NETWORK BASED INTRUSION DETECTION SYSTEM

Using Classifiers (Scikit Learn)

Scope

Dataset

NSL-KDD

Classifiers

1. **Decision Tree**
2. **K-Nearest Neighbours**
3. **Classification and Regression Tree**
4. **Random Forest**
5. **AdaBoost**
6. **Logistics Regression**
7. **Linear Discriminant Analysis**
8. **Quadratic Discriminant Analysis**
9. **Multi-Layer Perceptron**
10. **Linear SVC**

Repository

https://github.com/BenoyRNair/NIDS

Classification

1. **Binary (Benign and Attack classes)**
2. **Multi-class Benign, Probe, DoS, U2R, and R2L classes)**

Metrics

1. **Accuracy**
2. **Precision**
3. **Recall**
4. **F1-score**
5. **Execution Time**

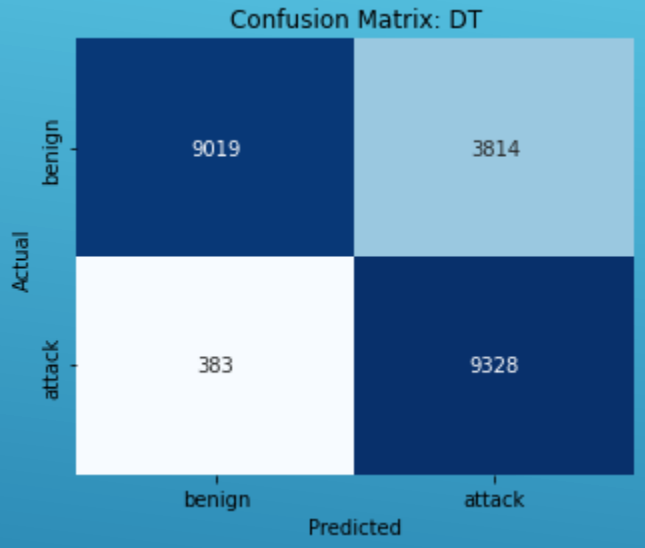
Binary Classification

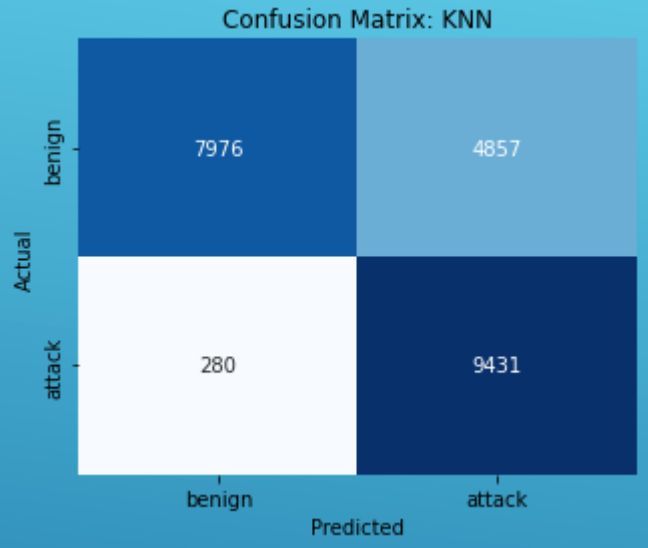
Metrics

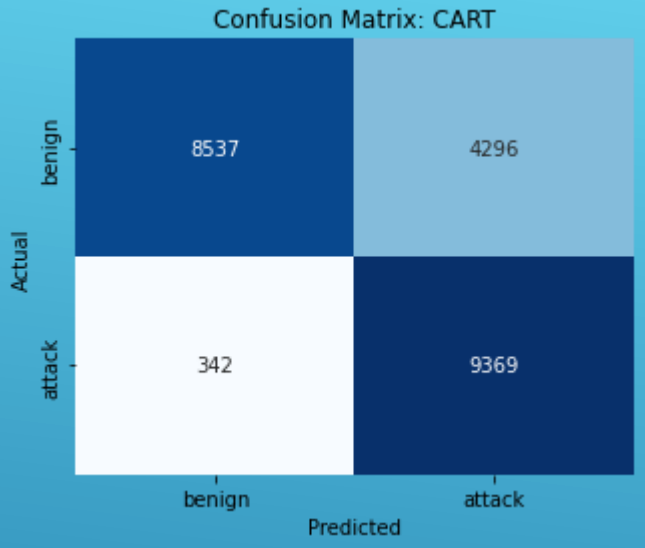
Classifier	Accuracy	Precision	Recall	F1-score	Execution Time (seconds)
DT	81.38 %	85.18 %	83.17 %	81.34 %	1.90
KNN	77.21 %	83.43 %	79.63 %	76.91 %	63.07
CART	79.42 %	84.26 %	81.50 %	79.29 %	0.80
RF	72.55 %	81.63 %	75.62 %	71.72 %	0.42
ABoost	77.53 %	81.61 %	79.39 %	77.44 %	18.72
LR	70.15 %	76.10 %	72.59 %	69.67 %	11.39
LDA	76.16 %	80.98 %	78.23 %	75.98 %	4.44
QDA	51.49 %	75.54 %	57.32 %	42.50 %	2.41
MLP	74.21 %	80.81 %	76.75 %	73.77 %	29.56
LinSVC	75.13 %	79.28 %	77.01 %	75.01 %	17.95

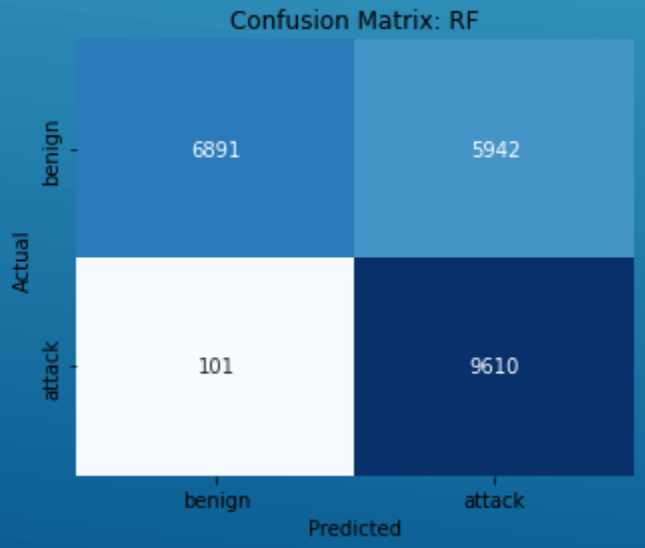
Binary Classification

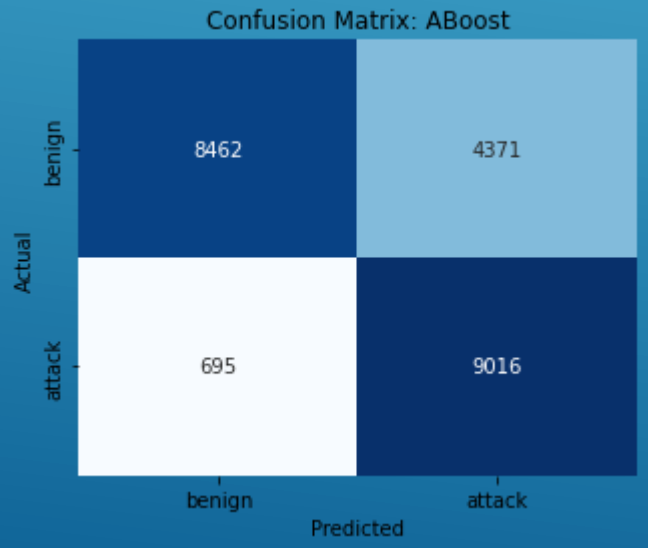
Confusion Matrixes

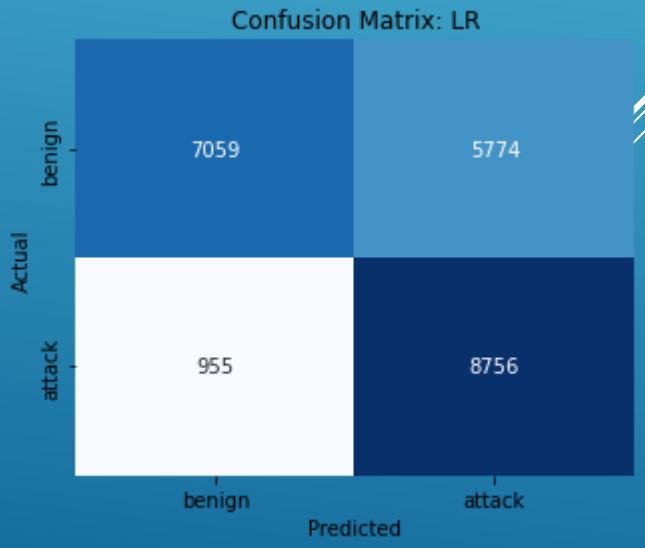






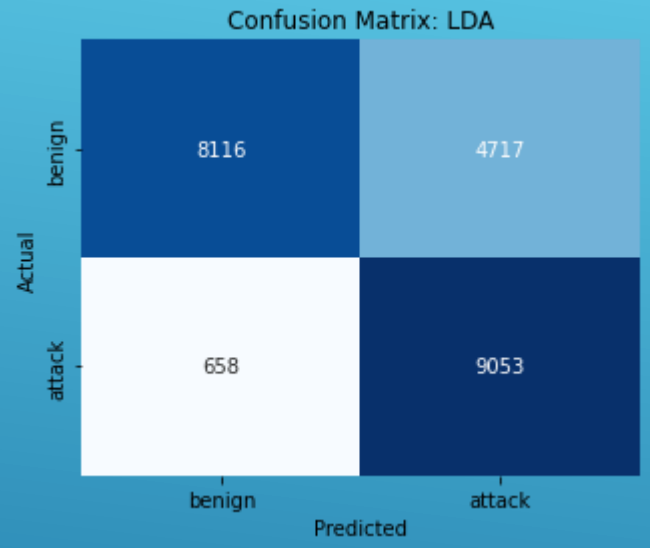


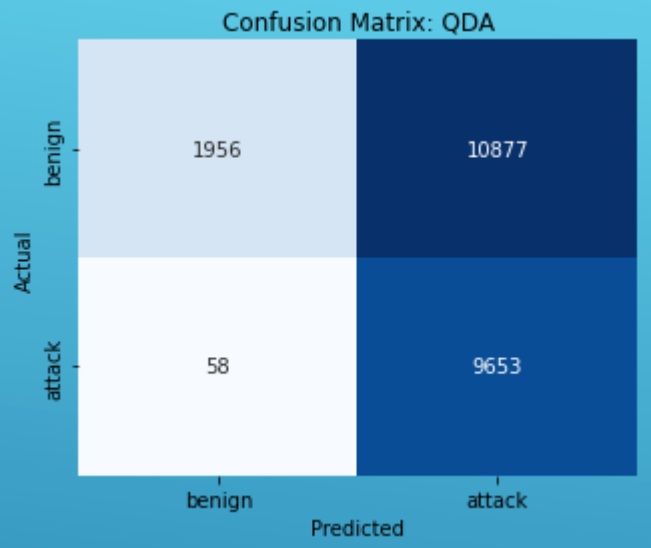


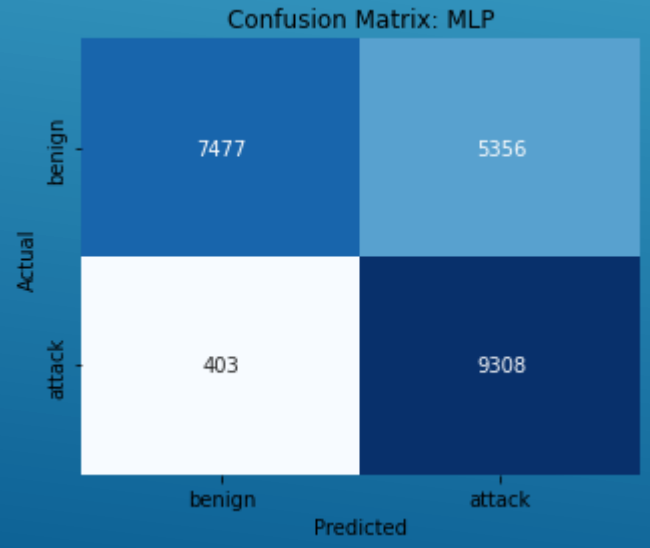


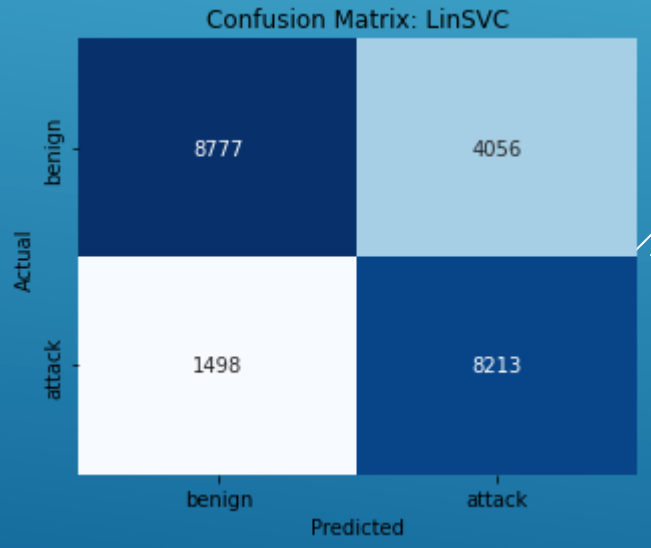
Binary Classification

Confusion Matrixes









Multi-class Classification

Metrics

Classifier	Accuracy	Precision	Recall	F1-score	Execution Time (seconds)
DT	76.20 %	81.60 %	53.19 %	72.73 %	2.85
KNN	73.26 %	72.08 %	48.79 %	68.22 %	61.49
CART	71.93 %	66.57 %	45.39 %	66.98 %	0.80
RF	65.81 %	62.64 %	38.37 %	60.08 %	0.39
ABoost	61.26 %	54.06 %	40.85 %	57.30 %	19.85
LR	61.48 %	48.16 %	31.62 %	53.21 %	78.79
LDA	75.57 %	80.15 %	60.95 %	73.13 %	4.43
QDA	65.73 %	73.57 %	43.44 %	61.79 %	2.19
MLP	77.35 %	80.87 %	51.31 %	74.92 %	91.43
LinSVC	71.06 %	65.07 %	45.23 %	66.85 %	83.63

Multi-class Classification

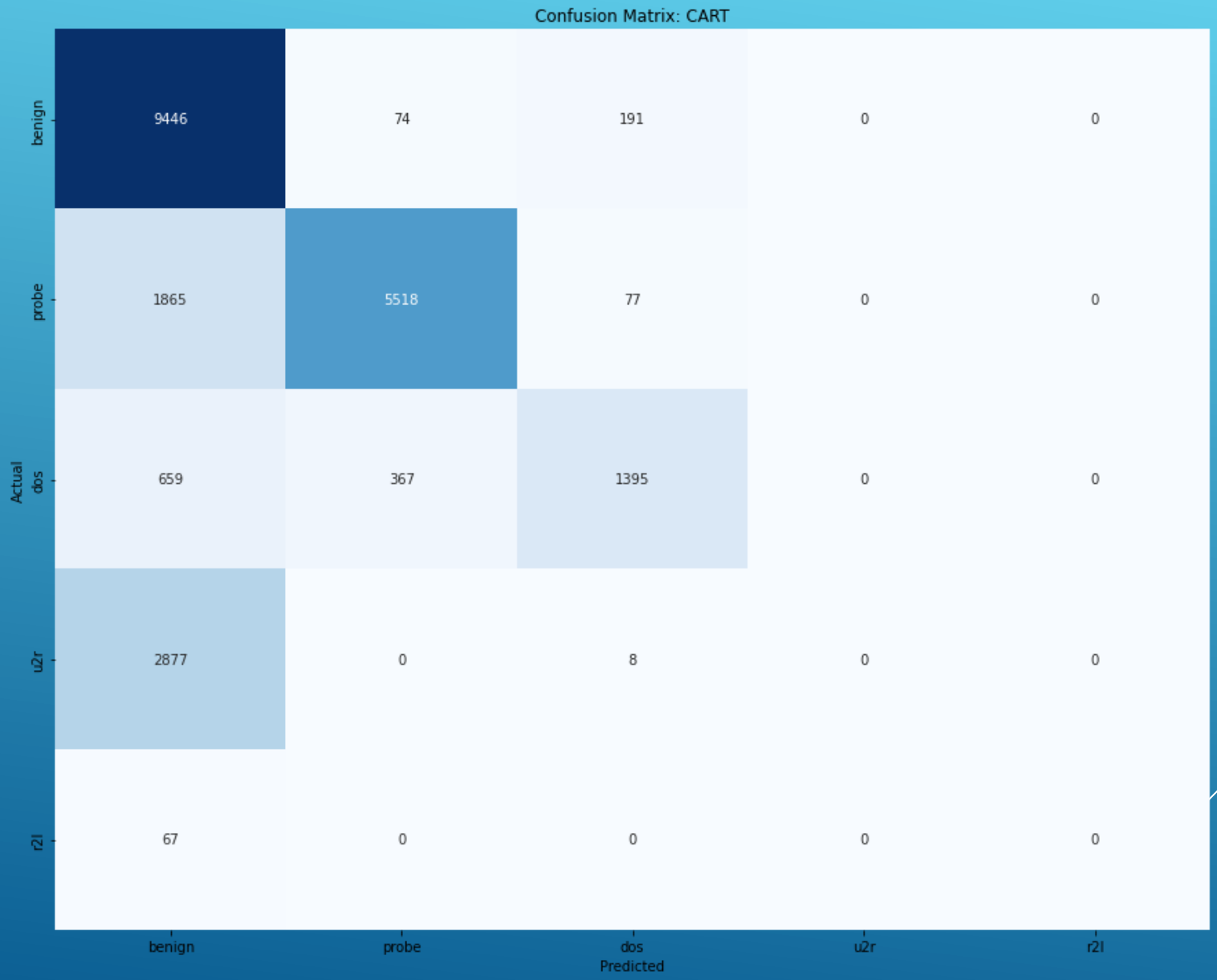
Confusion Matrix: Decision Tree

Multi-class Classification

Confusion Matrix: K-Nearest Neighbours

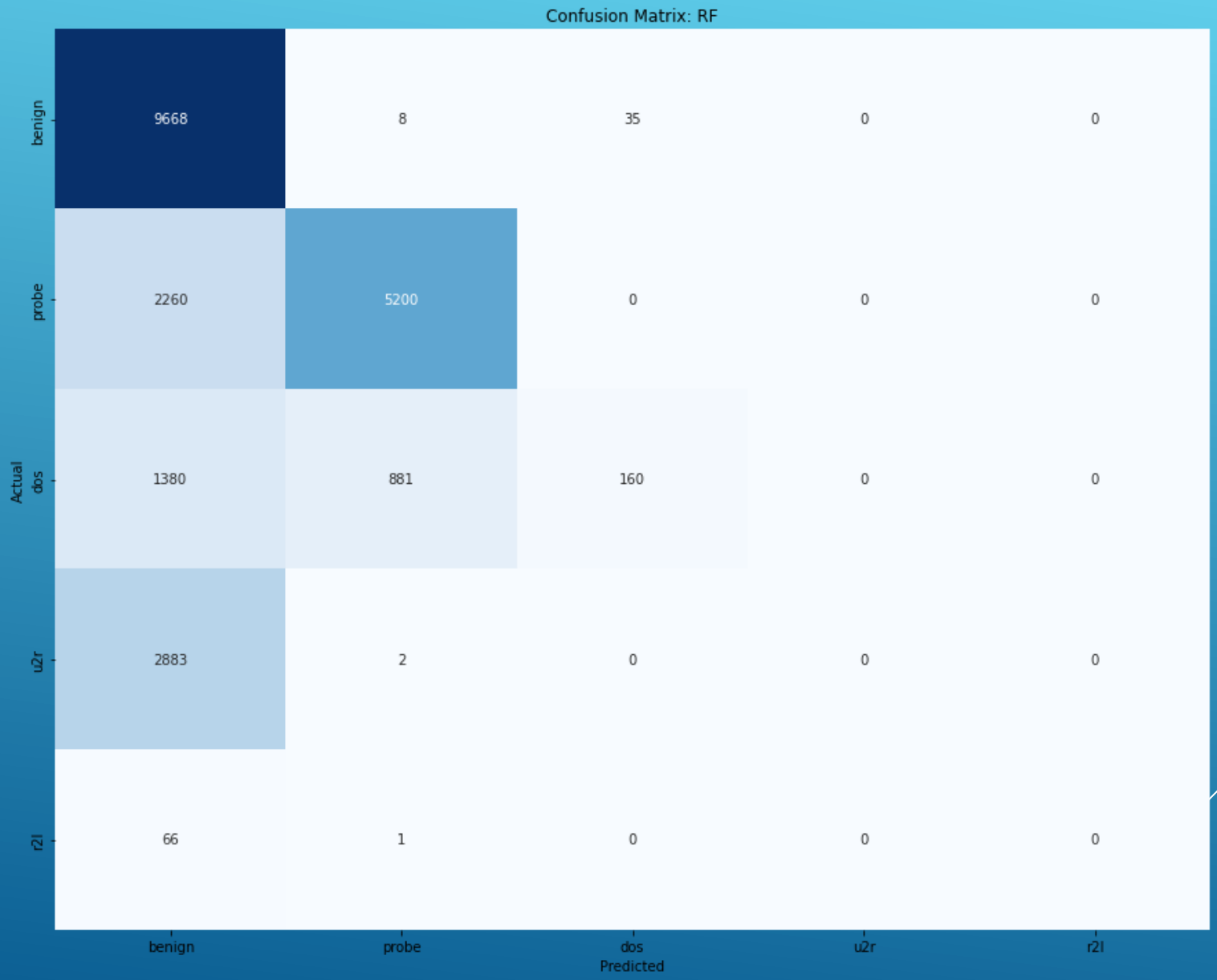
Multi-class Classification

Confusion Matrix: Classification and Regression Tree



Multi-class Classification

Confusion Matrix: Random Forest



Multi-class Classification

Confusion Matrix: AdaBoost

Multi-class Classification

Confusion Matrix: Logistics Regression

Multi-class Classification

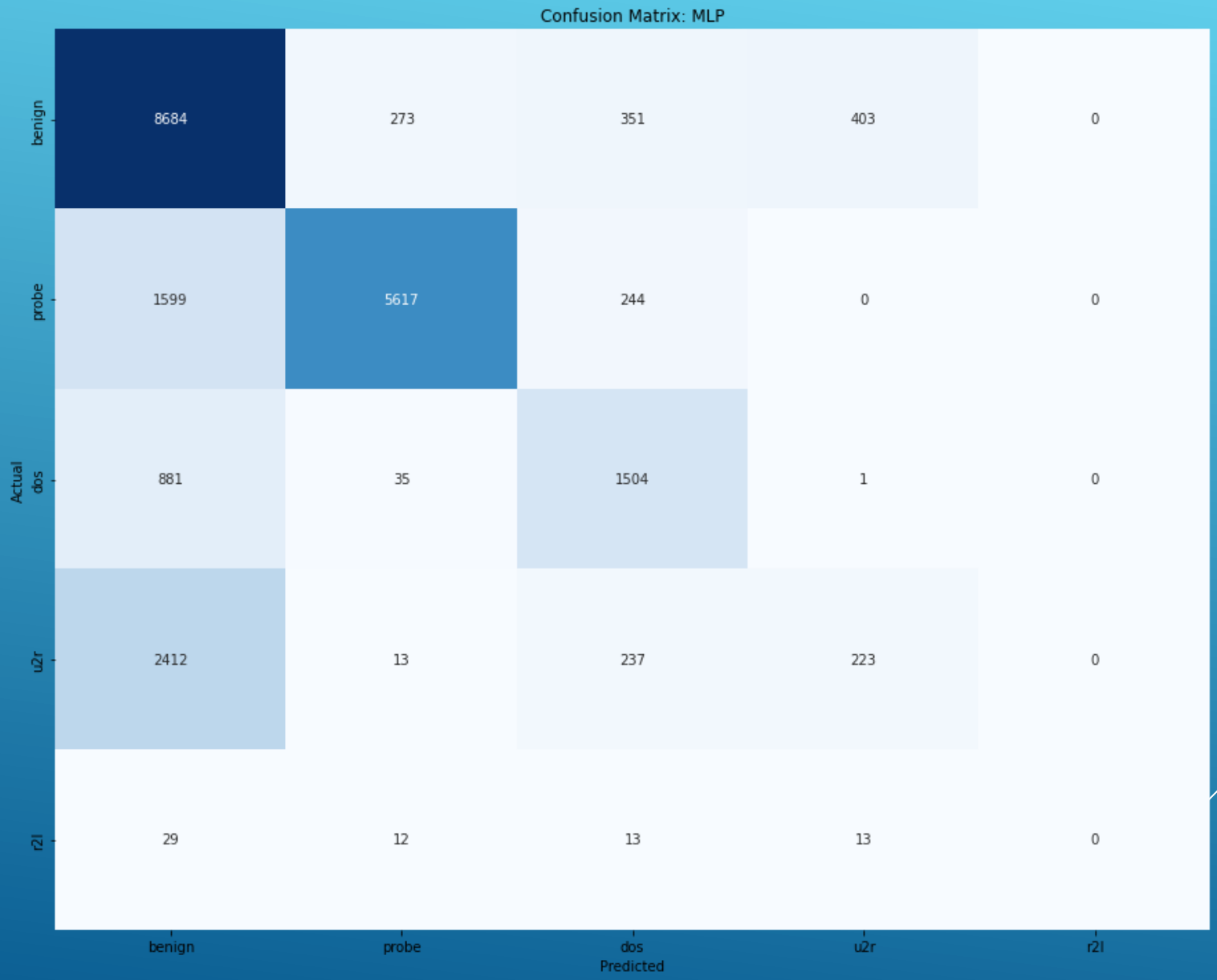
Confusion Matrix: Linear Discriminant Analysis

Multi-class Classification

Confusion Matrix: Quadratic Discriminant Analysis

Multi-class Classification

Confusion Matrix: Multi-Layer Perceptron



Multi-class Classification

Confusion Matrix: Linear SVC