

The Industrial Problem

Using mathematical tools to investigate problem in medicine, specifically those that can be tackled using large disease registries, such as the Hungarian Myocardial Infarction Registry (HUMIR).

Óbuda University, Physiological Controls Research Center (PhysCon)



PhysCon works on the interdisciplinary field of biomedical engineering on the physiological modeling, simulation and control domain, efficiently supporting the progress of medical science with knowledge of engineering sciences.

Gottsegen Gyorgy Hungarian Institute of Cardiology

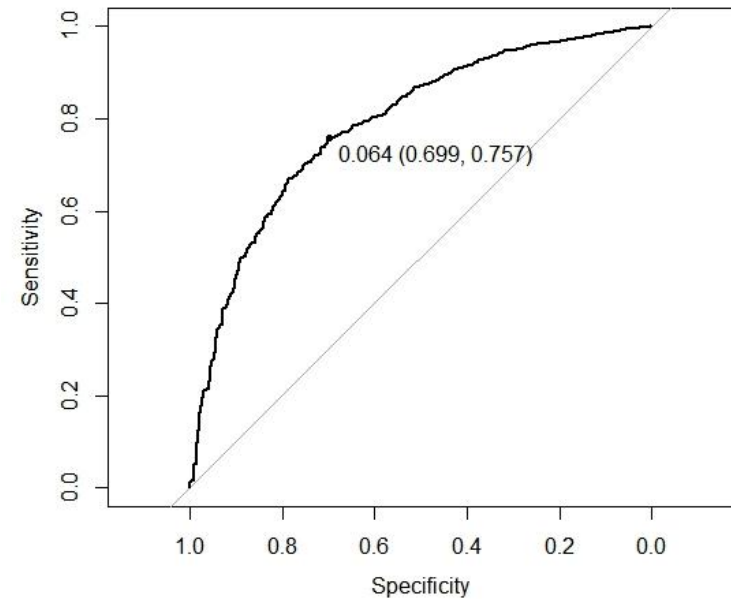
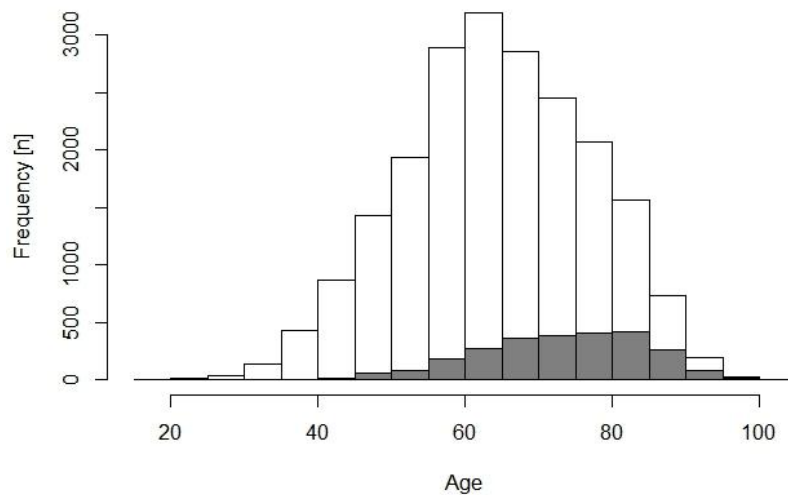


The Gottsegen Hungarian Institute of Cardiology is committed to providing excellence in multidisciplinary, comprehensive, and innovative cardiovascular care.

SZÉCHENYI 2020

Challenges & Goals

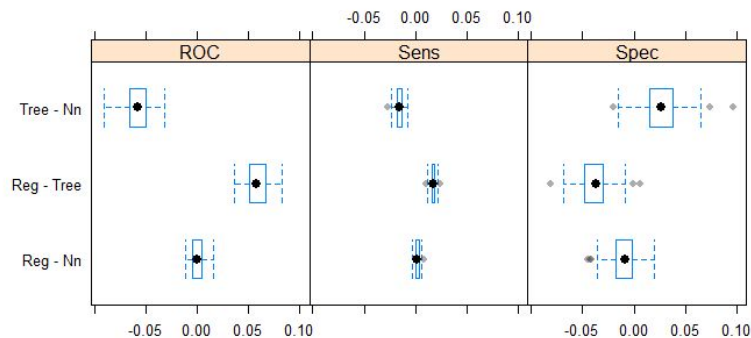
- To compare traditional statistical tools with machine learning
- In predicting survival after infarction
- To select the best approach
- To maximize performance
- To compare the philosophically different approaches



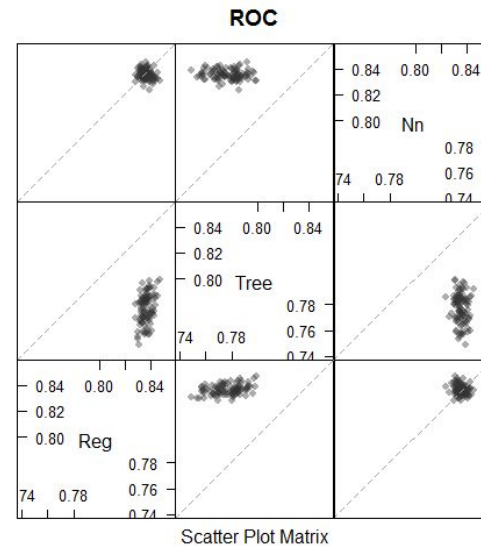
Distribution of ages and performance of a classifier

Mathematical and computational methods and techniques applied

- Three methods were compared in predicting 30-day and 1-year mortality after suffering acute myocardial infarction (heart attack)
- The large, nationwide database of the Hungarian Myocardial Infarction Registry (HUMIR) was used, with more than 47,000 patients included
- Logistic regression on the one hand, and decision trees and neural networks on the other were used



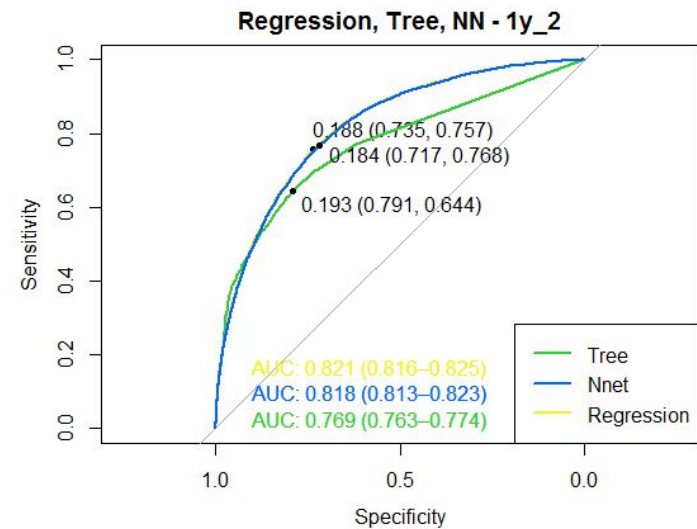
Difference between methods



Scatterplot of performance metrics

Results & Benefits to the company

- Results
- Machine learning methods **couldn't outperform** logistic regression
- Neural network was on par with regression
- They both outperformed decision trees
- Benefits
- Results that can **guide researchers** in optimal selection of prediction tools
- General **knowledge** on how traditional tools compare to machine learning solution



Detailed performance comparison

Information is obtained on how to statistically predict survival after infarction to achieve the best performance.