



Engineering
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School of Computing
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School of Computing & Information Sciences

Summer 2023 Capstone II Project



Enhancing Intrusion Detection Systems

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Problem

- Difficulty in improving existing models
- Diverse ways of weighing features in IDS
- Multiple models with distinct advantages and metrics (precision, accuracy, f1 score, recall)

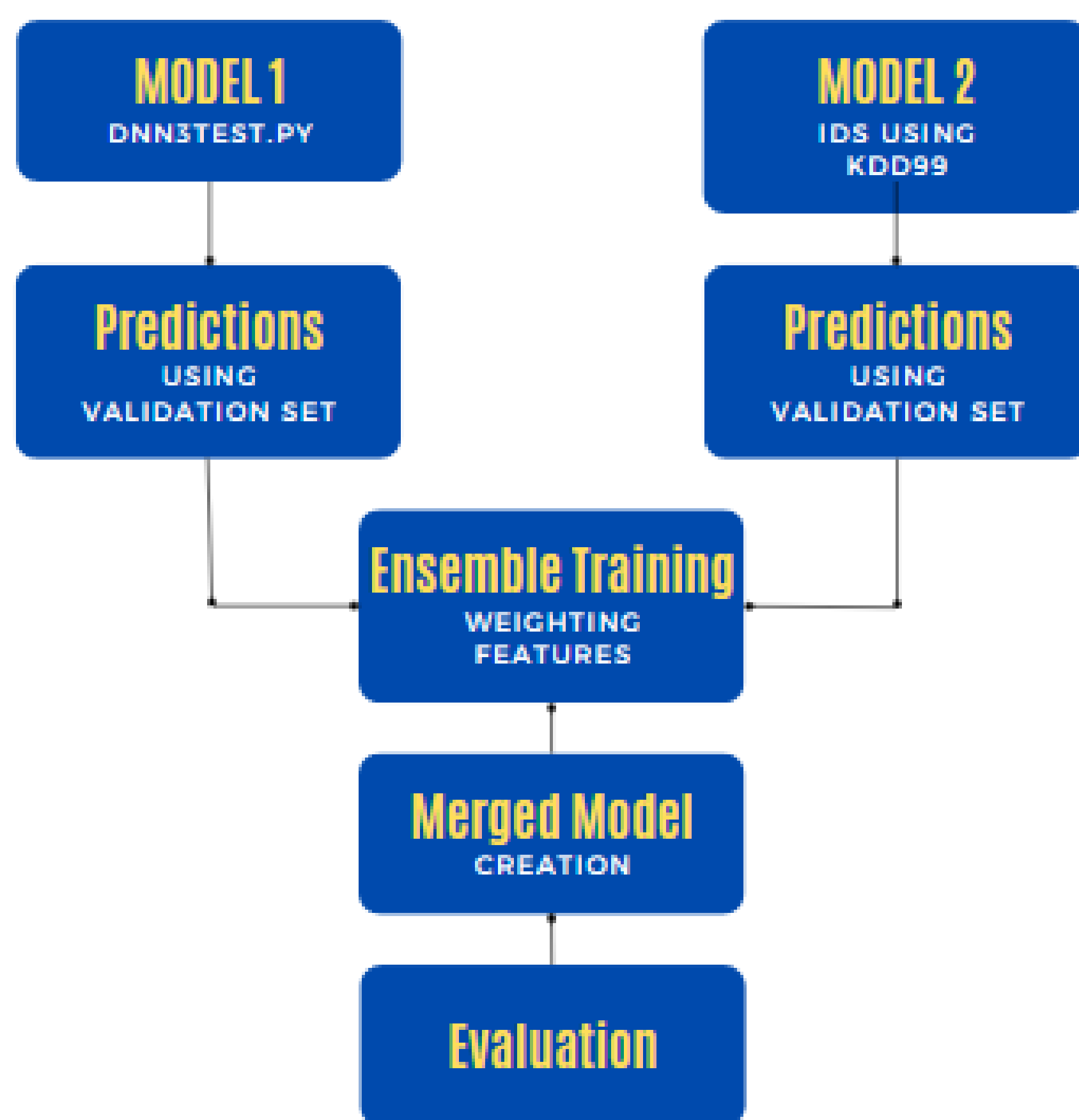
Project Overview

Our project aims to create a merged intrusion detection model and evaluate it using the kddcup99 dataset. It loads two pre-trained models for detection, preprocesses the dataset, and defines a custom callback to record accuracy during training. By trying different weight combinations and then merging the predictions, our project is able to improve some of the metrics of the two pre-trained models.

Tools Used

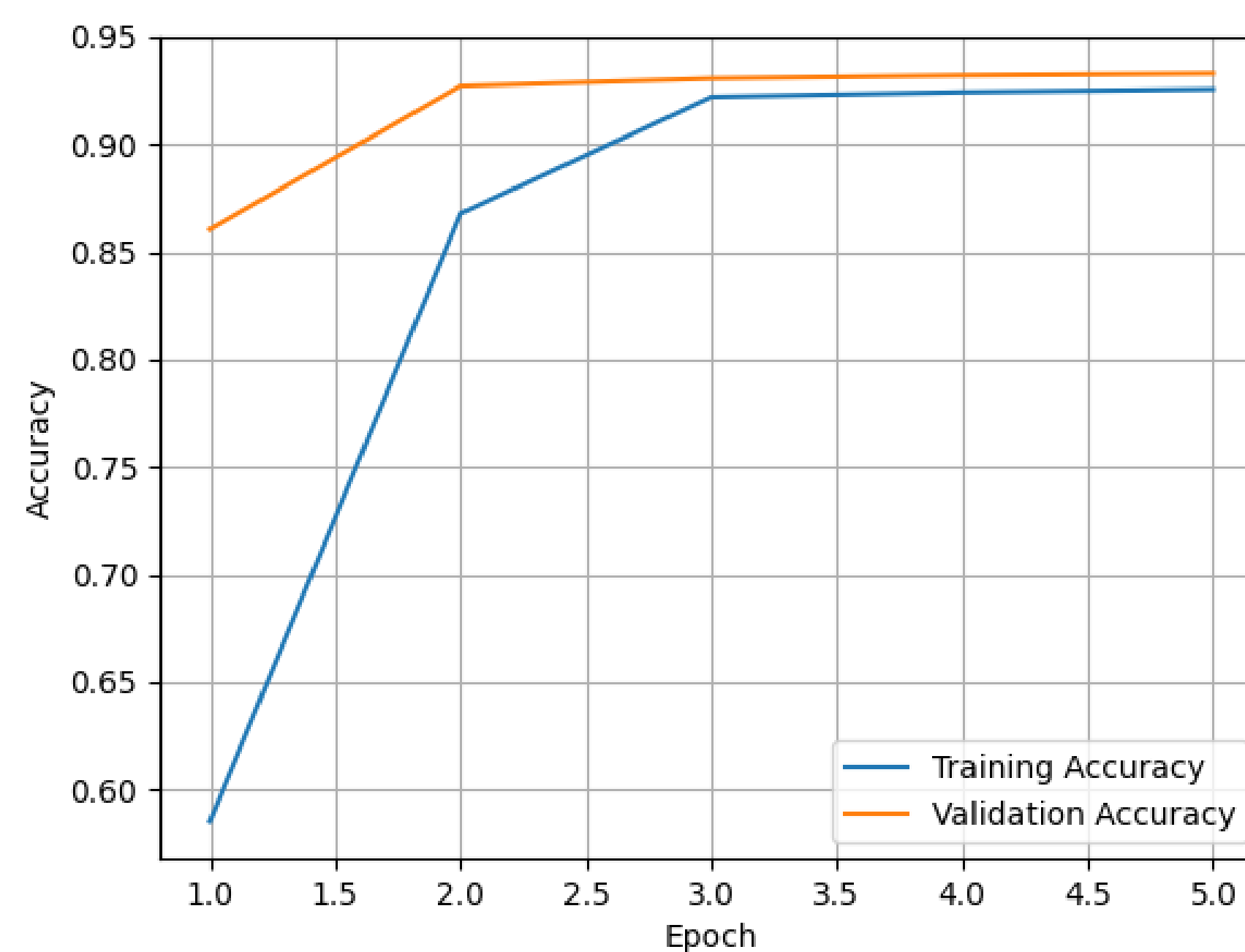
- PyCharm with the following modules:
 - scikit-learn
 - Keras
 - matplotlib
 - Ensemble Methods
 - Pandas
- Open-source IDSs

System Design

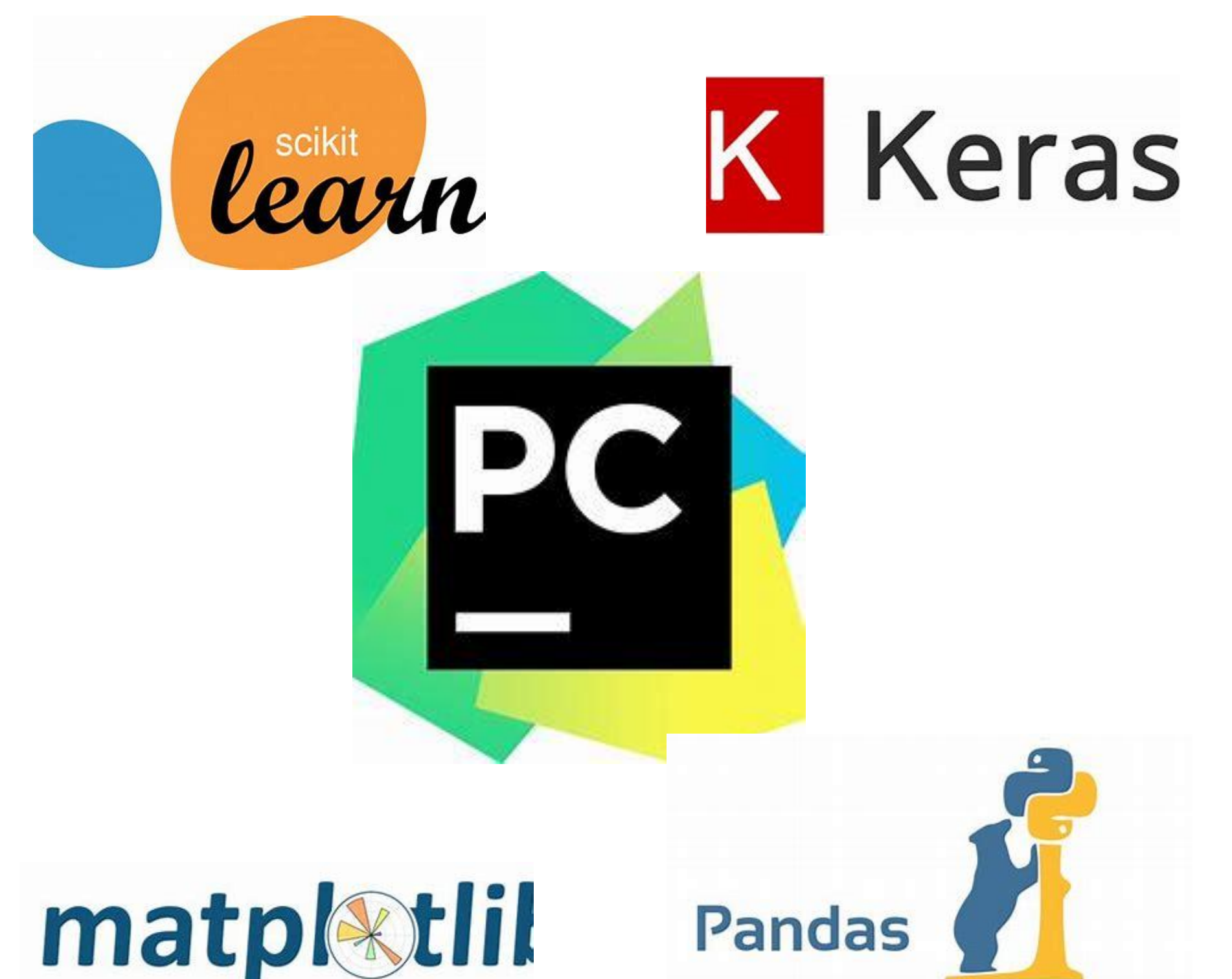


System Results

Model	Precision
Dnn3test	0.995
IDS using KDD99	0.900
Merged Models	0.998



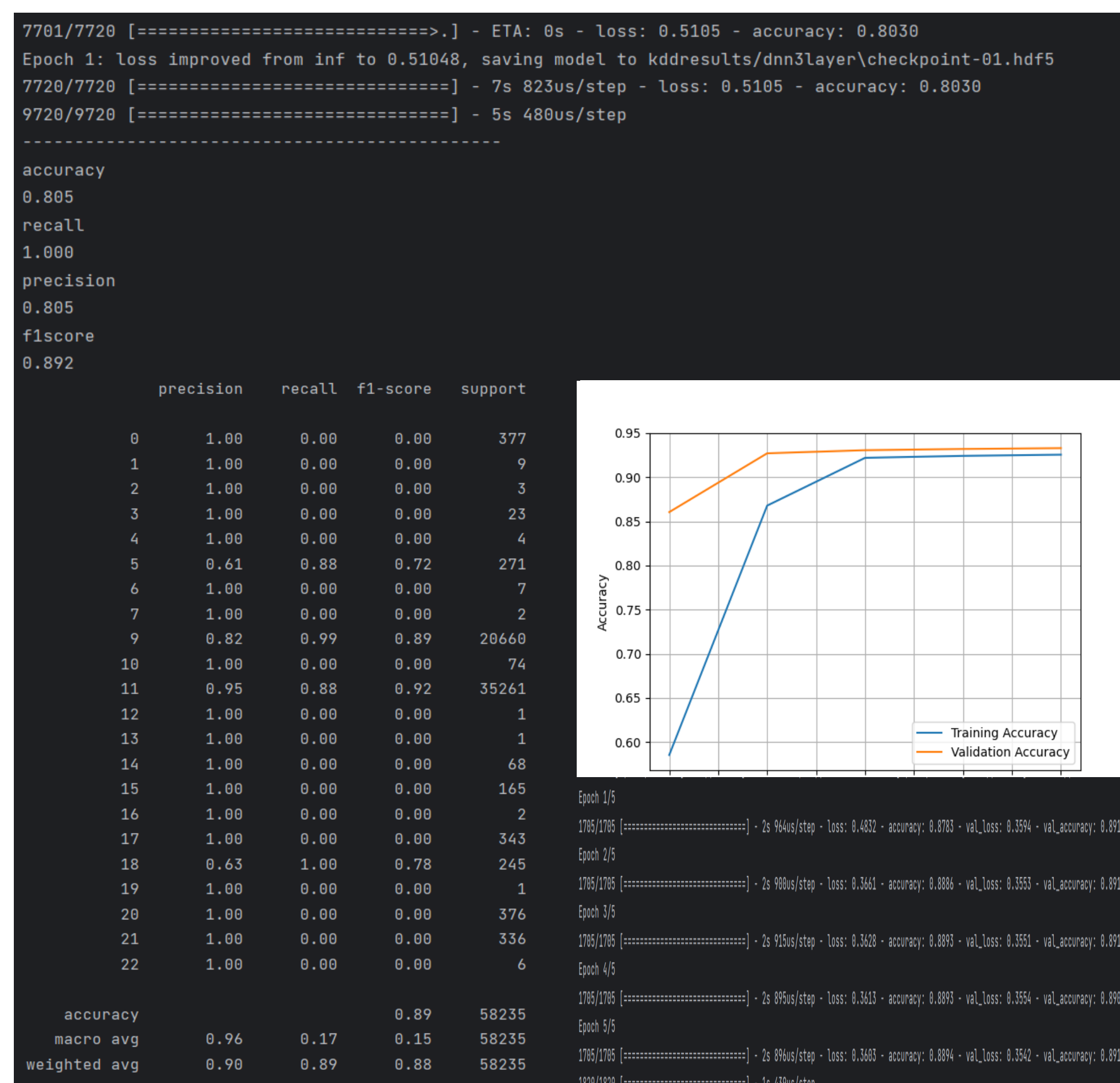
Implementation



Individual Contributions

- Made two open-source IDS models compatible.
- Organized the code to work alongside each other in PyCharm.
- Created the Merged Model which was later improved upon by others on the team.

Screenshots



Summary

In summation, our team successfully developed a Merged Model that utilizes predictions from two pre-trained models. The Merged Model demonstrated higher accuracy and precision compared to the individual models, showcasing the effective combination of their respective strengths for improved performance.

Acknowledgement

I thank Dr. Yanzhao Wu
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