Abstract

Developing New Hybrid Machine Learning Ensembles to Improve Software Reliability for Quality Diagnosis

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The work presents precise computational machine learning methods to improve the quality of the state of the art diagnosis of chronic diseases like Parkinson’s disease, Coronary artery disease, Diabetes, Cancer etc. The aim is to prevent delay as well as misdiagnosis of patients using proposed robust inference system. Accurate detection of disease at early stage is a herculean task in the medical research. The research work addresses the drawbacks inherited in existing medical decision support systems. The proposed system consists of multiple classifier system for training purpose and final decision is given by Bayes voting classifier. The crux of the work is to calibrate the parameters involved in the machine learning ensembles for fine tuning them.

The hybrid machine learning methods include sparse multinomial logistic regression, rotation forest ensemble with support vector machines, bagging, artificial neural networks, CHAID decision tree, boosting etc. To overcome the drawbacks of existing statistical feature selection methods, some feature selection methods based on machine learning algorithms are proposed. The machine learning ensembles are optimized using design of experiment. Experiments are performed with confidence level of 95% and 99% along with corrected t-test (two tailed).
The performance of proposed model is compared against the existing methods and addresses the main research findings. The proposed inference system predicts the patient's health condition with software reliability and accuracy greater than 98%. The developed hybrid machine learning algorithms have performed better than the state of the art algorithms and performance comparisons are based on specificity, sensitivity, accuracy and other metrics.

The experiments are conducted using hybrid machine learning models choosing steep parameters for distinguishing affected patients against healthy individuals based on invasive and non invasive symptoms. It paves a new path for the telemonitoring of diseased patients based on non-invasive measurable features and can be extended over other diseases as a future work. This work shows a high degree of software reliability of medical inference system. The study aims at improving the quality of disease treatment by tracking them and reinforces the viability of cost effective, regular and precise telemonitoring applications.