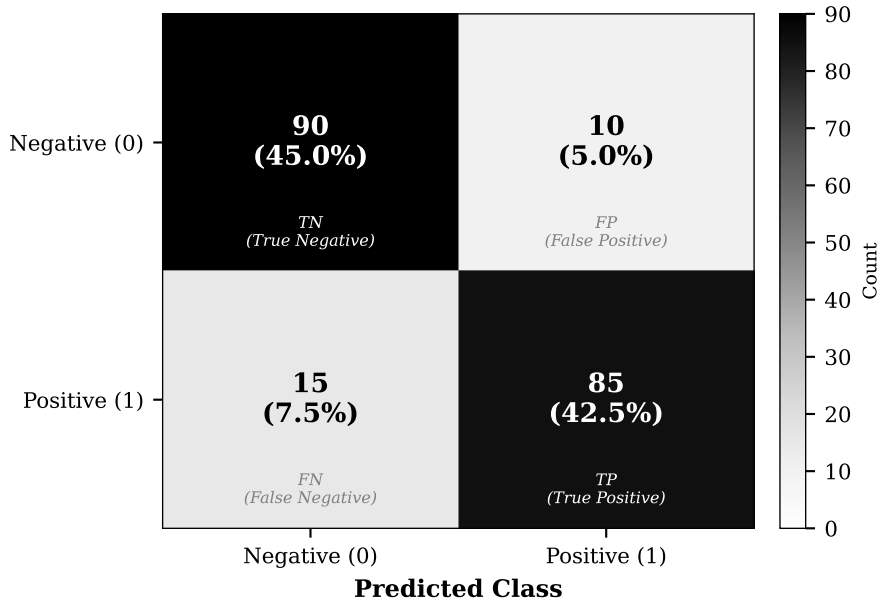


# Confusion Matrix and Classification Metrics [SYNTHETIC DATA]

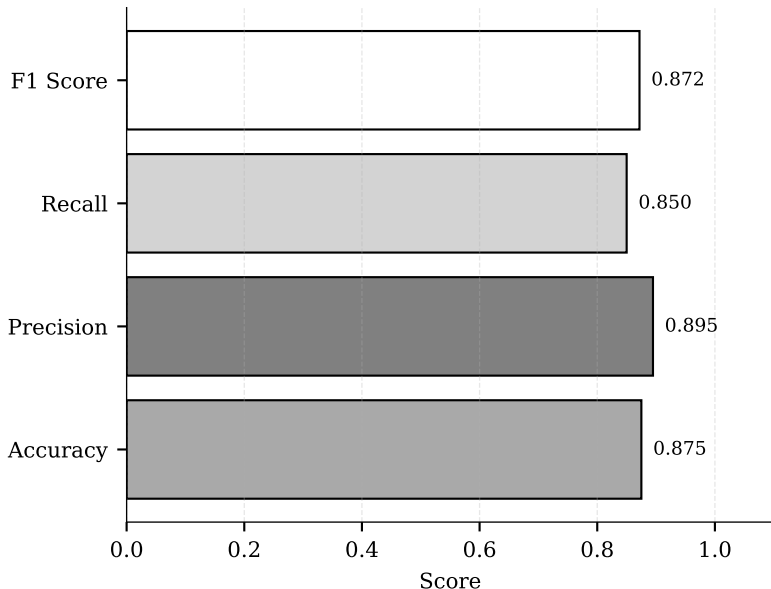
## Confusion Matrix



## Performance Metrics

Metric	Formula	Value
Accuracy	$(TP+TN)/Total$	0.875
Precision	$TP/(TP+FP)$	0.895
Recall (Sensitivity)	$TP/(TP+FN)$	0.850
Specificity	$TN/(TN+FP)$	0.900
F1 Score	$2 \times (P \times R) / (P+R)$	0.872

## Metrics Comparison



## Interpretation Guide

### Key Concepts:

True Positive (TP): Correctly predicted positive  
True Negative (TN): Correctly predicted negative  
False Positive (FP): Incorrectly predicted positive (Type I Error)  
False Negative (FN): Incorrectly predicted negative (Type II Error)

### Trade-offs:

- High Precision: Few false alarms (minimize FP)
- High Recall: Catch all positives (minimize FN)
- F1 Score: Balance between Precision and Recall

### Example: Fraud Detection

- High Recall: Don't miss fraudulent transactions
- High Precision: Don't flag legitimate transactions