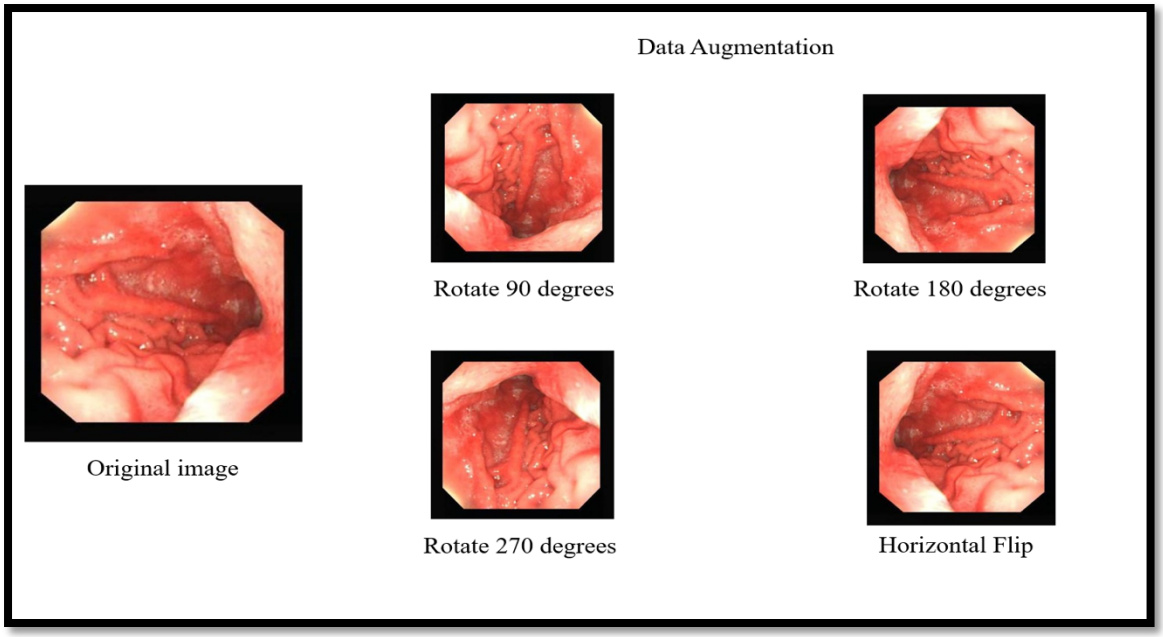
Supplementary Figure 1

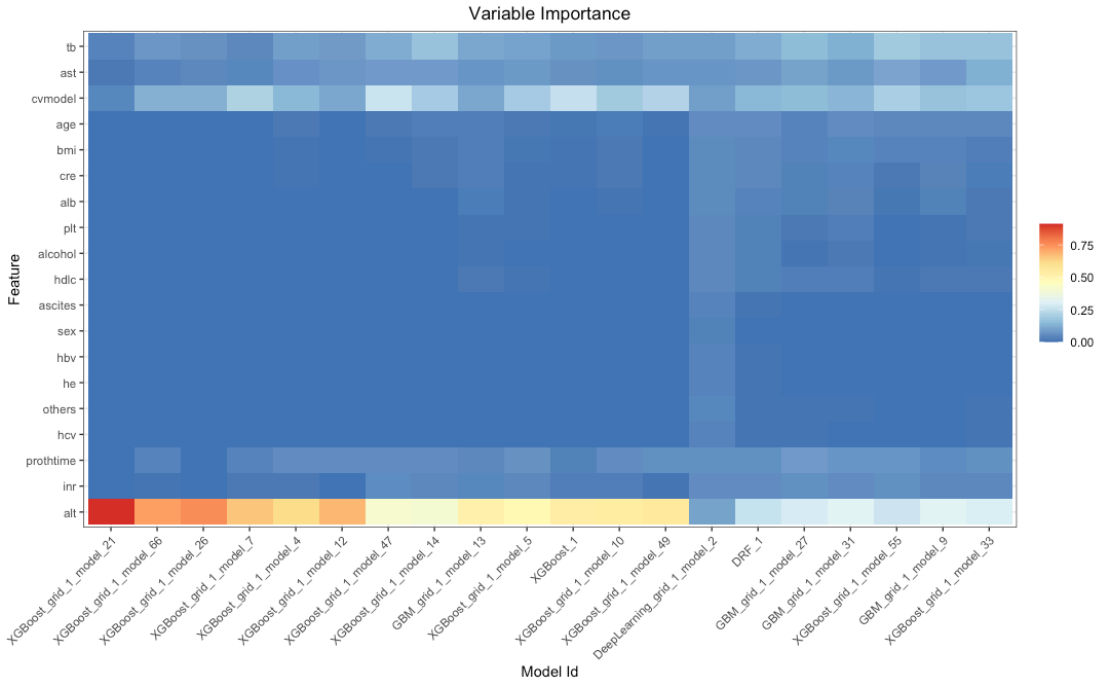
Image augmentation in the target training of deep learning models



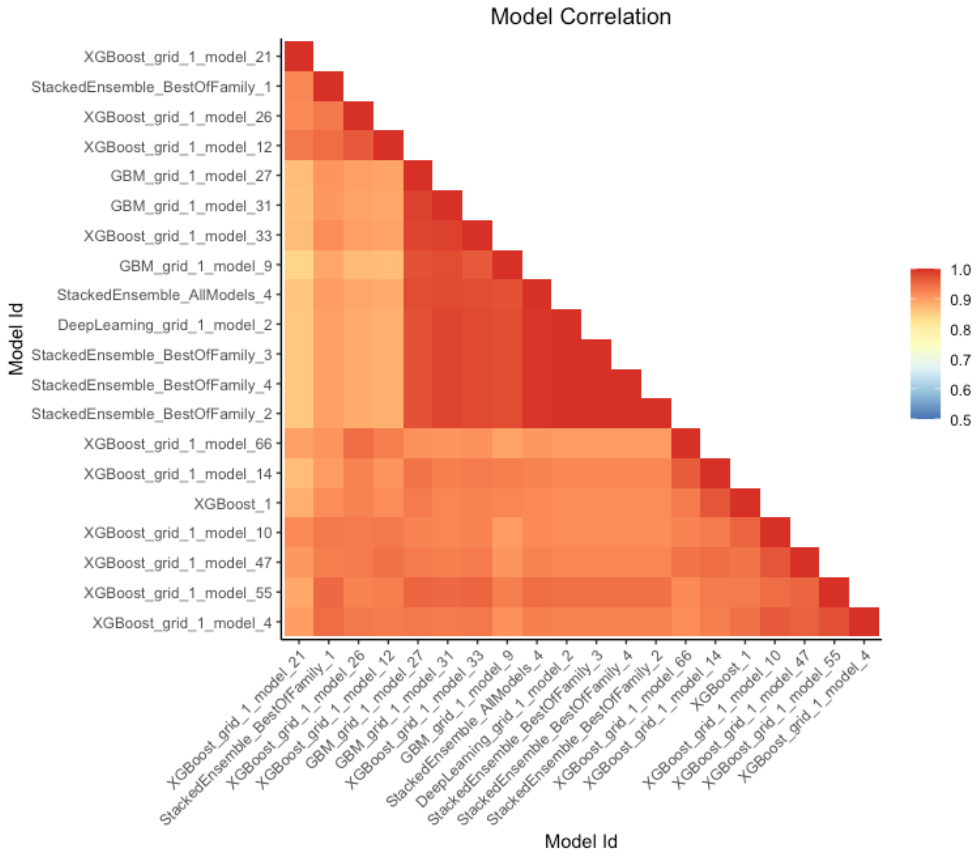
Considering the specialized nature of medical data, we used non-rigid variations for the endoscopic images. Rotational transformation and flip transformation were applied to augmented the data.

Supplementary Figure 2

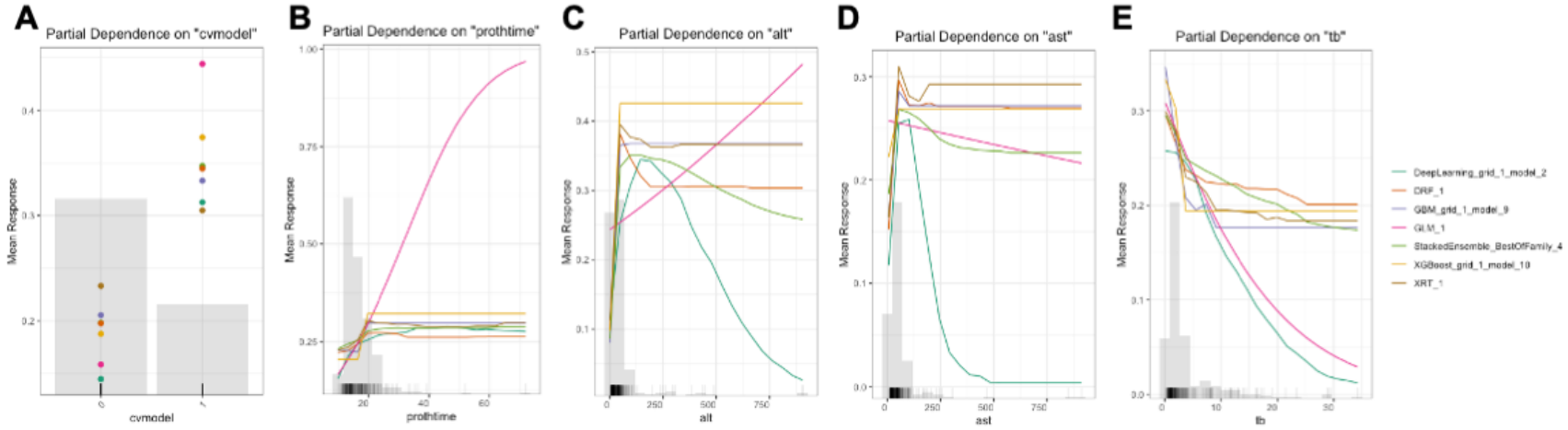
Heatmaps of all variables in various AutoML models



Supplementary Figure 3 AutoML models' correlation



Supplementary Figure 4 partial dependence plots of important variables in AutoML models



Partial dependence plots of variables in AutoML models: A: EfficientNet model, B: prothrombin time, C: alanine aminotransferase (ALT), D: aspartate aminotransferase (AST), and E: total bilirubin

Supplementary content 1 AutoML models summary

1 The Stacking model

H2OBinomialModel: stackedensemble

Model Key:

StackedEnsemble_BestOfFamily_4_AutoML_1_20220313_114512

Number of Base Models: 6

Base Models (count by algorithm type):

deeplearning	drf	gbm	glm	xgboost
1	2	1	1	1

Metalearner:

Metalearner algorithm: glm

Metalearner cross-validation fold assignment:

Fold assignment scheme: AUTO

Number of folds: 5

Fold column: NULL

Metalearner hyperparameters:

H2OBinomialMetrics: stackedensemble

** Reported on training data. **

MSE: 0.0007864432

RMSE: 0.0280436

LogLoss: 0.009931325

Mean Per-Class Error: 0

AUC: 1

AUCPR: 1

Gini: 1

2 The Random Forest model

H2OBinomialModel: drf

Model Key: DRF_1_AutoML_1_20220313_114512

Model Summary:

number_of_trees: 34

number_of_internal_trees: 34

model_size_in_bytes: 12586

min_depth: 6

max_depth: 12

mean_depth: 9.50000

min_leaves: 19

max_leaves:34

mean_leaves: 24.88235

H2OBinomialMetrics: drf

** Reported on training data. **

** Metrics reported on Out-Of-Bag training samples **

MSE: 0.06475549

RMSE: 0.254471

LogLoss: 0.2090637

Mean Per-Class Error: 0.1170732

AUC: 0.9711498

AUCPR: 0.9154434

Gini: 0.9422997

R^2: 0.6587363

3 The Deep Learning model

H2OBinomialModel: deeplearning

Model Key: DeepLearning_grid_1_AutoML_1_20220313_114512_model_2

Status of Neuron Layers: predicting bleed, 2-class classification, bernoulli distribution, CrossEntropy loss, 1,902 weights/biases, 27.6 KB, 517,000 training samples, mini-batch size 1, layers number: 3 (1^{st} layer units 35, dropout 5%, ; 2^{nd} units 50, droupt 20%, activation = relu; 3^{rd} units 3, activation = softmax)

H2OBinomialMetrics: deeplearning

** Reported on training data. **

** Metrics reported on full training frame **

MSE: 5.171595e-05

RMSE: 0.00719138

LogLoss: 0.0008240017

Mean Per-Class Error: 0

AUC: 1

AUCPR: 1

Gini: 1

4 The gradient boosting machine

H2OBinomialModel: gbm

Model Key: GBM_grid_1_AutoML_1_20220313_114512_model_9

Model Summary:

number_of_trees: 60

number_of_internal_trees: 60

model_size_in_bytes: 7,005

min_depth: 2

max_depth: 3

mean_depth: 2.96667

min_leaves: 4

max_leaves: 6

mean_leaves: 4.61667

H2OBinomialMetrics: gbm

** Reported on training data. **

MSE: 0.02681526

RMSE: 0.1637537

LogLoss: 0.1169887

Mean Per-Class Error: 0.03101045

AUC: 0.9984669

AUCPR: 0.9957289

Gini: 0.9969338

R^2: 0.8586826

5 The general linear model

H2OBinomialModel: glm

Model Key: GLM_1_AutoML_1_20220313_114512

GLM Model: summary

Family: binomial

Link: logit

Regularization: Ridge (lambda = 0.01639)

lambda_search

nlambda = 30, lambda.max = 9.4017, lambda.min = 0.01639, lambda.1se = 0.1102

number_of_predictors_total: 27

number_of_active_predictors: 27

number_of_iterations: 42

training_frame: AutoML_1_20220313_114512_training_train_sid_bc36_1

H2OBinomialMetrics: glm

** Reported on training data. **

MSE: 0.1135841

RMSE: 0.3370224

LogLoss: 0.3717507

Mean Per-Class Error: 0.1891986

AUC: 0.8758188

AUCPR: 0.7772275

Gini: 0.7516376

R^2: 0.4014079

Residual Deviance: 204.4629

AIC: 260.4629

6 The eXtreme Boosting model

H2OBinomialModel: xgboost

Model Key: XGBoost_grid_1_AutoML_1_20220313_114512_model_10

Model Summary:

number_of_trees: 37

H2OBinomialMetrics: xgboost

** Reported on training data. **

MSE: 0.07000971

RMSE: 0.2645935

LogLoss: 0.2441295

Mean Per-Class Error: 0.07961672

AUC: 0.9702439

AUCPR: 0.9192149

Gini: 0.9404878

R^2: 0.6310464