Table 1. Summary of ML Models and Methods. Comparison of preprocessing steps, algorithm types, feature selection strategies and interpretability mechanisms across all models.

Models	Preprocessing	Algorithm	Feature Selection	Interpretability
RF	SMOTE balancing, Feature alignment	Ensemble decision trees (bagging)	Gini importance	Gini scores
XGB	SMOTE balancing, Feature alignment	Gradient boosting (binary)	Gain-based importance	Gain-based importance
SVM	SMOTE balancing, Feature alignment	RBF kernel, hyperparameter tuned	Linear SVM coefficients	Coefficient weights
LASSO	SMOTE balancing, Feature alignment	Logistic regression (L1 regularisation)	Non-zero coefficients (LASSO)	Coefficient magnitude
NN	SMOTE balancing, Feature alignment, Z-score normalisation	Feedforward NN (10 nodes)	Garson's algorithm	Garson's algorithm

Table 2. Summary of performance metrics for ML models based on the top 20 selected genes.

Model	Accuracy	ROC/AUC	PR/AUC	Sensitivity	Specificity	Balanced Accuracy
RF	**0.913**	**0.968**	0.895	**0.9403**	0.84	**0.8901**
XGB	**0.913**	**0.968**	**0.923**	**0.9403**	0.84	**0.8901**
SVM	0.9022	0.919	0.832	**0.9403**	0.8	0.8701
LASSO	0.8804	0.949	0.854	0.8806	**0.88**	0.8803
NN	0.8804	0.946	0.863	0.8806	**0.88**	0.8803