SPAM DETECTION

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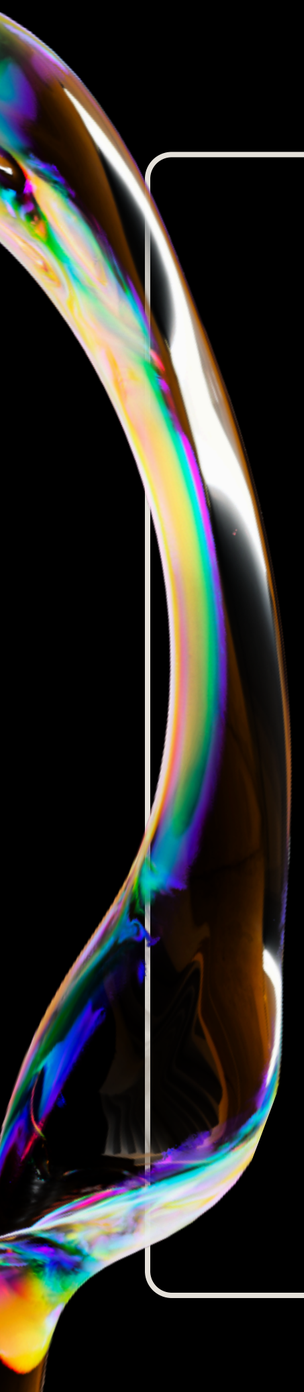
PROBLEM STATMENT

Our System aims to identify and filter spam messages from legitimate ones using machine learning techniques by analyzing the content of SMS messages



MOTIVATION

SMS spam is a common problem worldwide, often leading to security risks and privacy violations. This system aims to detect and filter out spam messages before they reach the user’s inbox, helping users avoid phishing scams and other unwanted communications markets.

Our collaborative approach ensures that we're not just service providers but invested advocates for your growth. Let us be the catalyst for your startup's journey, guiding you towards achieving your goals and beyond.

SOLUTION APPROACH

Data Collection and Preprocessing

The first step involves comprehensive data gathering from diverse social media platforms. Collecting labeled datasets that include both spam and legitimate content ensures robust training. Ensuring data diversity across different types of spam and user demographics is crucial.

Feature Engineering

Text-based features capture linguistic characteristics of potential spam. Analyzing word frequency, examining n-gram patterns, and detecting suspicious keywords provide critical insights. Punctuation density, capitalization anomalies, and text length variations serve as powerful indicator

Machine Learning Model Selection

Ensemble methods combine multiple algorithms to improve spam detection reliability. Random Forest, Gradient Boosting, and Support Vector Machines offer complementary strengths in classification. Combining their predictions creates a robust and adaptable detection mechanism.

DATASETS

1. UCI Machine Learning

3.Kaggle/Ankit/spam_data

4. KimDongH/Spam_Dataset

ALGORITHMS USED

1. KNN

2. SVM

3. Logistic Regression

4. Random Forest

5. Naive Bayes

RESULTS

DATASET - 1

	KNN	SVM	Random forest	logistic regression
Precision	1	1	1	1
Accuracy	0.90	0.90	0.92	0.89
Recall	0.24	0.24	0.28	0.18
ROC AUC	0.87	0.99	0.99	0.99

DATASET - 2

	Logistic Regression	Naive Bayes	SVM	Random Forest
Accuracy	0.92	0.88	0.94	0.90
Precision	0.91	0.91	0.91	0.84
Recall	0.81	0.66	0.89	0.84
ROC AUC	0.97	0.96	0.98	0.96

DATASET – 3

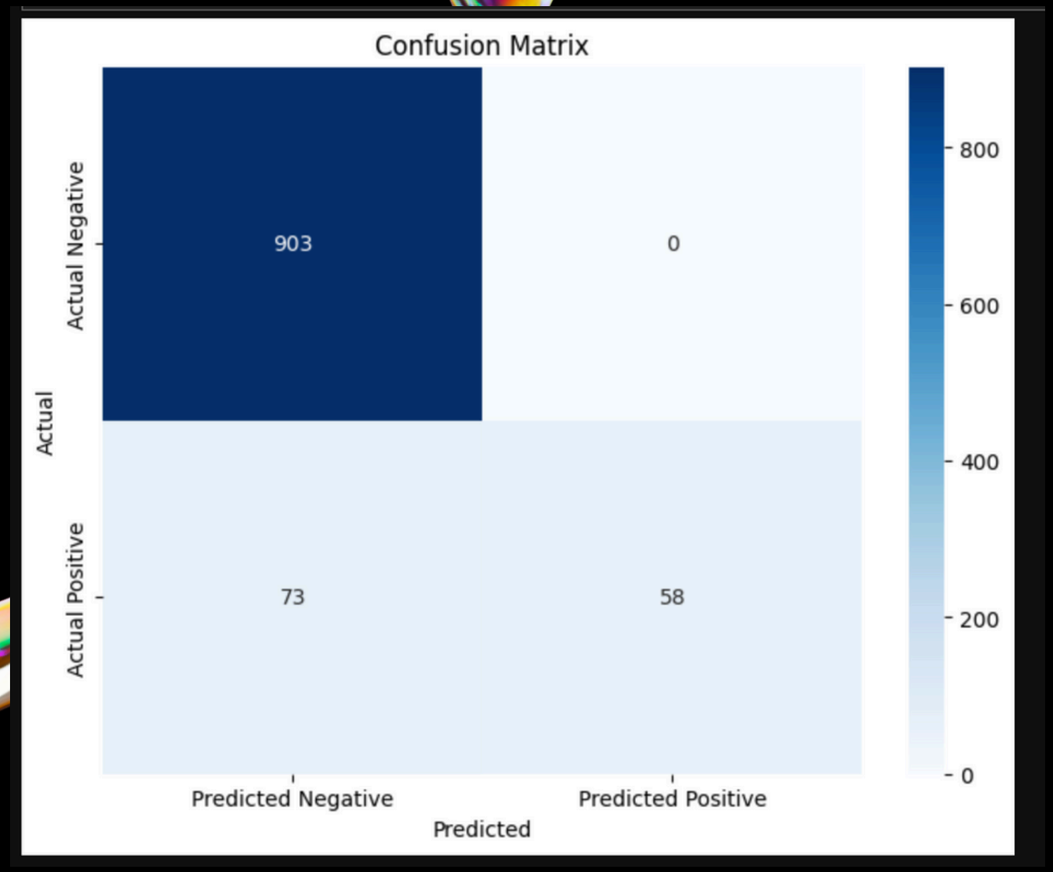
	Naive Bayes	SVM	Random	Logistic
Accuracy	0.9524	0.9524	0.7619	0.9524
Precision	0.9286	0.9286	0.7857	0.9286
Recall	1.0000	1.0000	0.8462	1.0000
ROC AUC	0.9630	0.9630	0.8148	0.9630

DATASET – 4

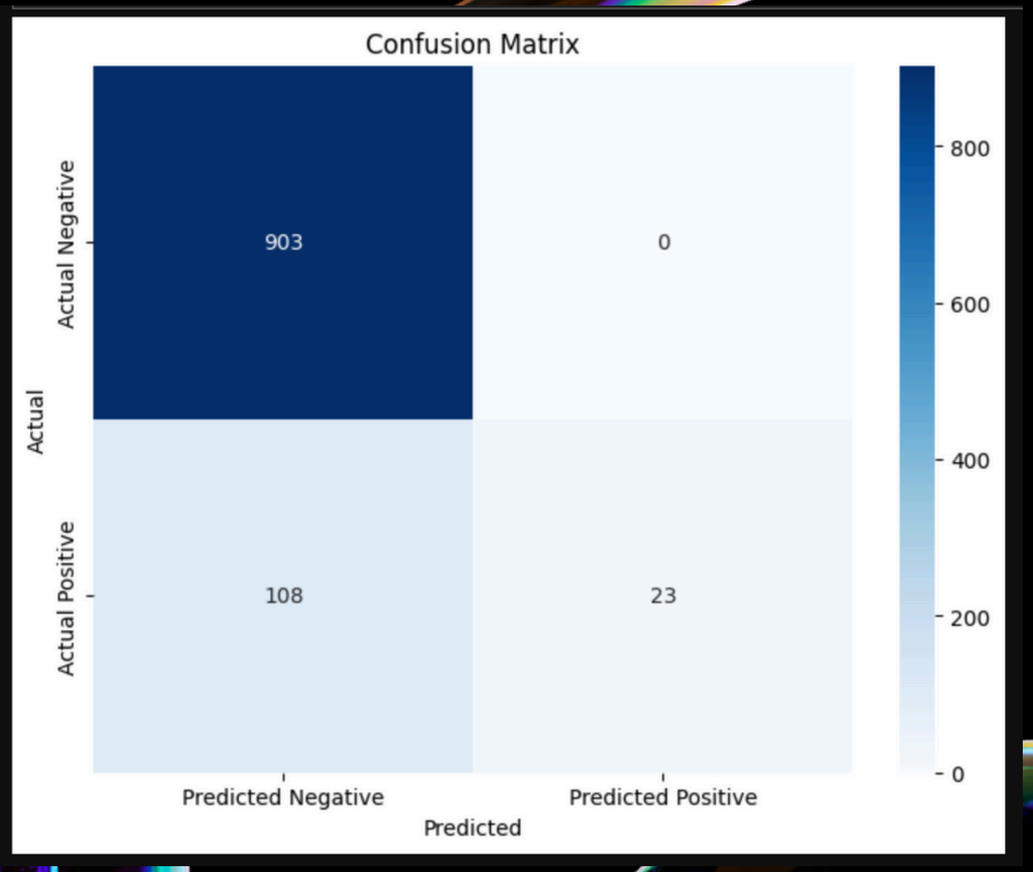
	KNN	Naive Bayes	Random	Logistic
Accuracy	0.96	0.95	0.97	0.962
Precision	0.95-(0) 0.94-(1)	0.96-(0) 0.94-(1)	0.99-(0) 0.96-(1)	0.98-(0) 0.95-(1)
Recall	0.94-(0) 0.95-(1)	0.94-(0) 0.96-(1)	0.96-(0) 0.99-(1)	0.95-(0) 0.97-(1)
ROC AUC	0.69	0.95	0.99	0.96

CONFUSION MATRIX

DATASET - 1

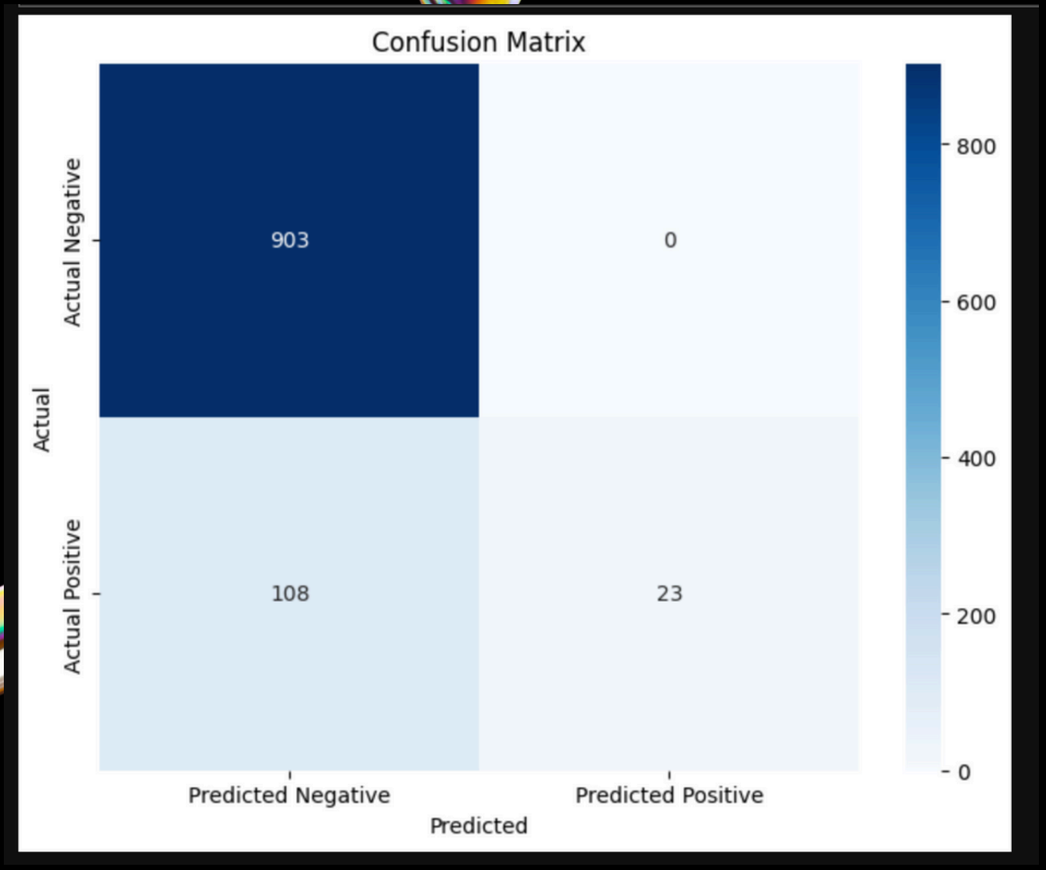


Random Forest

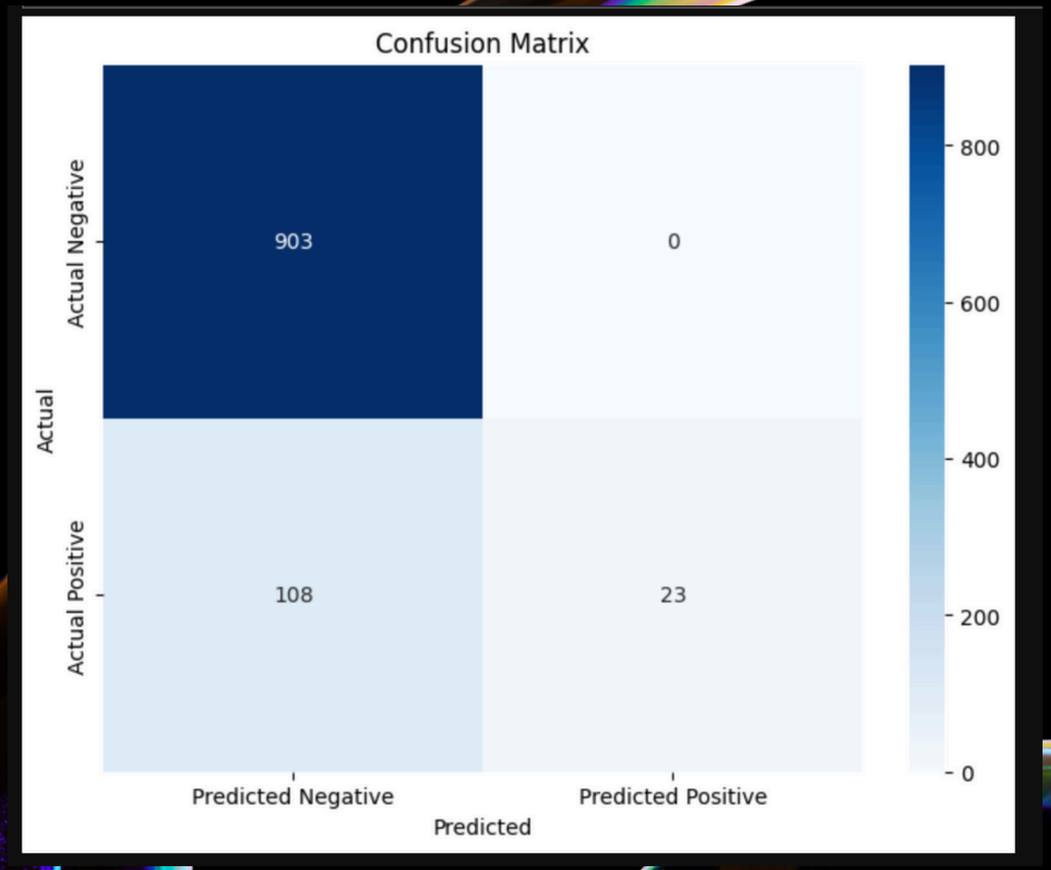


Logistic Regression

DATASET - 1

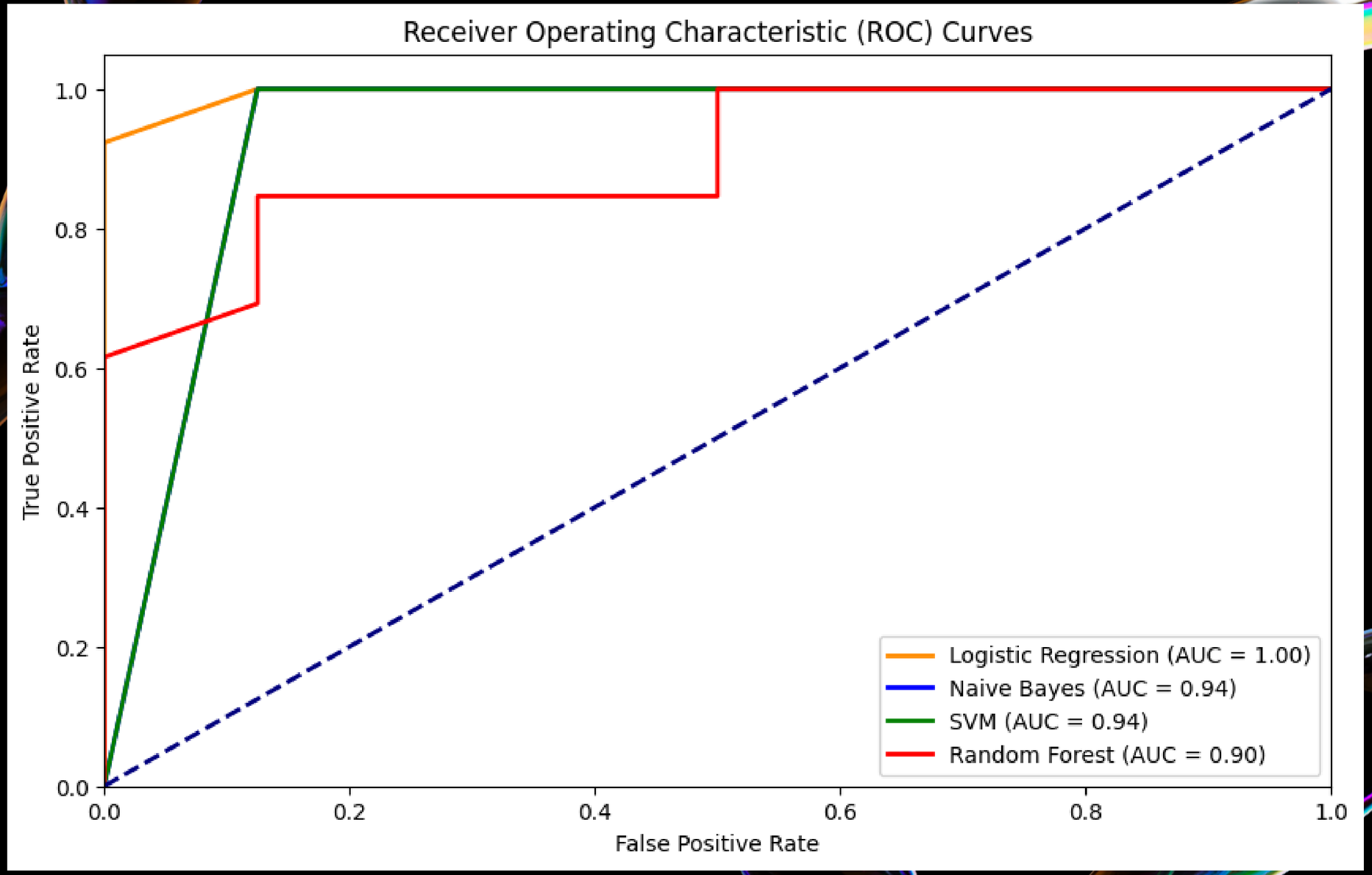


SVM

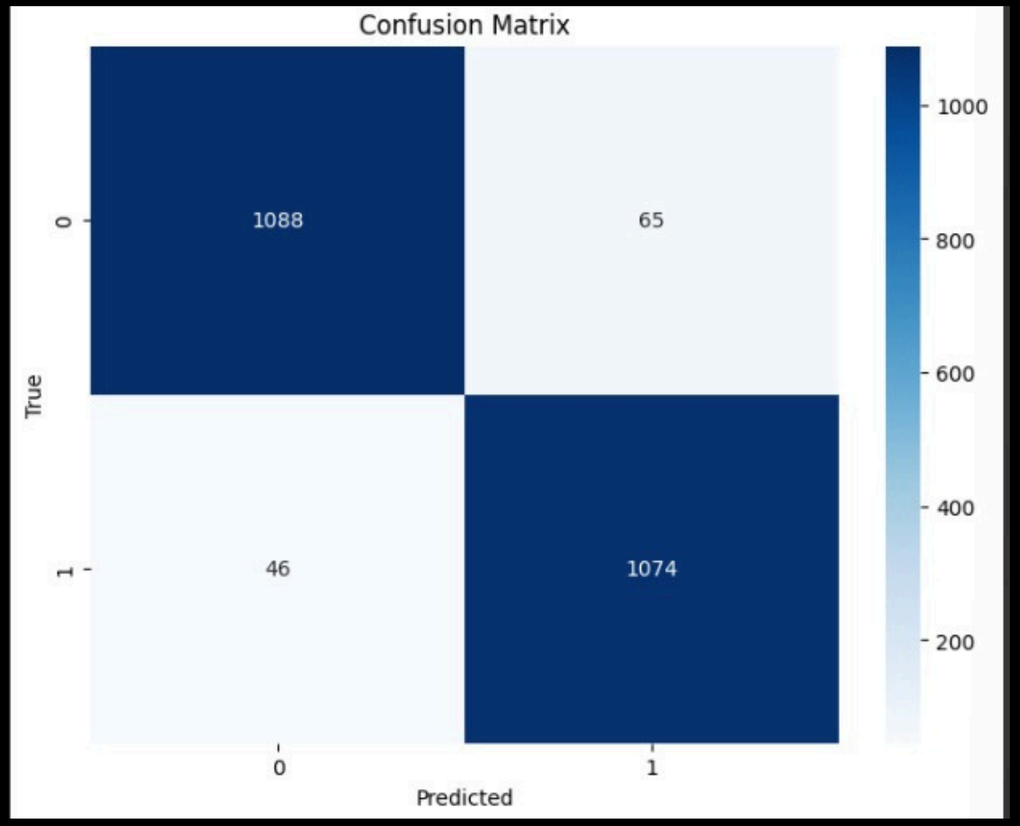


KNN

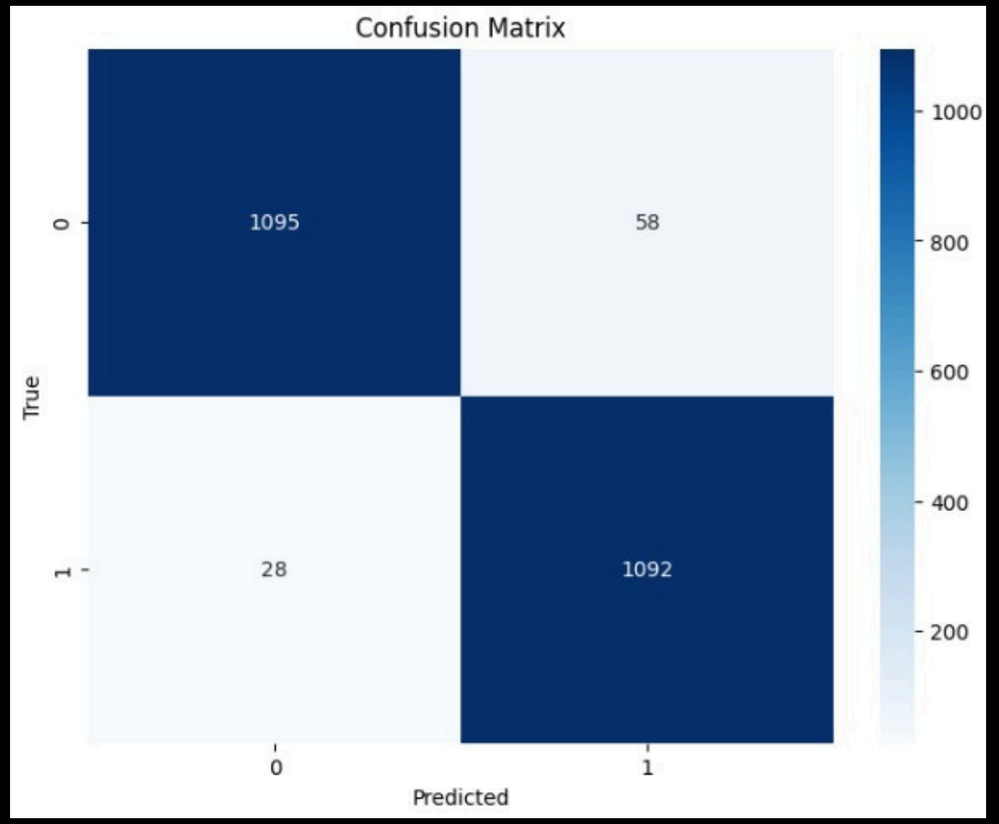
DATASET – 3


Receiver Operating Characteristic (ROC) Curves
True Positive Rate
False Positive Rate
0.0
0.2
0.4
0.6
0.8
1.0
Logistic Regression (AUC = 1.00)
Naive Bayes (AUC = 0.94)
SVM (AUC = 0.94)
Random Forest (AUC = 0.90)

DATASET - 4

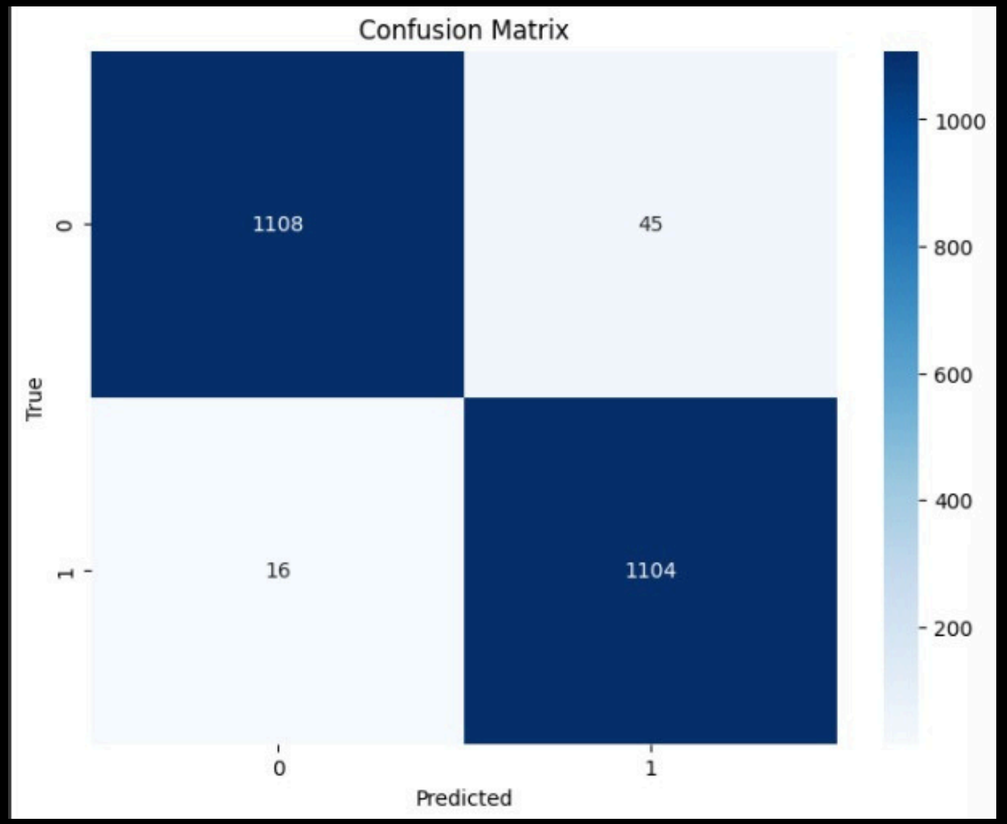


KNN

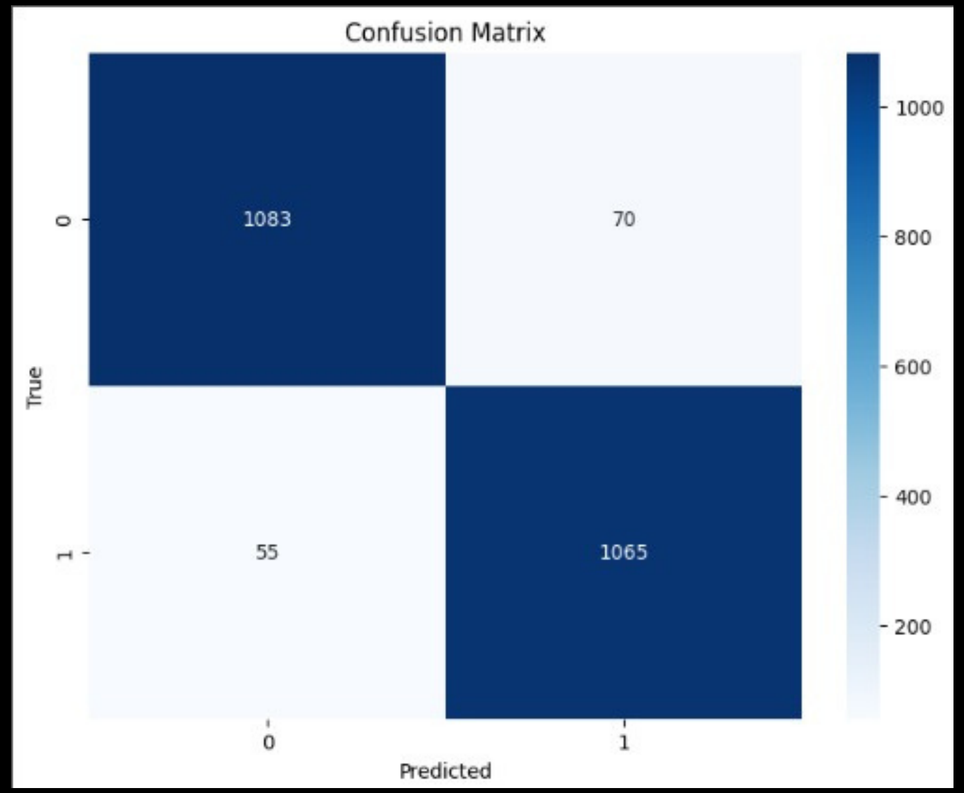


Logistic Regression

DATASET - 4

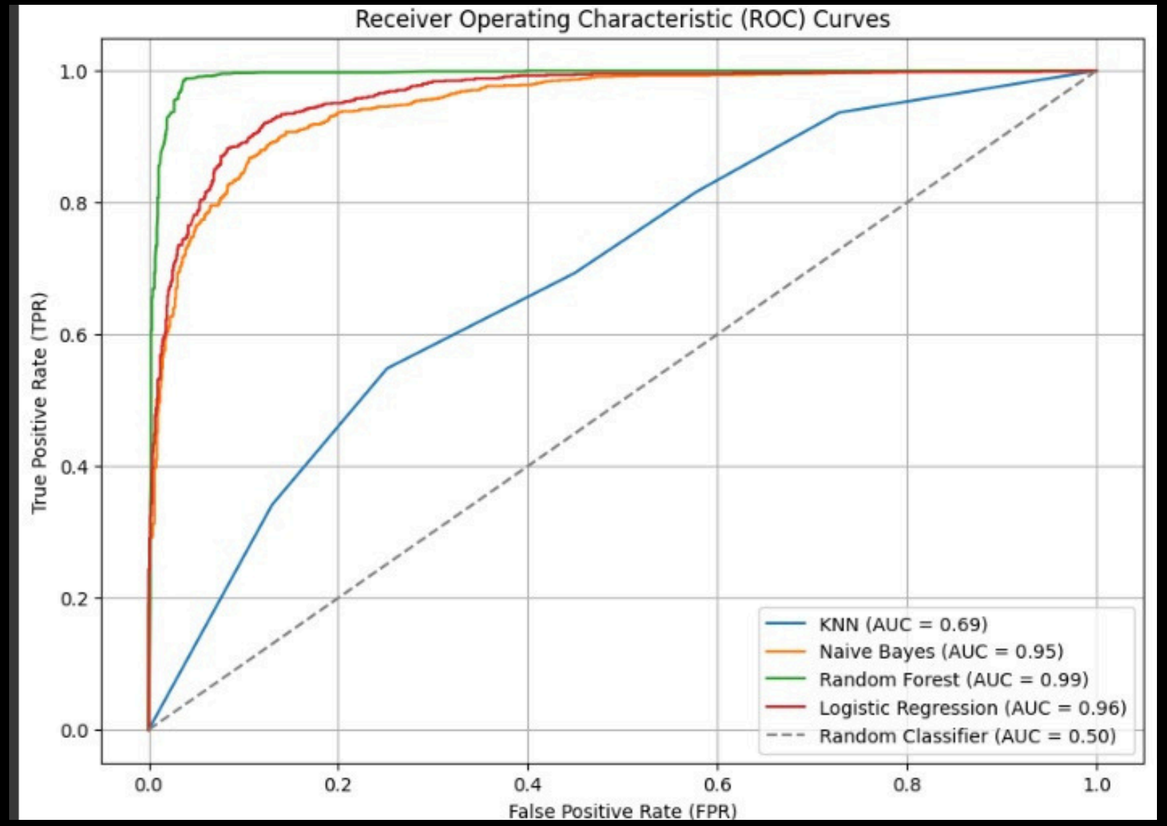


Naive Bayes



Random Forest

ROC CURVE


Receiver Operating Characteristic (ROC) Curves
True Positive Rate (TPR)
False Positive Rate (FPR)
0.0
0.2
0.4
0.6
0.8
1.0
KNN (AUC = 0.69)
Naive Bayes (AUC = 0.95)
Random Forest (AUC = 0.99)
Logistic Regression (AUC = 0.96)
Random Classifier (AUC = 0.50)

THANK YOU

for your time and attention