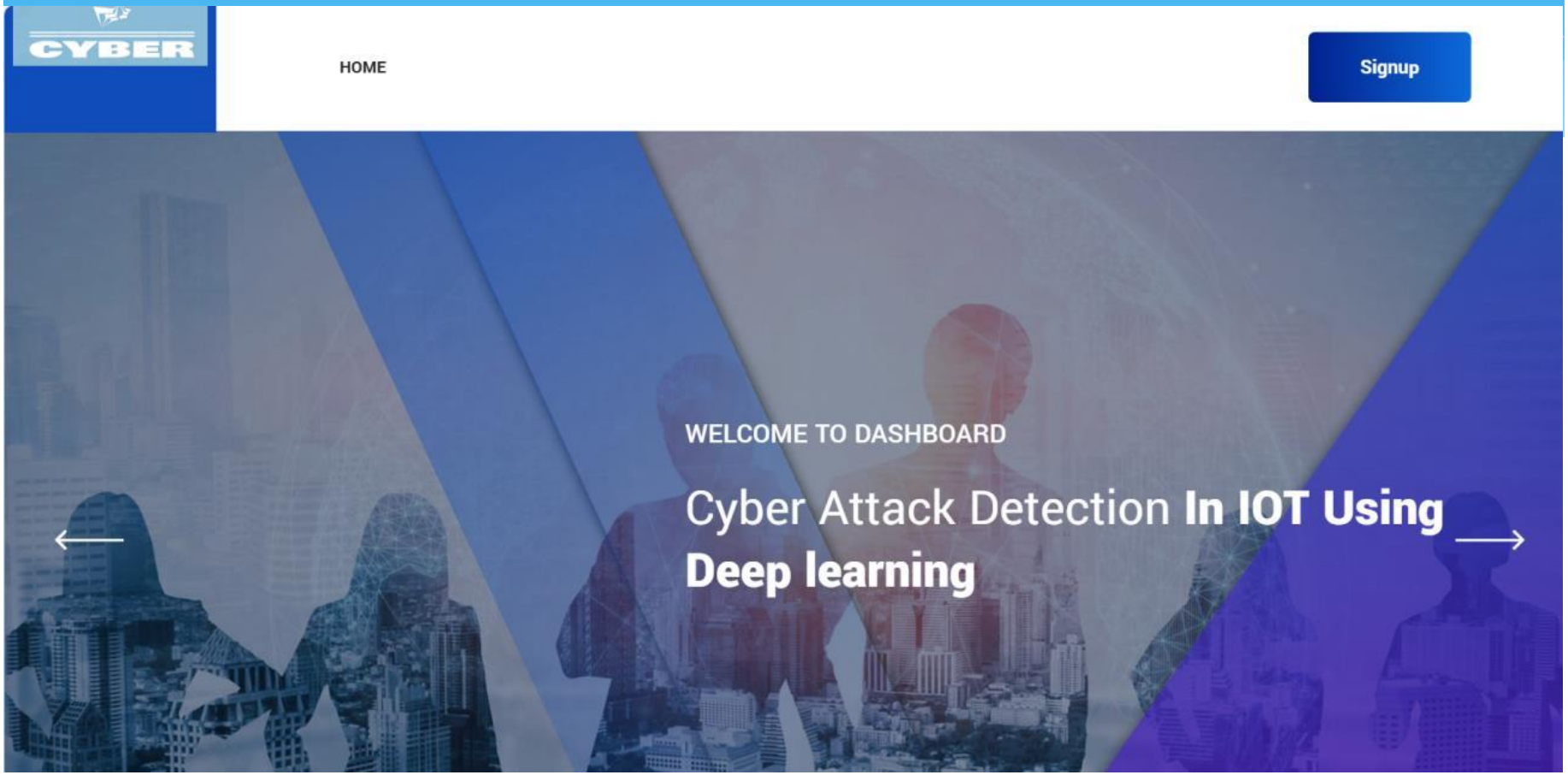
Software Requirements

* Operating System : Windows 64-bit
* Technology : Python
* IDE : PythonIDLE
* Tools : Anaconda
* Python Version : Python 3.6

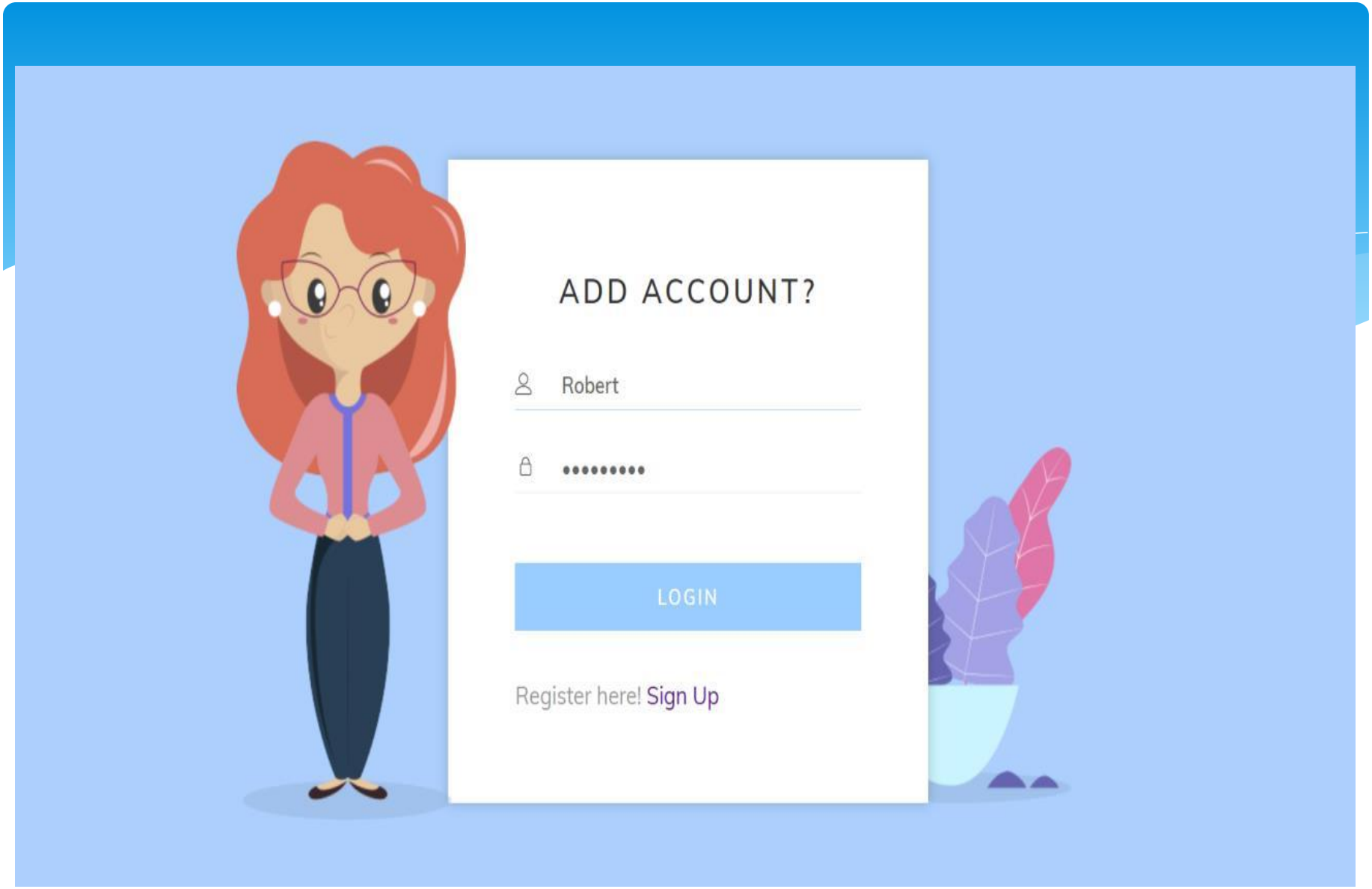
IMPLEMENTATION



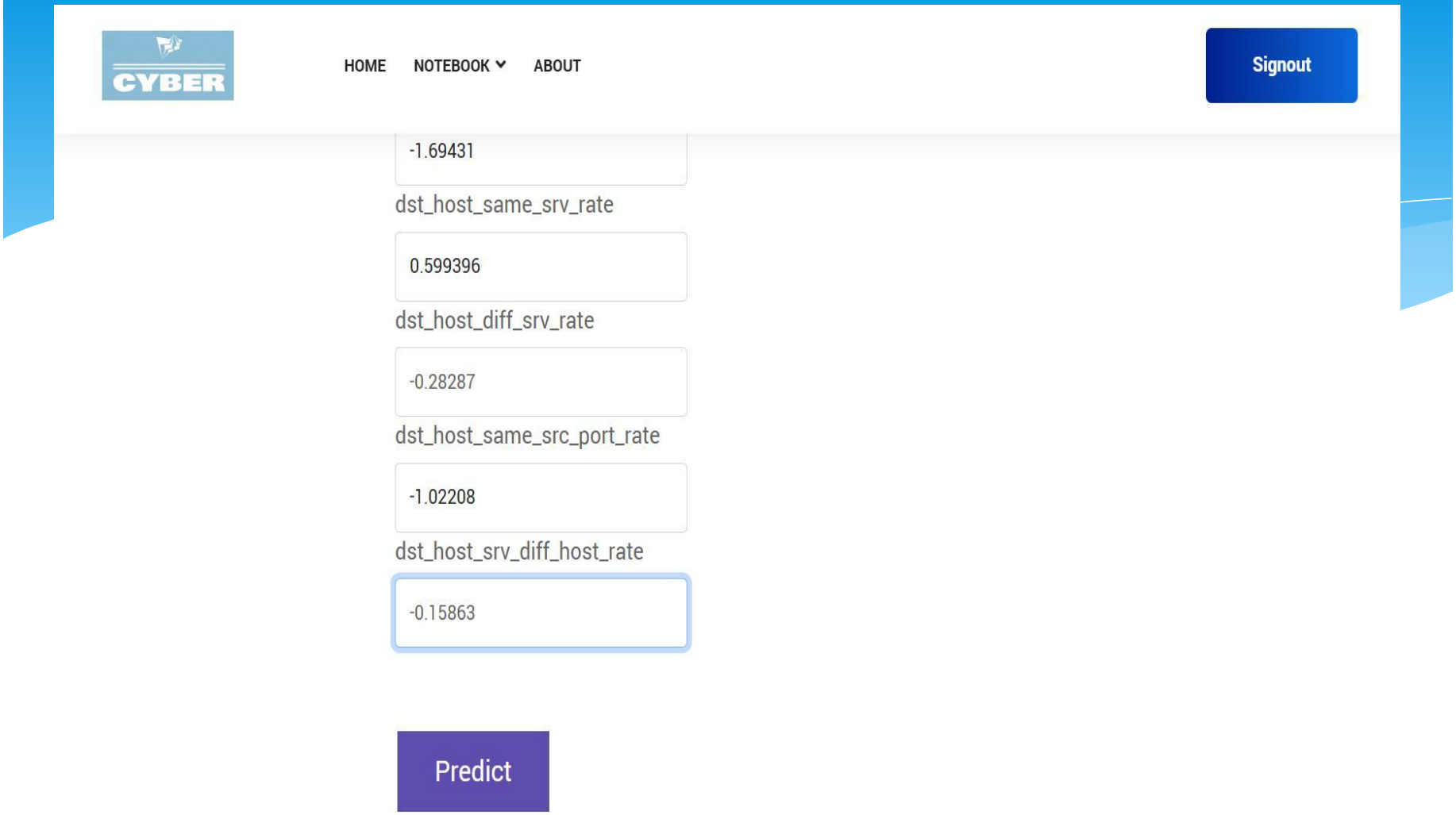
RESULTS



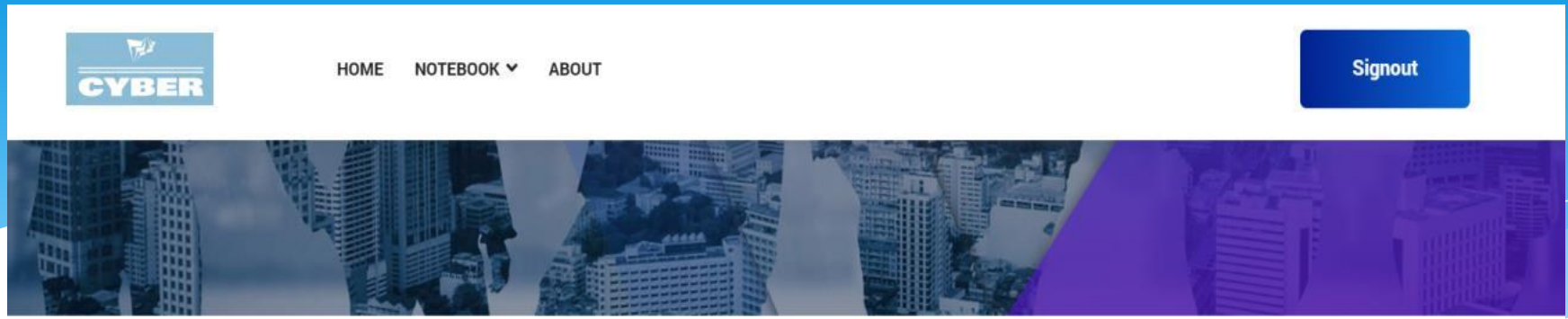
Home Page



Login Page



Prediction Page



Result: **Attack is Detected and its DOS Attack!**

Result Page showing name of attack detected

	ML Model	Accuracy	Precision	Recall	F1-Score
0	CNN	0.989	0.994	0.989	0.991
1	RNN	0.793	1.000	0.793	0.885
2	RBM	0.991	0.993	0.991	0.992
3	DNN	0.994	0.994	0.994	0.994
4	CNN LSTM	1.000	0.993	0.990	0.992

Results of KDDCUP

CONCLUSION

* This project has shown that for a limited set of attacks and IoT devices, it is possible to use generative deep learning methods like mutual information classification and CNN-LSTM to classify attacks with high accuracy.
* We have also used a recent dataset called KDD network attack dataset and implemented baseline models, mutual information classification and CNN-LSTM.
* We also tried randomizing the test set in a way that we can inject new information and the model was able to consider it as an anomaly.
* Our results show that the LSTM based models are more effective at identifying attacks and classifying them.

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THANK YOU