LITERATURE SURVEY

Early detection of Chronic Kidney Disease using Machine Learning

1. Prediction of chronic kidney disease using different classification algorithms.

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Informatics in Medicine Unlocked 24 (2021) 100631.

In this study, different classifiers were applied for the classification of a CKD dataset. The algorithms were applied using random tree, decision table (DT), K-nearest neighbor (K-NN), J48, stochastic gradient descent (SGD) and Naïve Bayes classifiers, and a prediction model was proposed based on feature selection to efficiently predict CKD cases. Results showed that the J48 and decision table classifiers outperformed the other classifiers with accuracies of 99%, ROCs equal to 0.999 and 0.992, MAEs of 0.0225 and 0.1815, and RMSEs of 0.0807 and 0.2507, respectively. A sensitivity analysis of selected classifiers was implemented to evaluate the performance of these classifiers with changes in their parameters. Additionally, the results showed an enhanced classification performance for K-NN (K = 1).Naïve Bayes and decision table classification were enhanced to 99.75%, 98.25% and 99.25%, respectively.

2. Analysis of the performance of feature optimization techniques for thediagnosis of machine learning-based chronic kidney disease.

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Machine Learning with Applications 9 (2022) 100330

In this paper,research analysis of several feature optimization approaches along with a max voting ensemble model to establish a highly accurate CKD diagnosis system by using an appropriate feature set. The ensemble model of this research is structured with five existing classifiers.Three types of feature optimization namely feature importance, feature reduction, and feature selection where for each approach two most proficient techniques are analyzed with the mentioned ensemble model. Based on all analysis the research gets a feature optimization technique called Linear discriminant analysis belonging to the feature selection approach provides the most outstanding result of 99.5% accuracy by using 10-fold cross-validation.

3. Neural network and support vector machine for the prediction of chronic

kidney disease: A comparative study.

Njoud Abdullah Almansour, Hajra Fahim Syed, Nuha Radwan Khayat, Rawan Kanaan Altheeb,Renad Emad Juri, Jamal Alhiyafi, Saleh Alrashed, Sunday O. Olatunji.

Computers in Biology and Medicine 109 (2019) 101–111

In this paper, A dataset of 400 patients and 24 attributes related to diagnosis of chronic kidney disease was used.The classification techniques used in this study include Artificial

Neural Network (ANN) and Support Vector Machine (SVM). To perform experiments, all missing values in the dataset were replaced by the mean of the corresponding attributes. Then, the optimized parameters for the Artificial Neural Network (ANN) and Support Vector Machine (SVM) techniques were determined by tuning the parameters and performing several experiments. The empirical results from the experiments indicated that ANN performed better than SVM, with accuracies of 99.75% and 97.75%, respectively, indicating that the outcome of this study is very promising.

4. Explainable prediction of chronic renal disease in the colombian population using neural networks and case-based reasoning.

Vásquez-Morales, Gabriel R., et al.

Ieee Access 7 (2019): 152900-152910.

In this paper, demographic data of two different populations: people diagnosed with CKD and others without CKD is used. A neural network-based classifier is used to predict whether a person is at a risk of developing CKD. The model achieved an accuracy of 95%. A Case-Based Reasoning(CBR) is used as a twin system for the proposed paradigm for the explanation of CKD predictions. The system was also used to test on population, where 7% of the total population in Colombia were identified as being at risk of developing CKD.

5. Detection and diagnosis of chronic kidney disease using deep learning-based heterogeneous modified artificial neural network.

Fuzhe Ma, Tao Sun , Lingyun Liu , Hongyu Jing.

Future Generation Computer Systems 111 (2020) 17–26.

In this paper, Heterogeneous Modified Artifical Neural Network (HMANN) has been proposed for the early detection, segmentation, and diagnosis of chronic renal failure on the Internet of Medical Things (IoMT) platform. Furthermore, the proposed HMANN is classified as a Support Vector Machine and Multilayer Perceptron (MLP) with a Backpropagation (BP) algorithm. The proposed algorithm works based on an ultrasound image which is denoted as a preprocessing step and the region of kidney interest is segmented in the ultrasound image. In kidney segmentation, the proposed HMANN method achieves high accuracy and significantly reducing the time to delineate the contour.

6. A machine learning methodology for diagnosing chronic kidney disease.

Qin, Jiongming, et al.

IEEE Access 8 (2019): 20991-21002.

In this paper, the CKD dataset was from the UCI which has a large number of missing values was used. KNN imputation was used to fill the missing values. Six machine learning algorithms (logistic regression, random forest, support vector machine, k-nearest neighbour, Naive Bayes classifier and feed forward neural network) was developed for the analysis of prediction. The random forest model achieved the best performance with 99.75% accuracy. An integrated model by combining both logistic regression and random forest was also built. This model achieved an accuracy of 99.83% after ten times of simulation.

7. Prediction of chronic kidney disease using machine learning algorithm.

Tekale, Siddheshwar, et al.

International Journal of Advanced Research in Computer and Communication Engineering 7.10 (2018): 92-96.

In this paper, the data of 400 patients with 24 attributes related to CKD was used. Only the 14 optimal attributes for the prediction of CKD were considered. The various machine learning models like Decision Tree, and SVM was built and compared. The SVM achieved an accuracy of 96.75% while the Decision Tree algorithms with 91.75%. SVM performs better than the Decision Tree algorithms but it is time-consuming the Decision Tree algorithms.

8. Generating comparative analysis of early Stage prediction of Chronic Kidney Disease.

Rubini, L. Jerlin, and P. Eswaran.

International Journal of Modern Engineering Research (IJMER) 5.7 (2015): 49-55.

In this paper,a a new chronic kidney disease dataset with three classifiers such as radial basis function network, multilayer perceptron, and logistic regression was proposed. Highest accuracy is achieved by MLP(99.75%) RBF Network followed by RBK Network(98.5%) and then Logistic Regression(97.5%).Error rate, sensitivity, specificity, F-score and kappa values are also predicted using these classifiers. Among all these classifiers Multilayer perceptron classifier gave good accuracy.

9. A soft computing approach to kidney diseases evaluation.

Neves, José, et al.

Journal of medical systems 39.10 (2015): 1-9.

In this paper, the dataset consists 24 attributes, forming five main categories. A hybrid decision support system is developed by Neves and his team, allowed to consider incomplete, unknown, and even contradictory information. This is complemented with an approach to computing centered on Artificial Neural Networks, in order to weigh the Degree-of Confidence in terms of reasoning procedures and knowledge representation based on Logic Programming. Their study involved 558 patients with an age average of 51.7 years and the chronic kidney disease was observed in 175 cases.

10. A classification of ckd cases using multivariate kmeans clustering.

Dubey, Abhinandan.

International Journal of Scientific and Research Publications 5.8 (2015): 1-5.

In this paper, an adopted K-means Clustering algorithm with a single mean vector of centroids, to classify and make clusters of varying probability of likeliness of suspect being prone to CKD. They observed and stated that the suspects falling in clusters K1 or K3 are surely suffering from CKD. The probability of a suspect lying in K2 cluster to fall in the class of CKD is 0.50545, which implies that the suspect cannot be classified by their L-factor classifier. However, suspects from clusters K1 & K3 were found to be falling in CKD class with full probability.