ML model for Shared Decision-Making Tool for CRC screening

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Dataset

The PLCO dataset, Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial dataset.

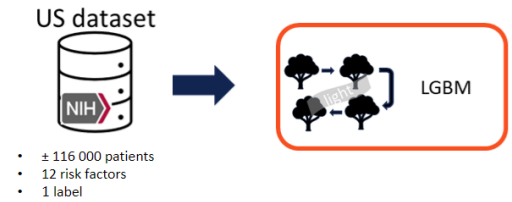
Enrolment period: 1993 - 2001
Data size: ~154,000
Screening period: 1993 - 2009
Data Collection: +500 risk factors. 6 questionnaires

Features

- Sex,
- Age,
- Height,
- Weight,
- BMI,
- Hypertension,
- Heart problems,
- Diabetes,
- Smoke history,
- Smoke quantity and
- Alcohol drink history.

Exception made directly in the family history feature.*

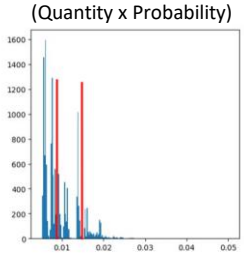
Model



- ± 116 000 patients
- 12 risk factors
- 1 label

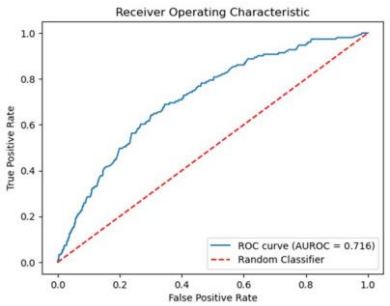
We trained a Light Gradient Boosting Machine (LGBM) Regressor model with PLCO dataset. With ~116000 patient data, between these ~1700 were positive cases.

Model prediction (Test set)
(Quantity x Probability)



Model's Performance

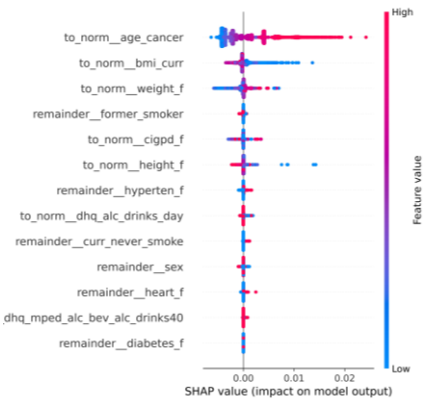
AUROC of the model is 0.716.



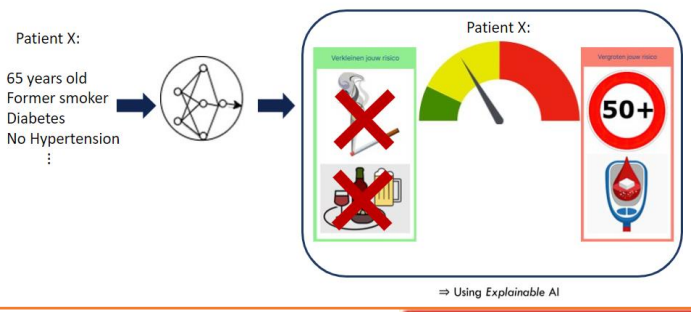
The Receiver Operating Characteristic (ROC) curve is a **graphical representation of the true positive rate (sensitivity) plotted against the false positive rate (1 - specificity)** as the discrimination threshold of the model varies. The area under this ROC curve, the AUROC, is a single scalar value that summarizes the overall performance of the model across various threshold settings.

SHAP

SHAP values quantify the impact of each feature on a specific prediction compared to a baseline prediction. They show how much each feature pushes the prediction up (positive impact) or down (negative impact).



Inference Example



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