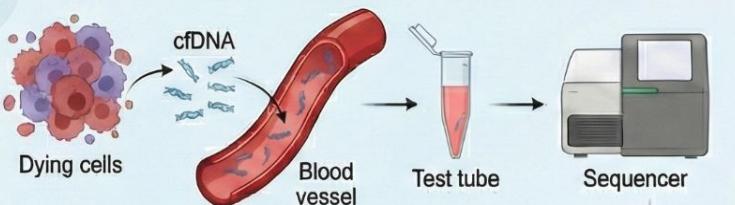


Reproducing LIONHEART: A Novel cfDNA-Based Cancer Detection Method

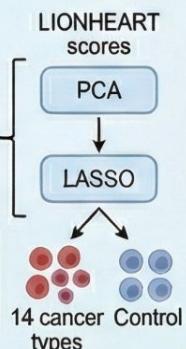
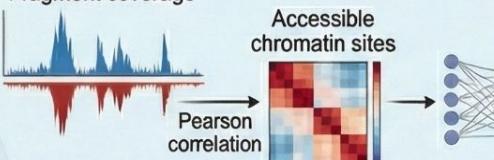
Method



Dying cells release cell-free DNA fragments into the bloodstream. The fragments are extracted from the plasma and whole genome sequenced.

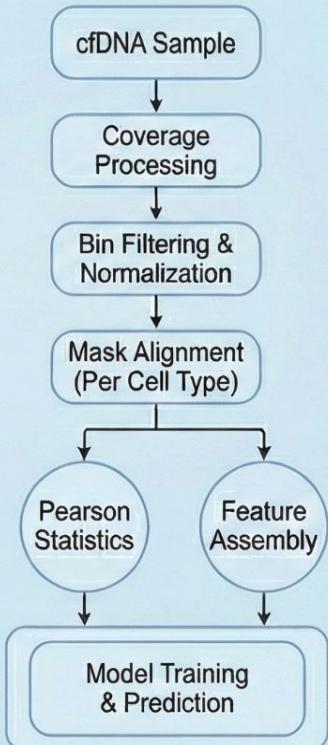
The fragment coverage is counted in 10bp bins and correlated to the accessible chromatin locations of 896 cell types.

Fragment coverage

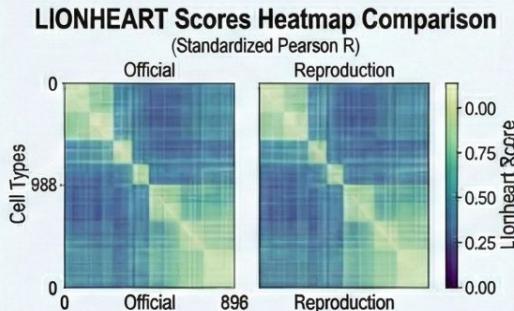


The correlation coefficients are PCA-transformed and fed to a LASSO logistic regression model that classifies samples as either 10 cancer or control.

Reproduction Pipeline



Results Comparison



Validation AUC

89.76

● Reproduce Model

P(Cancer) on Test

90.12

● Reproduce Model

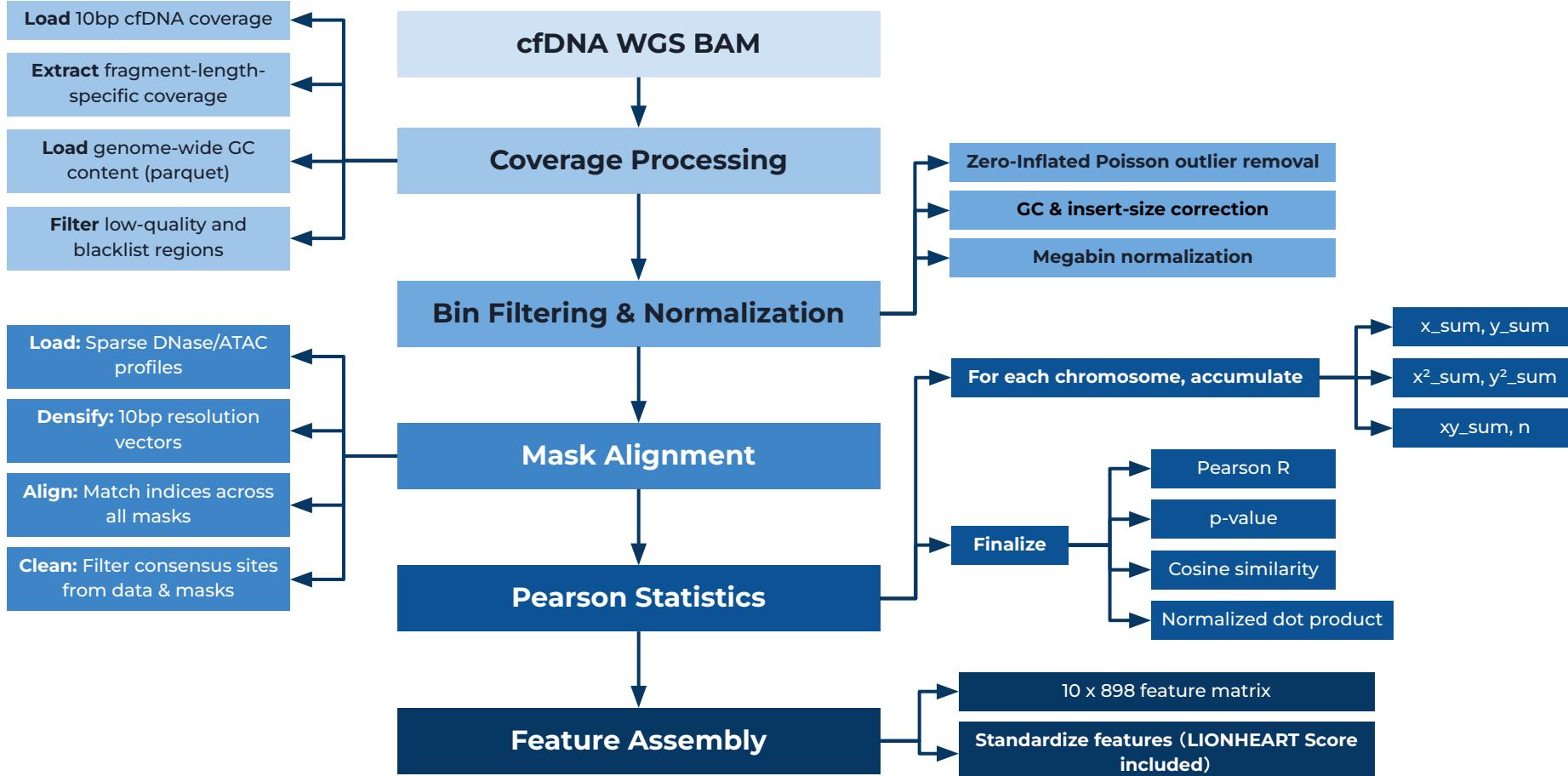
91.70

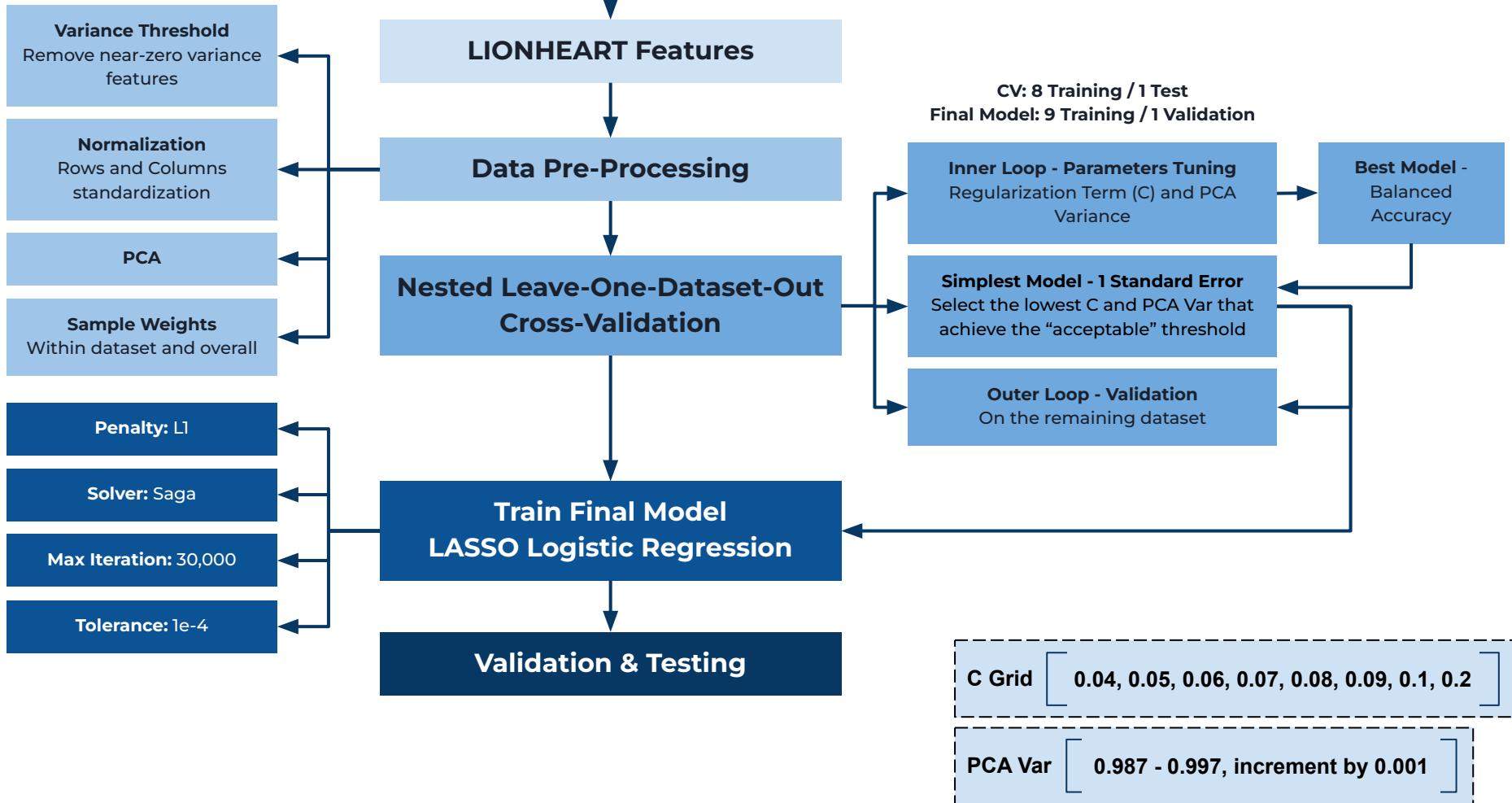
● Reference Model

94.39

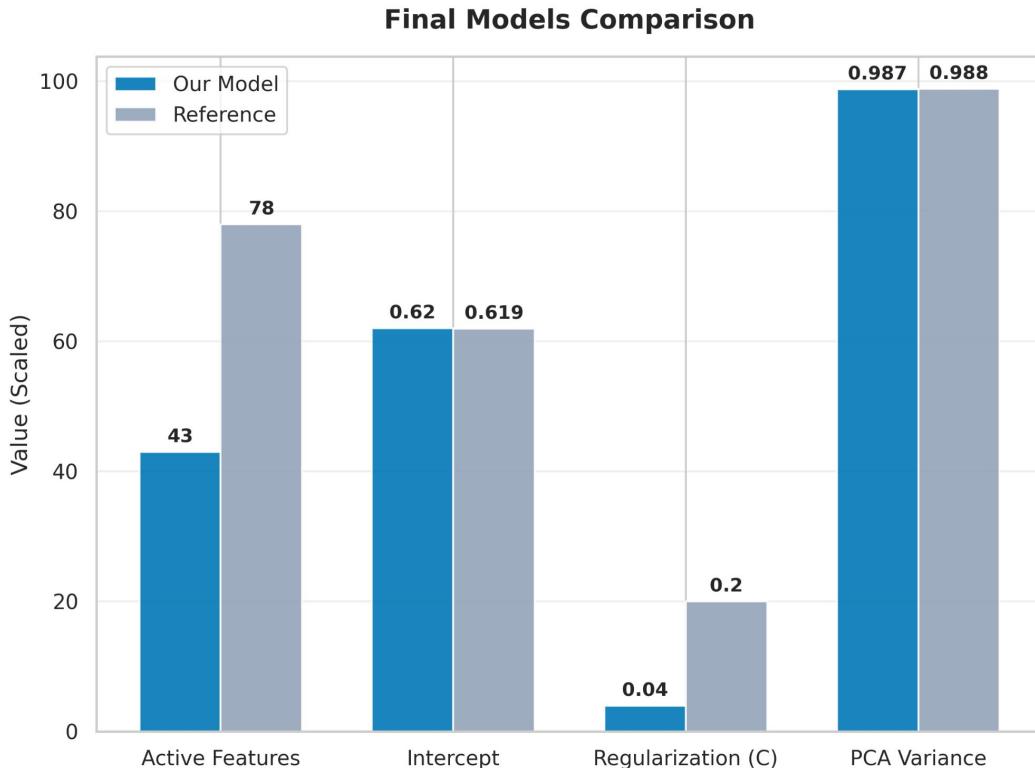
● Reference Model

REPRODUCTION PIPELINE





MODELING RESULTS



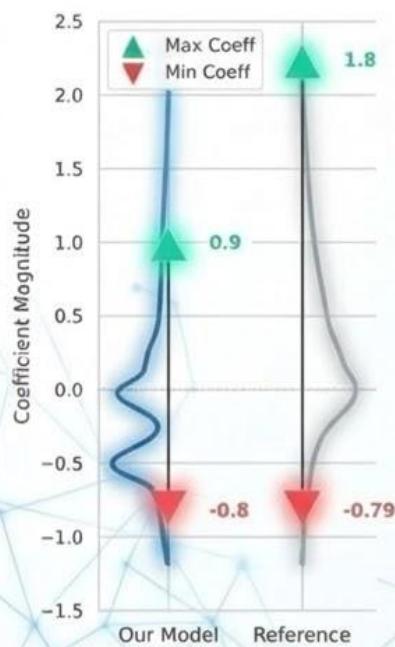
Stronger penalty → Much more conservative model

45% fewer features to achieve a comparable AUC

Identified the “core” biological signals

MODELING RESULTS

Final Model Coefficients



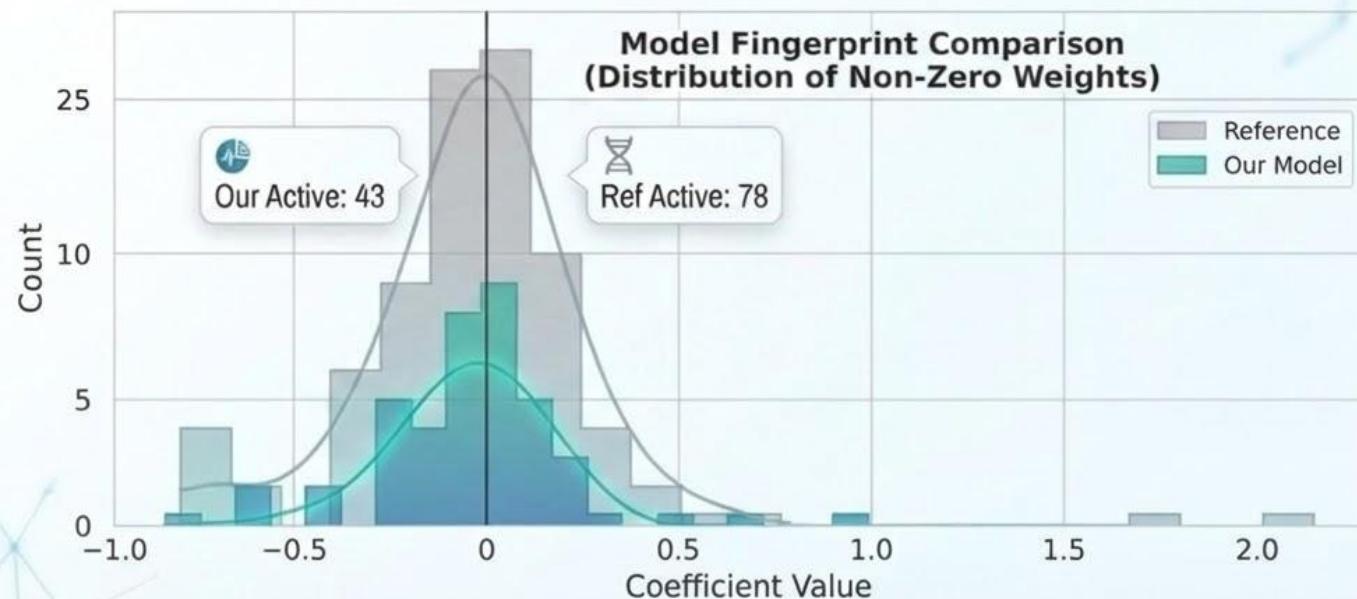
Validation AUC



P(Cancer) on Test

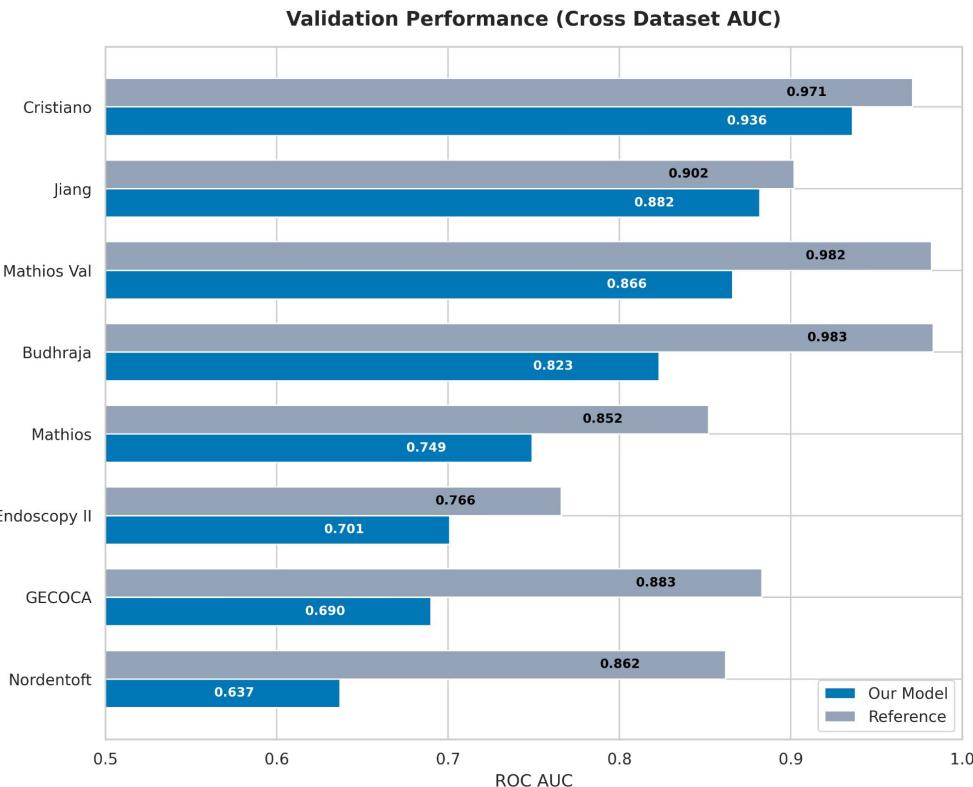


Model Fingerprint Comparison (Distribution of Non-Zero Weights)



MODELING RESULTS

Cross Validation Performance



Reference Stats

0.90

Weighted Mean

0.983

Max (Budhraja)

0.766

Min (Endoscopy)

Reproduced Stats

0.802

Weighted Mean

0.936

Max (Cristiano)

0.637

Min (Nordentoft)