An Ensemble Deep Learning Architecture for Imbalanced Classification of Thoracic Surgery Patients

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Abstract : Selecting appropriate patients for surgery is one of the main issues in thoracic surgery (TS). Both short-term and long-term risks and benefits of surgery must be considered in the patient selection criteria. There are some limitations in the existing datasets of TS patients because of missing values of attributes and imbalanced distribution of survival classes. In this study, a novel ensemble architecture of deep learning networks is proposed based on stacking different linear and non-linear layers to deal with imbalance datasets. The categorical and numerical features are split using different layers with ability to shrink the unnecessary features. Then, after extracting the insight from the raw features, a novel biased-kernel layer is applied to reinforce the gradient of the minority class and cause the network to be trained better comparing the current methods. Finally, the performance and advantages of our proposed model over the existing models are examined for predicting patient survival after thoracic surgery using a real-life clinical data for lung cancer patients.