

Configuration Manual

MSc Research Project

MSc Cybersecurity

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**National College of
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Submission Sheet
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Programme: M.Sc. Cyber Security **Year:** 2024-2025

Module: M.Sc. Research Project

Lecturer: Micheal Prior

Submission Due Date: 11/08/2025

Project Title: Adaptive Machine Learning for Real-Time Intrusion Detection in Networks

Word Count: 763 **Page Count:** 6

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Adaptive Machine Learning for Real-Time Intrusion Detection in Networks

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Anju Sobha

1. Introduction

In the current fast changing digital space, various cyber challenges like zero-day exploits and advanced persistent threats are on the increase and becoming advanced. The classic Intrusion Detection Systems (IDS) have been known to fail in detection of either new or multitype attacks especially where the systems are reliant on the static rules that are in use. The project takes advantage of classical machine learning methods to boost anomaly detection with the use of the NSL-KDD dataset. The aim is to create an accurate, scalable and resource-efficient IDS by coupling models such as Support Vector Machine, Random Forests and Neural Networks and advanced feature engineering and data balancing techniques with a view to building an IDS that can operate on real time with minimal false alarms. In this project, find that model and deploying it in the real time response is not only the solution but to make a system which can detect the false alarms in a real time with minimising and optimising the space and computation time is more important.

To achieve this, this config file will help set up the entire flow. This talks not only how the training module will be set up but also how our app will be set. This app is designed in such a way that it not only runs OS agnostic but also it runs with server agnostic.

2. System Configuration

RAM: 16

OS: Windows 11 22 H2, Ubuntu 16.04, Windows 10

Idle required: Jupyter Colab, Spyder (if needed), Sublime

GPU Required: NA

Software Required: Anaconda, Jupyter Notebook, Spyder or Notepad

3. Folders in the project File

Drive:

https://drive.google.com/drive/folders/1iuxGH6l8bekdnup_FXLHQ65Lp_ILYEKp?usp=sharing

Data Files: KDDTrain.txt, KDDTest.txt

Code:

https://drive.google.com/drive/folders/1iuxGH6l8bekdnup_FXLHQ65Lp_ILYEKp?usp=sharing

4. Steps to execute the code

Training Module

Step 1: Connect to the Google Colab

Step 2: Authenticate the Drive connection

Step 3: Run Shift + Enter

Step 4: Verify the results

Step 5: Save the best models in pickle file

Installing Anaconda

Step 1: Go to the internet browser

Step 2: Download <https://www.anaconda.com/download>

Step 3: Run the Set up

Step 4: Check in windows search “Anaconda Prompt” is showing

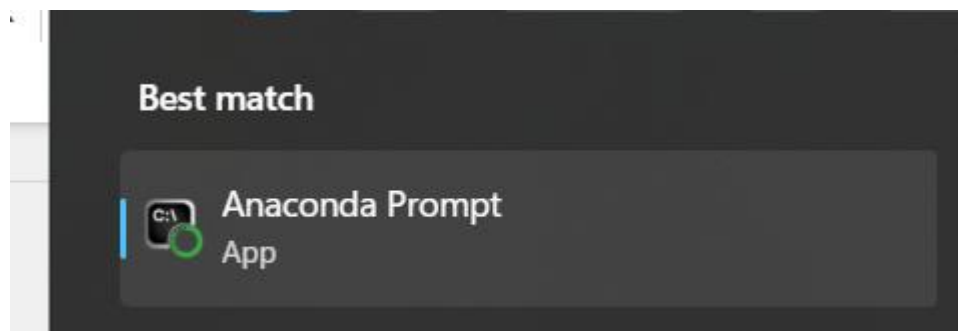


Fig: Verify Anaconda Prompt

Running the Streamlit App

Step 1: Save the best model from the “Training Module” section to a particular folder in local system [classifier.pkl]

Step 2: Save the app.py code in the same folder

Step 3: Save the training and testing files in the same folder

Step 4: Save the test.csv in the same folder

Step 5: Open Anaconda prompt

Step 6: write <<cd “Folder with the contents path”>>

Step 7: execute “python -m streamlit run app.py”

Note: leave the Email field blank

If there is any package issue is showing install those packages - Pip install xgboost, Pip install lightgbm

```
Anaconda Prompt - python - x + v
(base) C:\Users\Anju S> cd Documents\Desserataion-Final Project\Data-Files
(base) C:\Users\Anju S\Documents\Desserataion-Final Project\Data-Files>python -m streamlit run app.py

Welcome to Streamlit!

If you'd like to receive helpful onboarding emails, news, offers, promotions,
and the occasional swag, please enter your email address below. Otherwise,
leave this field blank.

Email:

You can find our privacy policy at https://streamlit.io/privacy-policy

Summary:
- This open source library collects usage statistics.
- We cannot see and do not store information contained inside Streamlit apps,
  such as text, charts, images, etc.
- Telemetry data is stored in servers in the United States.
- If you'd like to opt out, add the following to %userprofile%\.streamlit/config.toml,
  creating that file if necessary:

[browser]
gatherUsageStats = false

You can now view your Streamlit app in your browser.

Local URL: http://localhost:8501
Network URL: http://172.20.10.2:8501
```

Fig 2: Installing Streamlit app

```
File "C:\Users\Anju S\Documents\Desserataion-Final Project\Data-Files\app.py", line 17, in <module>
import xgboost as xgb
ModuleNotFoundError: No module named 'xgboost'
forrtl: error (200): program aborting due to control-C event
Image                PC                Routine                Line                Source
libifcoremd.dll      00007FFD0EA4DF54  Unknown                Unknown              Unknown
KERNELBASE.dll       00007FFE4331B0CD  Unknown                Unknown              Unknown
KERNEL32.DLL         00007FFE44A5E8D7  Unknown                Unknown              Unknown
ntdll.dll             00007FFE45A1C34C  Unknown                Unknown              Unknown

(base) C:\Users\Anju S\Documents\Desserataion-Final Project\Data-Files>Pip install xgboost
Collecting xgboost
  Downloading xgboost-3.0.3-py3-none-win_amd64.whl.metadata (2.1 kB)
Requirement already satisfied: numpy in c:\users\anju s\anaconda3\lib\site-packages (from xgboost) (1.26.4)
Requirement already satisfied: scipy in c:\users\anju s\anaconda3\lib\site-packages (from xgboost) (1.13.1)
Downloading xgboost-3.0.3-py3-none-win_amd64.whl (149.9 MB)
----- 149.9/149.9 MB 4.1 MB/s eta 0:00:00
Installing collected packages: xgboost
```

Fig 3: Installing necessary packages

Step 8: The browser will open the frontend

Intelligent Simulation Tester for Network Intrusions

Select Attack Type

ipsweep

Definition: Scans IP range to find live hosts.

May generate ping traffic across LAN.

Model Inference Result

Predicted probability: [0.81]

Launch Attack Simulation

Submit

Select an attack and press Submit to start simulation.

Fig 4: Streamlit App

5. References:

- [1] <https://www.analyticsvidhya.com/blog/2021/07/streamlit-quickly-turn-your-ml-models-into-web-apps/>
- [2] <https://www.analyticsvidhya.com/blog/2020/12/deploying-machine-learning-models-using-streamlit-an-introductory-guide-to-model-deployment/>
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- [5] https://www.tutorialspoint.com/machine_learning/index.htm