

Predict Risk of Liver Complications

This project focuses on predicting liver complications using an Artificial Neural Network (ANN) and patient data from *Cirrhosis.csv*. The dataset includes features like cholesterol, bilirubin, sex, and ascites, with the target variable categorizing patients into stable, progressive, or critical statuses. Key steps in the workflow include:

Data Cleaning: Missing values in cholesterol, triglycerides, copper, and platelets columns were replaced with median values to maintain consistency.

Data Visualization: Cholesterol distributions and scatter plots (e.g., cholesterol vs bilirubin) were used to analyze trends in patient statuses. The boxplot shows cholesterol outliers and range, while the histogram illustrates its frequency distribution and density.

ANN Implementation: A feed-forward neural network with backpropagation was developed, achieving an accuracy of approximately 53.8%. The ANN was configured with a 2-layer architecture ([2,4]), utilizing activation functions (*np.tanh* and *ReLU*), a learning rate ($\eta = 2e-3$), and trained for $1e5$ epochs.

Applications: The predictive model supports clinicians in early detection of high-risk patients and optimizing healthcare management through personalized medicine.

Conclusion: Cholesterol, combined with other features, proved to be a significant predictor, although the model's accuracy highlights room for improvement.