

Classifier calibration

The proposed classifier has been calibrated in order to provide a reliable estimation of the probability of bleeding in the considered prediction window. During calibration is fitted a regressor, or calibrator, that maps the output of a classifier to a calibrated probability in a range [0,1]. The calibrator tries to predict the conditional probability where is the output probability of the trained classifier.

Calibration is performed through Platt's scaling (31), where the regressor depends on a logistic function:

$$S(x) = \frac{1}{1+e^{Af+B}}$$

where A and B are the parameters that are estimated using maximum likelihood estimation.

A well calibrated model should be the one that given a set of patients with predicted bleeding probability close to 0.6, approximately 60% should actually belong to the positive class. This can be verified graphically through calibration or reliability curves. On the horizontal axis is mapped the predicted probability of bleeding, whereas on the vertical axis we see the fraction of those patients who actually bleed. A perfectly calibrated model should therefore fit the diagonal line of the graph.

It was plotted these curves for the developed models and the histograms that show the counts of records that have the same probability outcome (see Figures 8, which contains the calibration curves and histograms for all classifiers). The continuous lines compare the

classifiers when the trained model is tested either in MIMIC-III or eICU-CRD testing subset. It also is verified that the model is better calibrated when the testing set comes from the same database of the training subset. However, reliability increases when the model is trained on the training set that contains information of both datasets (see Figure 8, which shows the calibration curves).

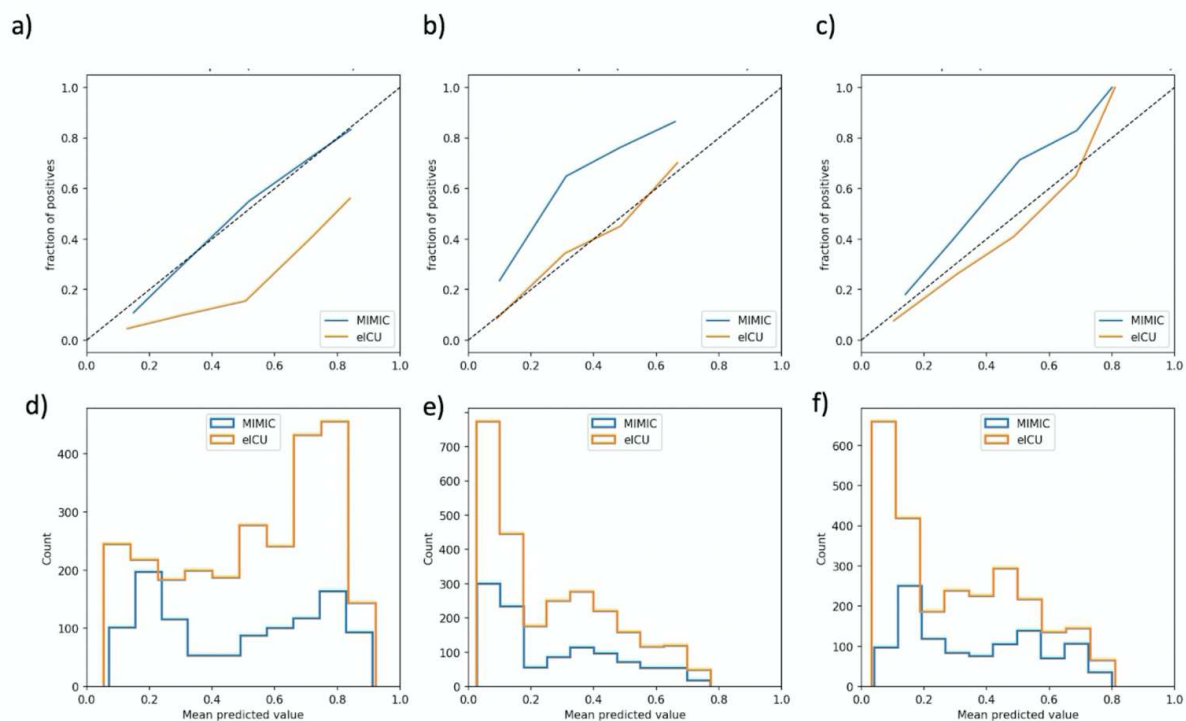


Figure 8 - Calibration curves for the models trained on a) the MIMIC-III training set, b) the eICU-CRD, and c) on the training set that contains both the MIMIC-III and the eICU-CRD and the relative histograms.