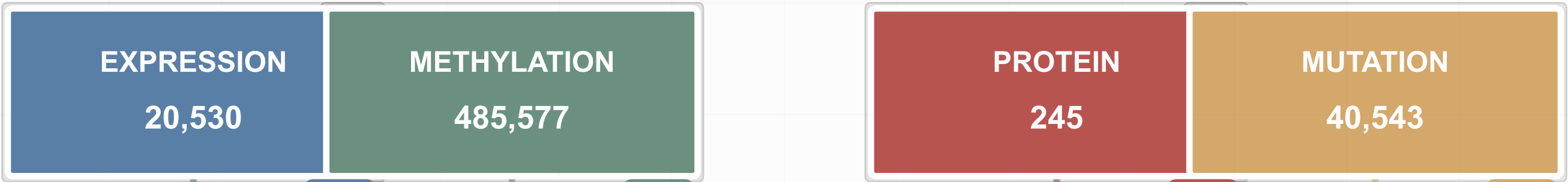


Multi-Modal Feature Reduction Architecture

From Raw Genomic Data to Treatment Response Prediction

Raw Multi-Modal Data



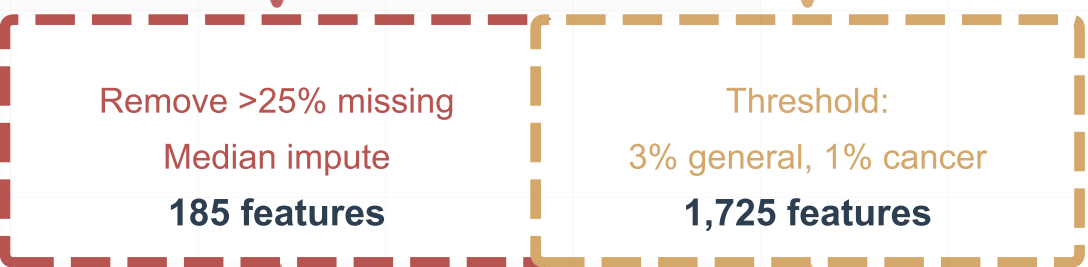
-14%

-92%

-24%

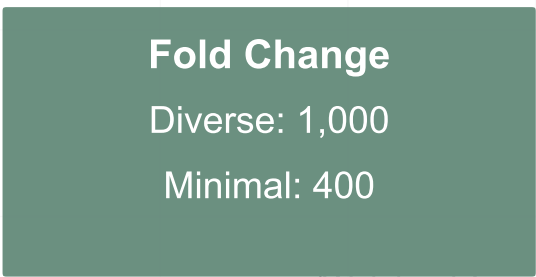
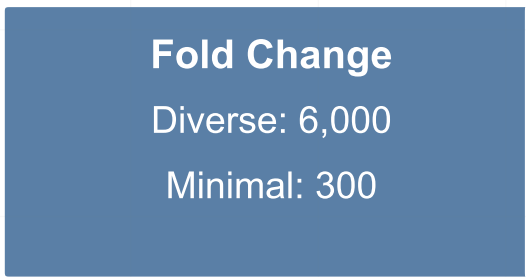
-96%

Preprocessing



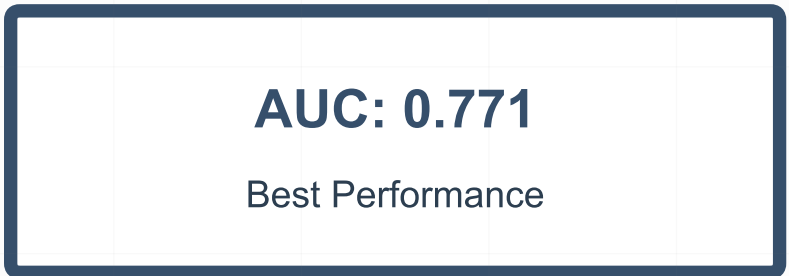
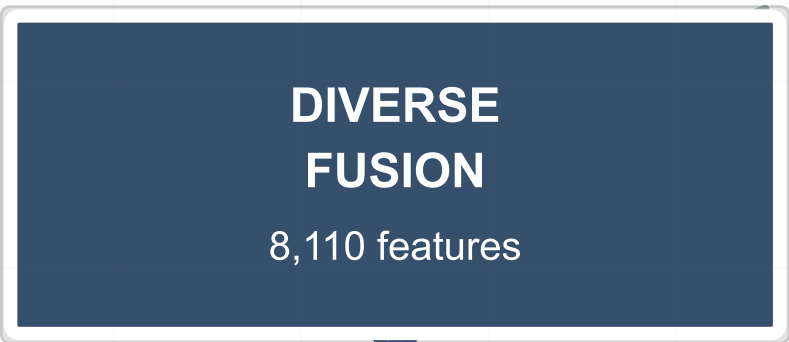
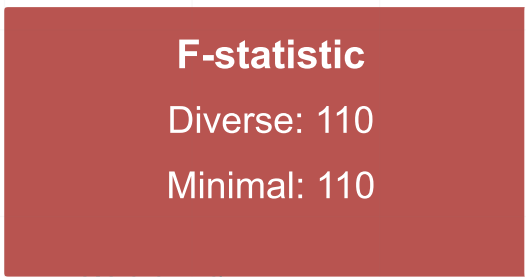
Feature Selection

(XGBoost, Random Forest, Logistic Regression)



Ensemble Fusion Strategies

(Weighted Average, Rank-Based, Performance-Weighted)



Treatment Response Prediction for Bladder Cancer

Figure 1. Multi-modal feature reduction pipeline. Starting from 546,895 raw features across four modalities, our systematic preprocessing and feature selection approach reduces dimensionality to 1,210 (minimal) or 8,110 (diverse) features while preserving predictive signal. Both fusion strategies achieve superior performance.