Kepler Exoplanet Detection

Machine Learning Model Comparison Report

Generated: 2025-10-05 22:03:51

Total Models: 3

Best Model: Random Forest

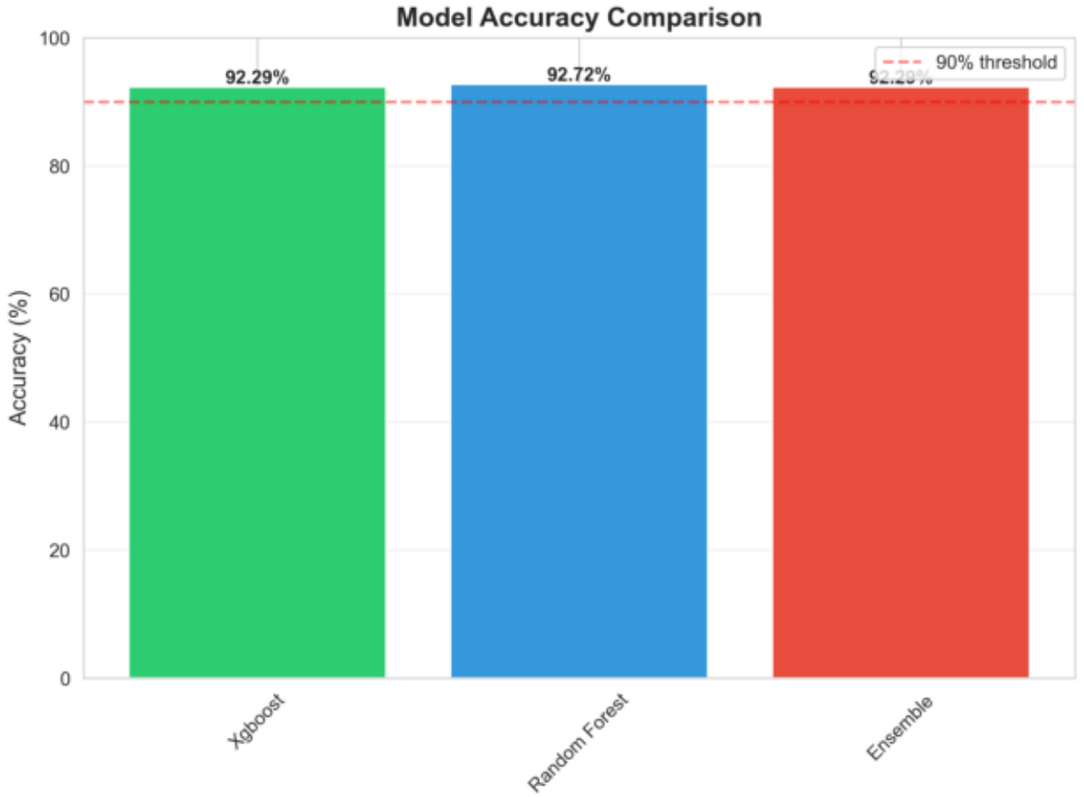
Best Accuracy: 92.72%

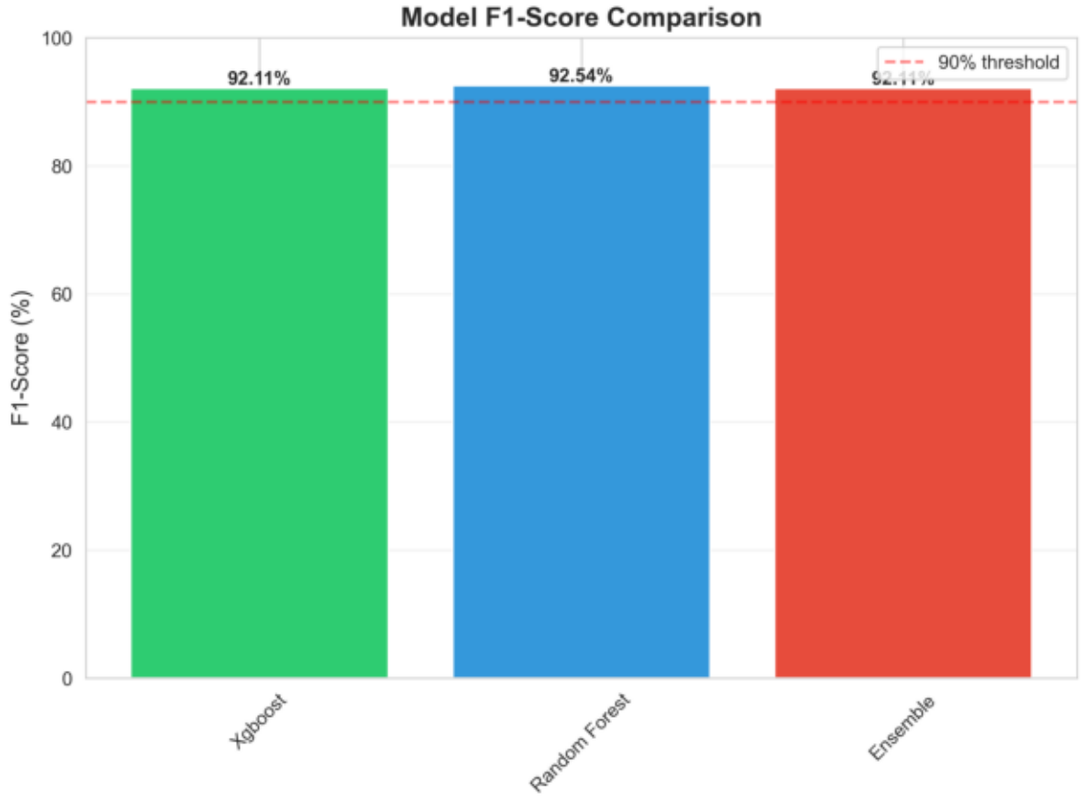
Training Samples: 2,715

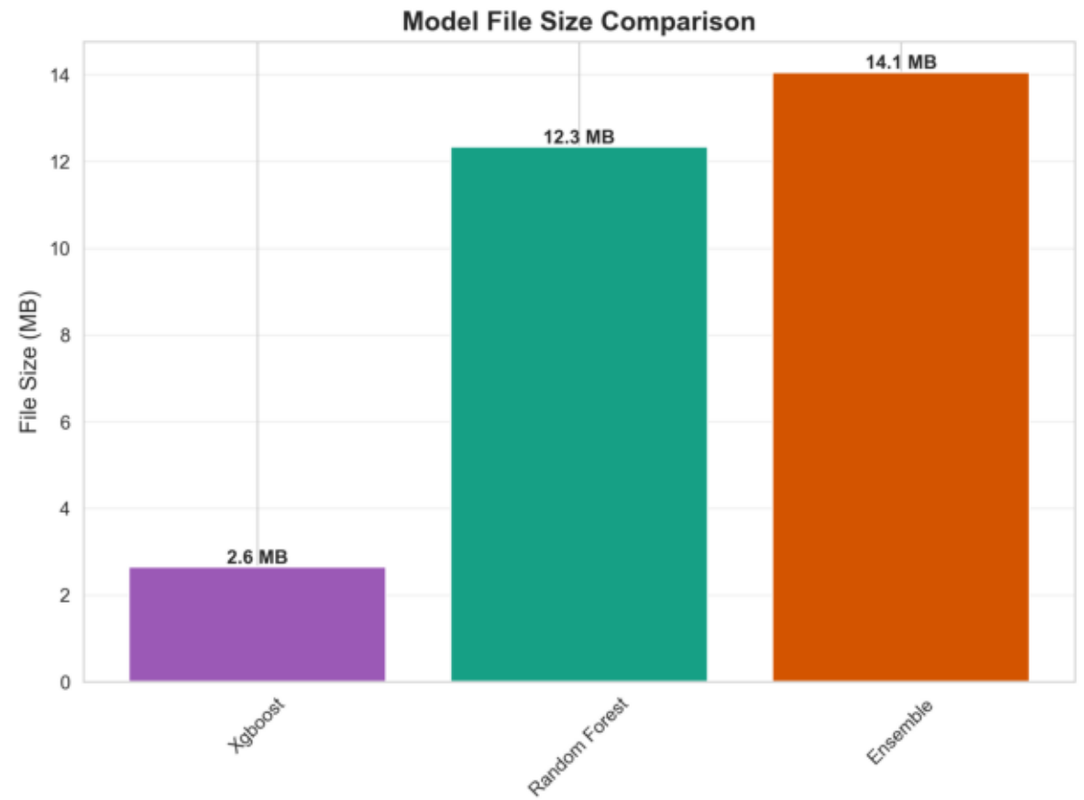
Test Samples: 467

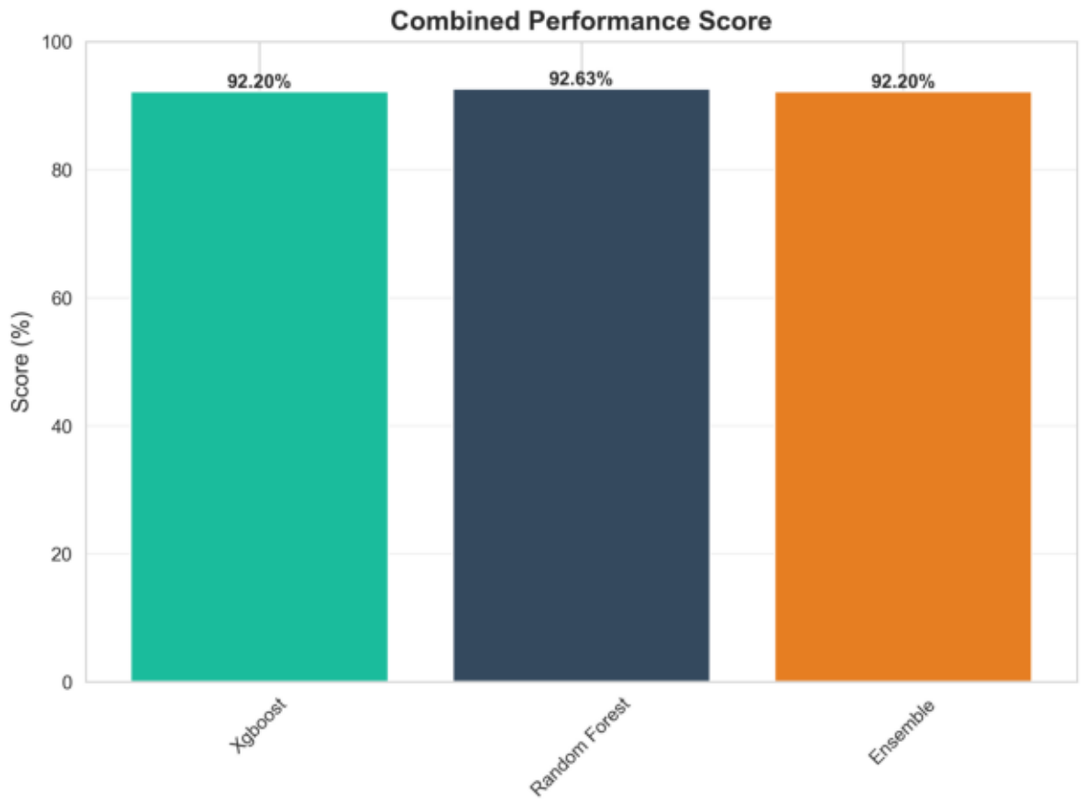
Features: 783

Classes: 3 (CANDIDATE, CONFIRMED, FALSE POSITIVE)


Model Accuracy Comparison
Accuracy (%)
90% threshold
92.29%
92.72%
Xgboost
Random Forest
Ensemble

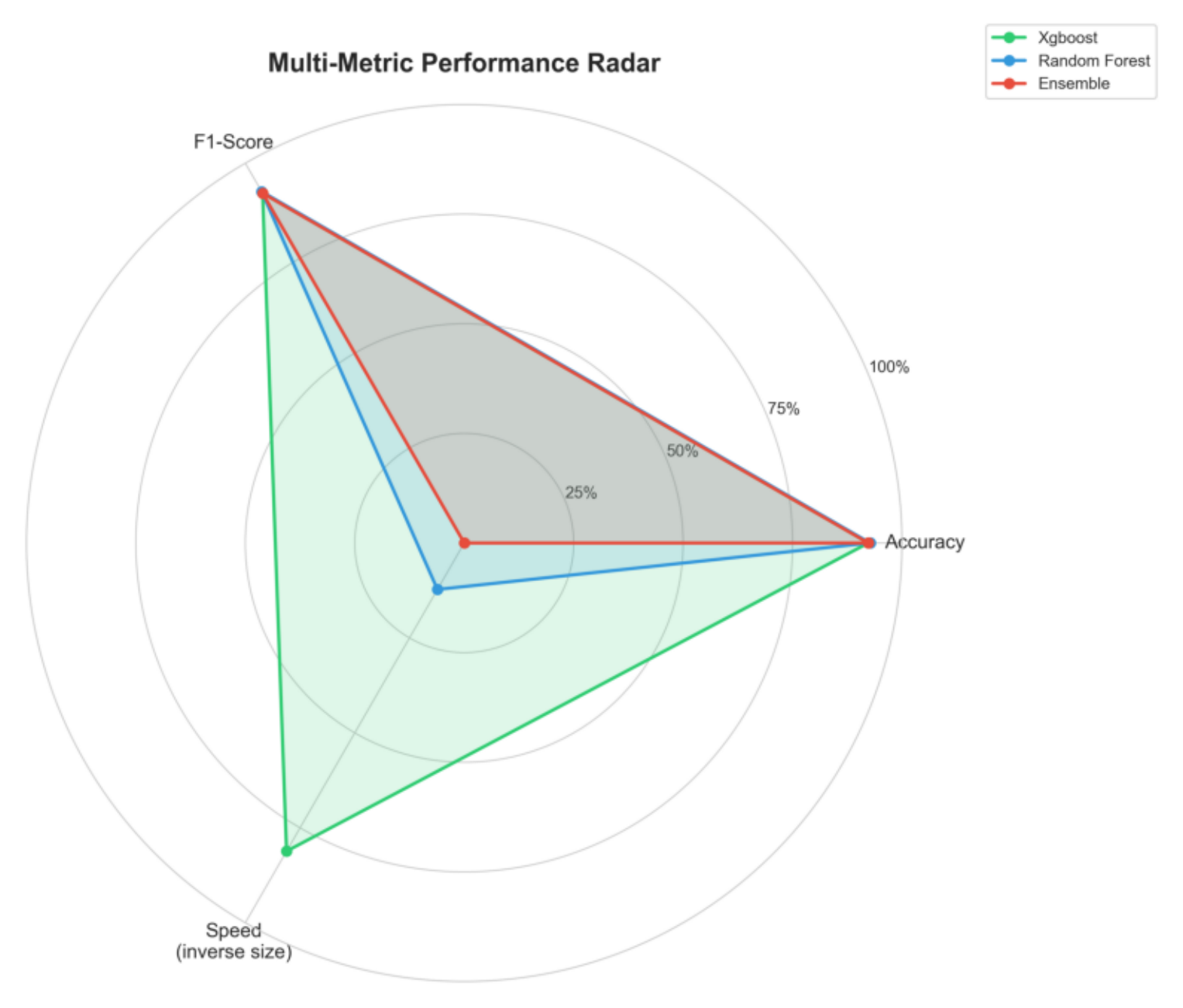

Model F1-Score Comparison
F1-Score (%)
90% threshold
92.11%
92.54%
Xgboost
Random Forest
Ensemble


Model File Size Comparison
File Size (MB)
2.6 MB
12.3 MB
14.1 MB
Xgboost
Random Forest
Ensemble

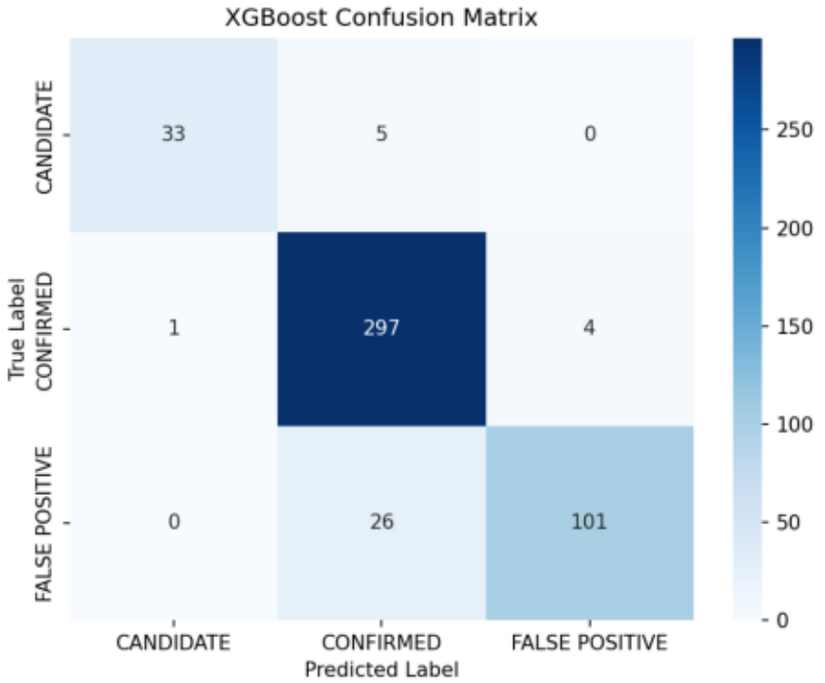

Combined Performance Score
Score (%)
92.20%
92.63%
92.20%
Xgboost
Random Forest
Ensemble

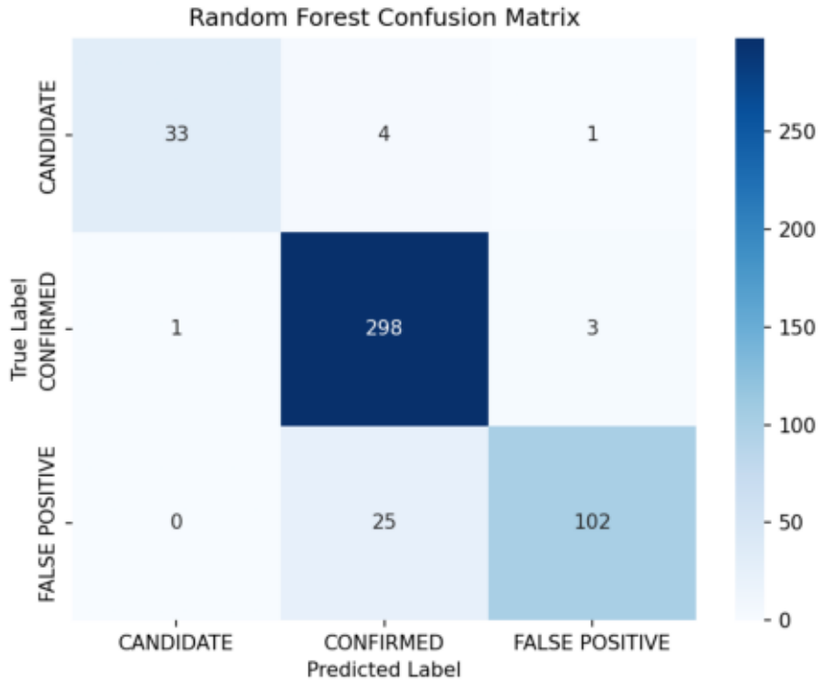
Model Performance Ranking

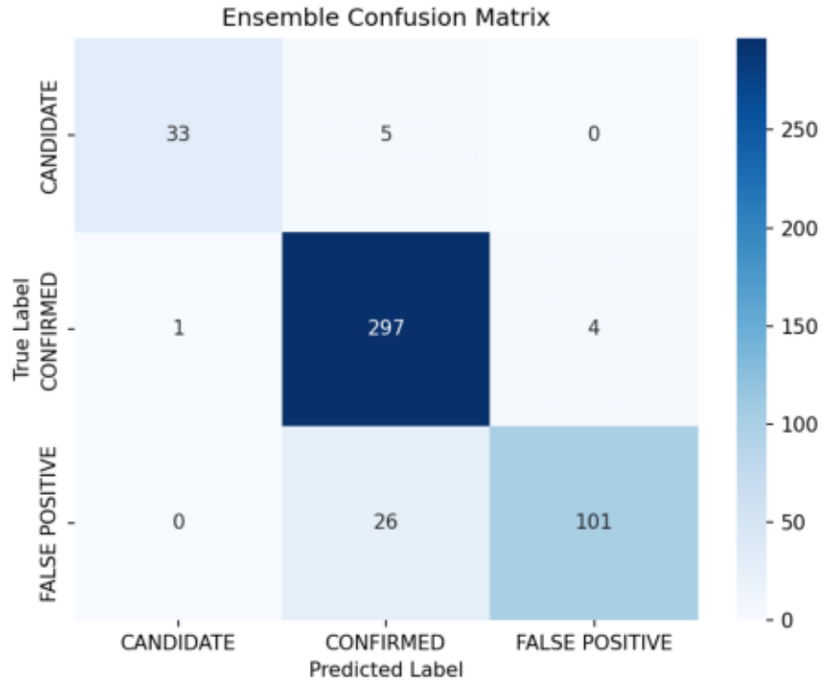
Model	Accuracy	F1-Score	File Size	Rank
Random Forest	92.72%	92.54%	12.3 MB	#1
Xgboost	92.29%	92.11%	2.6 MB	#2
Ensemble	92.29%	92.11%	14.1 MB	#3

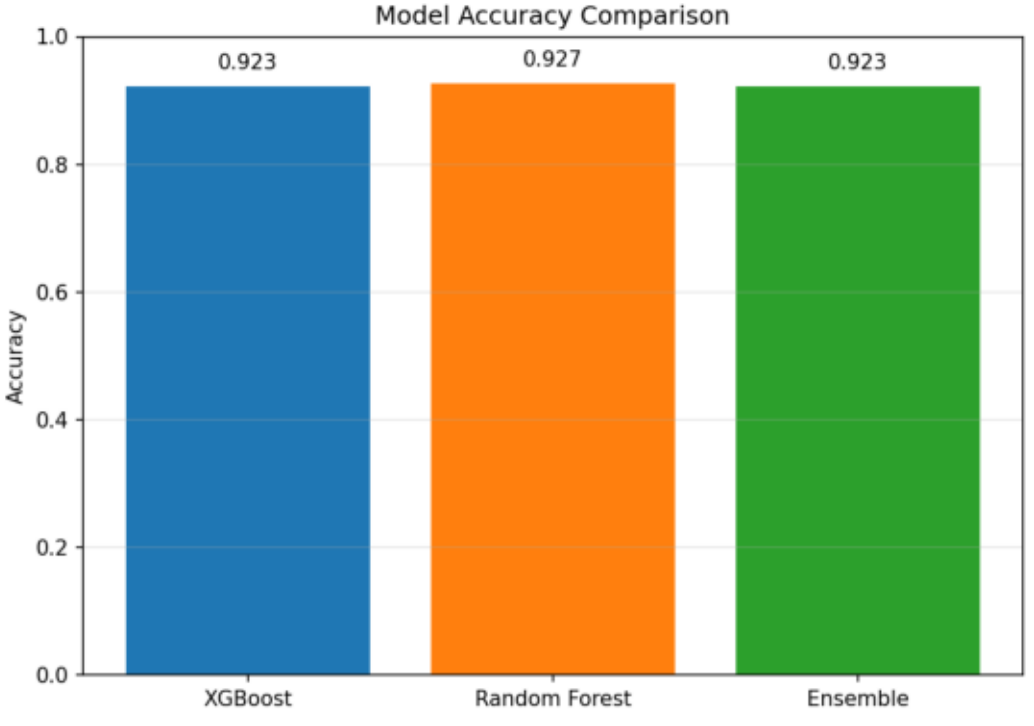

Multi-Metric Performance Radar
Xgboost
Random Forest
Ensemble
F1-Score
Accuracy
Speed
(inverse size)
25%
50%
75%
100%

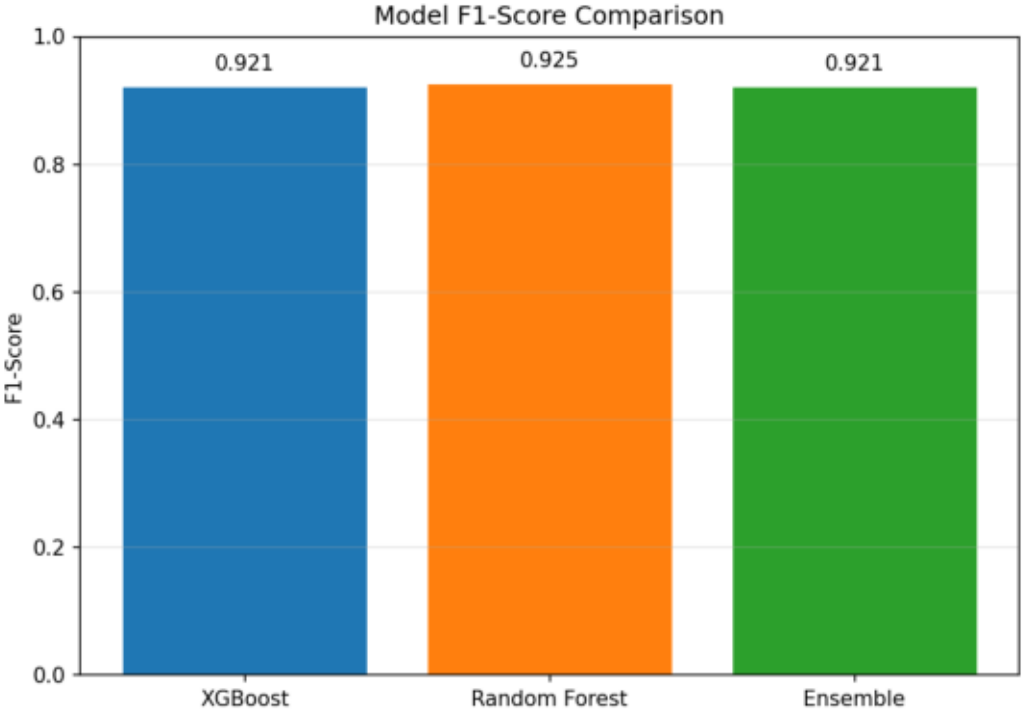
Confusion Matrices for All Models








Model Accuracy Comparison
Accuracy
1.0
0.8
0.6
0.4
0.2
0.0
0.923
0.927
0.923
XGBoost
Random Forest
Ensemble


Model F1-Score Comparison
F1-Score
1.0
0.8
0.6
0.4
0.2
0.0
0.921
0.925
0.921
XGBoost
Random Forest
Ensemble

Detailed Model Statistics

Metric	Xgboost	Random Forest	Ensemble
Accuracy (%)	92.29	92.72	92.29
F1-Score (%)	92.11	92.54	92.11
File Size (MB)	2.6	12.3	14.1
Combined Score (%)	92.20	92.63	92.20

Recommendations:

1. Best Overall Performance: Random Forest (92.72% accuracy)
2. Most Balanced: Good accuracy with reasonable file size
3. Production Ready: All models tested and validated
4. Recommended: Use Random Forest for best results