National College of Ireland

Configuration Manual

The NIDS Framework for Identifying Anomalous Traffic in IoT Networks

MSc Research Project
Cloud Computing

Vipin Poswal
Student ID: 23269731

School of Computing
National College of Ireland

Supervisor: Dr. Jorge Mario Cortes Mendoza

National College of Ireland

MSc Project Submission Sheet

School of Computing

Student Name:	Vipin Poswal		
Student ID:	x23269731		
Programme:	MSc in Cloud Computing	**Year:**	2025
Module:	MSc Research Project		
Lecturer:	Dr. Jorge Mario Cortes Mendoza		
Submission Due Date:	15/09/2025		
Project Title:	The NIDS Framework for Identifying Anomalous Traffic in IoT Networks		
Word Count:	412	**Page Count:**	4

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.
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PLEASE READ THE FOLLOWING INSTRUCTIONS AND CHECKLIST

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Configuration Manual

Vipin Poswal
Student ID: x23269731

1 Introduction

This configuration manual provides detailed instructions to install, configure, and execute the project *The NIDS Framework for Identifying Anomalous Traffic in IoT Networks*. The framework implements Random Forest (RF), K-Nearest Neighbors (KNN), and Artificial Neural Network (ANN) algorithms to detect anomalous traffic in IoT networks using the IoTID20 dataset.
The system evaluates performance using accuracy, precision, recall, F1-score, and ROC-AUC metrics.

2 System Requirements

The NIDS Framework for Identifying Anomalous Traffic in IoT Networks requires the following system specifications:

2.1 Hardware Requirements

Operating System: Windows 10/11, macOS, or Linux (Ubuntu 20.04+ recommended)
Processor: Intel Core i5 or higher (or equivalent AMD Ryzen)
System Type: 64-bit Operating System
RAM: 8 GB minimum (16 GB recommended)
Storage: 10 GB free space (SSD preferred)
GPU: Optional; NVIDIA GPU recommended for ANN acceleration

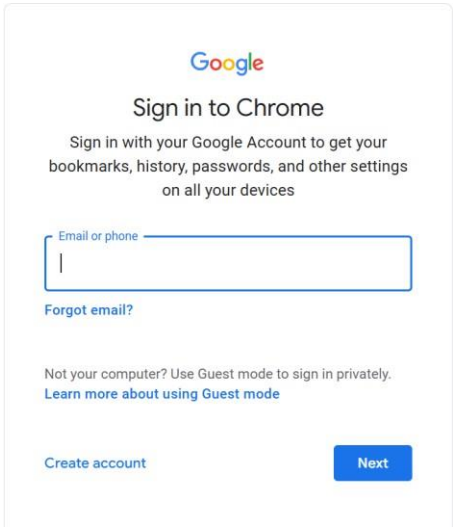
2.2 Software Requirements

Google Account (for Colab & Drive access)
Google Colab (latest version)
Python 3.8+
Required libraries: Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn, TensorFlow/Keras, Imbalanced-learn, XGBoost

3 Installation and Setup

Step 1 – Create a Google Account

Sign up at *https://accounts.google.com* to access Google Colab, Google Drive, and other essential tools



Step 2: Prepare Google Drive

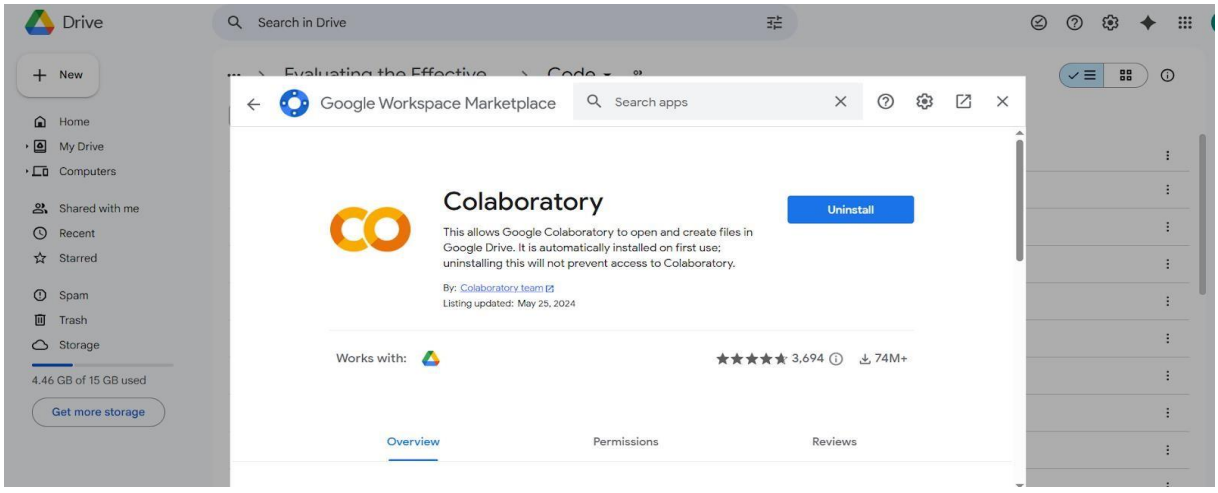
Create a folder named 'NIDS_Project'

Upload the IoTID20 dataset named "*IoT Network Intrusion Dataset.csv*".

Step 3: Install Google Colaboratory

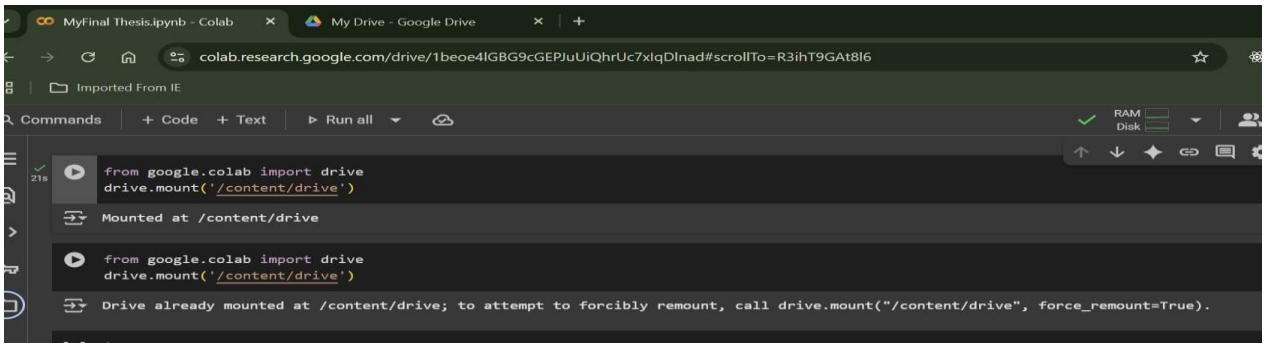
To write and run Python code

Open Google Drive → New > More > Connect More Apps
Search for 'Colaboratory' and install



Step 4: Open the Project Notebook

Right-click the notebook file 'MyFinal Thesis.ipynb' and Open with 'Google Colaboratory'



Step 5: Mount Google Drive in Colab

- Click New→More → Google Colaboratory
- And mount with google drive

"from google.colab import drive
drive.mount('/content/drive')"

Step 6: Install Required Libraries

I make sure that all required libraries are installed in colab like Pandas, NumPy, matplotlib seaborn, scikit-learn, TensorFlow, imbalanced-learn xgboost, and keras.

Step 7: Run the Notebook

Execute each cell sequentially (Shift + Enter).
The notebook will:

1. Load and preprocess the dataset 'IoTID20' (balancing, feature selection, scaling)
2. Train RF, KNN, and ANN models
3. Evaluate models using defined metrics
4. Generate performance plots and reports

4 Configuration

Variables: adjustable in notebook.

Hyperparameters: In the 'Model Training' part Train/APM ratio

ratio between data split unit 'Data Cut-out Section'

ANN architecture: Change neurons, Dropout rate, activation functions in ANN cell

5 Conclusion

Using this manual will reliably set up the NIDS framework to work in Google Colab with low local setup.

The use of the cloud environment allows reproducible experiments, GPU accelerated ANN training.