

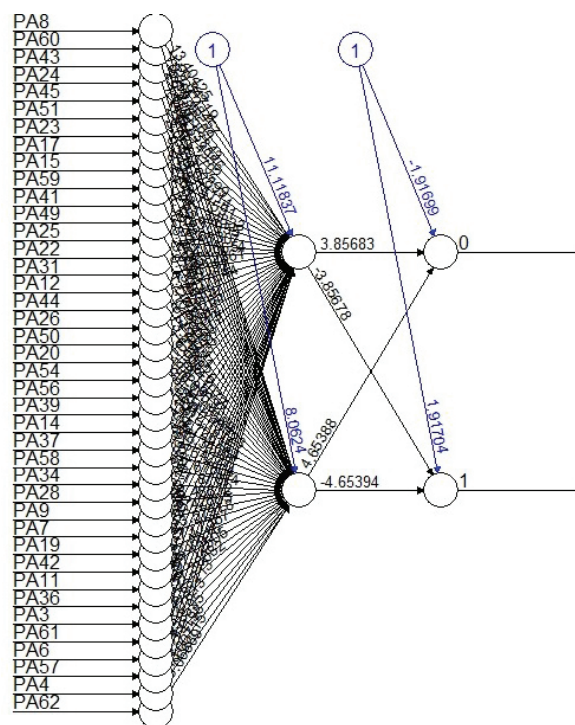
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Predicting Postoperative Delirium Risk for Intracranial Surgery: A Statistical Machine Learning Approach

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Delirium has a high morbidity rate and is common; around 10% of older, hospitalized patients have delirium, and fifteen to fifty percent of patients experience delirium during hospitalization. This puts delirium at the forefront of problems for which doctors and nurses look. Most journal articles about delirium focus on postoperative delirium (POD) in the Intensive Care Unit (ICU); however, none are specific to post-intracranial surgery. In this way, this research is distinct from others in this area. The purposes of this research project are to employ machine learning methods, which accurately predict whether a post-intracranial surgery patient will be diagnosed with POD in the ICU and identify the key predictors of POD. If POD could be predicted, many patients would experience a shorter hospital stay, less marginal complications, and a greater life expectancy. With our model, the onset of POD could ultimately be stopped.

We first conducted dimensional reduction on our dataset by employing factor analysis and elastic net classification to prevent overfitting of the model. After, we trained a neural networking model to predict POD. This model was 85% accurate, and we



This image illustrates how our neural networking model functions to predict POD.

found the key predictors of POD are whether the patient had delirium when they were admitted into the ICU, the type of lesion they had (if any), and if their blood was carrying enough oxygen. This was supported by chi-square analysis, which proved that the predictors are statistically significant.