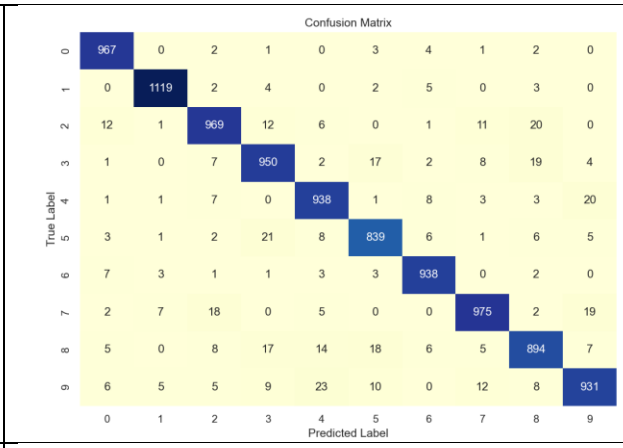
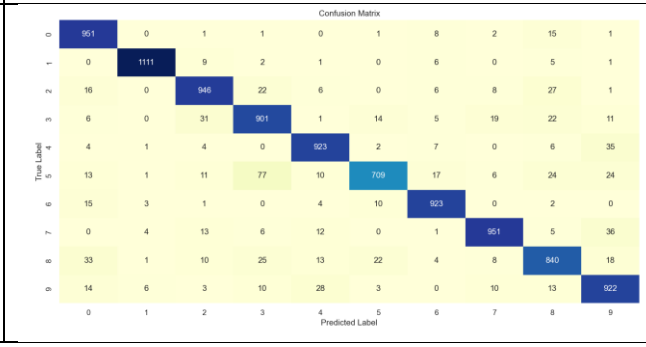
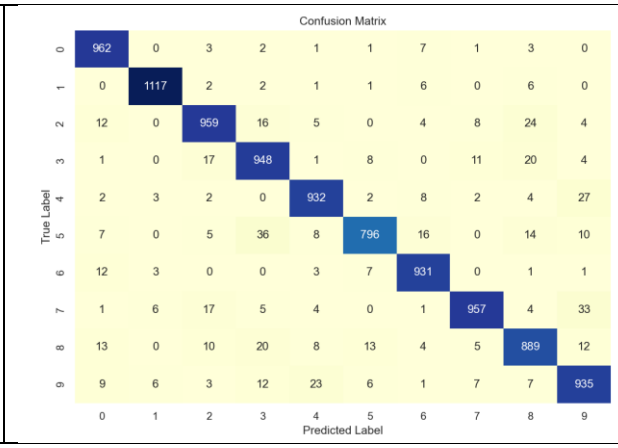
	Accuracy	Precision	Recall	F1 Score
PCA	95.20%	95.19%	95.20%	95.19%
Edges	91.77%	91.83%	91.77%	91.73%
Combined	94.26%	94.29%	94.26%	94.25%

The PCA features provide the highest scores across all metrics among the three approaches. This suggests that the dimensionality reduction via PCA effectively captures the most relevant information in the data, leading to high classification performance. High precision and recall values close to accuracy indicate that the model not only classifies most samples correctly but also maintains a balanced performance between classifying positive and negative classes correctly. The combined approach, which uses both PCA and edge features, shows performance metrics that are higher than using just edge features but slightly lower than using PCA alone. This could suggest that while the edge features do contribute some useful information to the model, their addition may also introduce some noise or redundant information that slightly dilutes the effectiveness of the PCA features. The high precision and recall indicate a well-balanced model, but there might be diminishing returns due to feature redundancy or interference. The edge-based features result in the lowest performance across all metrics. This lower performance might indicate that edge detection alone may not capture enough discriminative information necessary for the model to perform optimally, or the edge features may not align well with the way classes are differentiated in your dataset.

PCA	
Edges	

Both	

Overall, they all seemed to do well in recognizing the numbers. The first matrix shows high diagonal values, indicating a high number of correct predictions for each class, with relatively few misclassifications. This suggests that PCA features lead to a classifier with good performance across all classes. The second matrix has a similar structure, with strong diagonal values, but it shows more misclassifications compared to the PCA features matrix. This indicates that while the edge features do contain useful information for classification, they may not be as discriminative as PCA features for this problem. The third matrix has values that are again predominantly on the diagonal, indicating correct classifications. However, there seems to be a slight increase in misclassifications compared to the PCA-only approach, but an improvement over the edges-only approach.

Model	Hyperparameter	Accuracy	Precision	Recall
RF	n_estimators =100, max_depth = None	94.26%	94.29%	94.26%
	n_estimators =100, max_depth = 10	88.23%	88.46%	88.23%
	n_estimators =200, max_depth = None	94.39%	94.41%	94.39%
	n_estimators =200, max_depth = 10	88.61%	88.84%	88.61%
SVM	C = 10, kernel = linear	N/A		
	C = 10, kernel = saga			
Logistic regression	solver = liblinear	91.68%	91.70%	91.68%
	solver = saga	87.78%	87.80%	87.78%
K-Nearest Neighbors (KNN)	n_neighbors = 3	89.74%	90.32%	89.74%
	n_neighbors = 5	89.73%	90.53%	89.73%

	n_neighbors = 7	89.57%	90.44%	89.57%
Decision Tree Classifier	criterion = gini	40.39%	34.69%	40.39%
	criterion = entropy	46.64%	34.36%	46.64%
Gradient Boosting Classifier	n_estimators =100			
	n_estimators =200			
AdaBoost Classifier	n_estimators =100	73.58%	73.97%	73.58%
	n_estimators =200	73.91%	74.57%	73.91%
Naive Bayes	var_smoothing = 1e-9	46.64%	64.78%	46.66%
	var_smoothing = 1e-8	45.05%	64.14%	45.05%
Lasso Regression	alpha = 1			
	alpha = 10			
SGD	loss = hinge	83.17%	84.17%	83.47%
	loss = log_loss	82.50%	83.79%	82.50%
	loss = modified_huber	82.72%	83.43%	82.72%

The table presents a comparison of machine learning models, where the Random Forest (RF) with 200 trees and no depth limit demonstrates the highest Accuracy, Precision, and Recall at approximately 94.39%, indicating robust performance across all three metrics. However, models such as the Decision Tree Classifier show significantly lower effectiveness, with Accuracy and Recall around 40% for the `gini` criterion and slightly higher for `entropy`. Logistic Regression performs well with the `liblinear` solver, surpassing 91% across all metrics, which is better than its performance with the `saga` solver. Metrics for the Support Vector Machine (SVM), Gradient Boosting Classifier, and Lasso Regression are not provided due to the time needed was higher than expected, so there is a gap in the comparison. Overall, the RF model outperforms others where complete data is available, suggesting a strong fit for the given dataset.