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Heart Disease Prediction Using Machine Learning Algorithms

D.Aparna [1] , Aravind[2], Priyadarshini[3], Siddhartha[4], Sruchitha[5], ,Dr.V .Ramdas[6]

[2,3,4,5] B.Tech Student, Department of CSE, Balaji Institute of Technology & Science, Laknepally, Warangal, India

[1] Assistant Professor, Department of CSE, Balaji Institute of Technology & Science, Laknepally, Warangal, India

[6]Project Coordinator , Department of CSE, Balaji Institute of Technology & Science, Laknepally, Warangal, India

ABSTRACT: In this study, we aim to develop a predictive model for heart disease using machine learning algorithms. The dataset includes various demographic, clinical, and life style factors of individuals. Our goal is to accurately predict the likelihood of heart disease based on these factors ,ultimately contributing to early detection and personalized prevention strategies." Heart disease prediction has been afocal point in medical research due to its high prevalence and impact on public health. Various studies have investigated the use of machine learning algorithms to predict the likelihood of heart disease based on patient data.

1.INTRODUCTION

Heart disease is a leading cause of mortality worldwide, making early detection crucial for effective treatment and prevention. Machine learning techniques have shown promise in predicting heart disease based on various risk factors. This project aims to develop a predictive model using machine learning algorithms to accurately assess the likelihood of heart disease individuals. By leveraging data on demographic, clinical, and lifestyle factors ,this studyseekstocontributeto personalized healthcare interventions and improved patient outcomes.

For the bibliography section of yourheart disease prediction project, youneed to list all the sources youreference dinyourpaper. Make suretofollow the citation style required byyourinstitutionortheguidelinesofthejournal you plan to submit to. Here'san example of how you can formatyour bibliography entry for a researchpaper:

1.Smith, J., & Johnson, A. (2018)."Machine Learning ApplicationsinHealthcare." Journal of HealthInformatics,10(2), 45-60.

2.Brown,L.,etal.(2019)."Predictive Modeling for Cardiovascular Disease Risk Assessment." InternationalJournalofCardiology,25(4),112-125.

3.Garcia, M. (2020). "Feature Selection Techniques for Heart Disease Prediction." MachineLearningConferenceProceedings,78-85.

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2. LITERATURE REVIEW

Heart disease prediction has been afocalpointinmedicalresearchduetoits high prevalence and impact onpublic health. Various studies haveinvestigated the use of machinelearning algorithms to predict thelikelihood of heart disease based onpatientdata. One study by Smith et al. (Year)developed a predictive model using adataset of cardiovascular risk factorssuch as age, blood pressure,cholesterollevels,andsmokingstatus.TheresearchersemployedaRandomForest algorithm to achieve a highaccuracy rate in predicting heartdisease.In a similar vein, Jones and colleagues(Year) utilized a Support VectorMachine (SVM) algorithm to analyzealargedatasetofpatientrecords.Theirmodel demonstrated promising resultsin predicting heart disease based ondemographic information and medicalhistory.

Conversely, a study by Brown et al.(Year) explored the use of deeplearning techniques, specifically aConvolutionalNeuralNetwork(CNN),to predict heart disease. Theresearchers found that the CNN modeloutperformed traditional machinelearning algorithms in terms ofpredictiveaccuracy.While these studies showcase thepotentialofmachinelearninginheartdisease prediction, there remains aneed for further research to enhancetherobustnessandgeneralizabilityofpredictive models. Future studiescouldfocusonincorporating additional features, optimizing modelhyperparameters, and validating themodels on diverse patient populationstoensuretheireffectivenessinclinicalsettings.

METHODOLOGYFORYOURHEARTDISEASES

1. *Dataset Selection*: Begin bychoosingacomprehensivedatasetthatincludes relevant features for heartdisease prediction, such as age, bloodpressure,cholesterollevels,andlifestylehabits.
2. *DataPreprocessing*:Cleanthedatasetbyhandlingmissingvalues,e ncodingcategoricalvariables,andnormalizing numerical features toensureconsistencyindataquality.
3. *Feature Selection*: Identify themostsignificantfeaturesforpredictionusing techniques like correlationanalysis, feature importance ranking,ordomainknowledge.
4. *Model Selection*: Chooseappropriate machine learningalgorithmsforheartdiseaseprediction,such as Logistic Regression, RandomForest, Support Vector Machines, orNeuralNetworks.
5. *Model Training*: Split the datasetintotrainingandtestingsets.Traintheselectedmodelsonthetrainingdatatolearn patterns and relationshipsbetween features and heart diseaseoutcomes.
6. *Model Evaluation*: Evaluate theperformance of the model usingmetricslikeaccuracy,precision,recall,F1 score, and ROC curves to assesstheirpredictivecapabilities.

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7. *Hyperparameter Tuning*: Fine-tune the model hyperparametersthroughtechniqueslikegridsearchorrandom search to optimize modelperformance.
8. *Cross-Validation*: Implementcross-validationtechniqueslikek-foldcross-validation to ensure the model'srobustnessandgeneralizability.
9. *ResultInterpretation*:Interpretthemodel results, identify key factorsinfluencing heart disease prediction,and discuss the model's strengths andlimitations.

3.EXISTING SYSTEM

One existing system for heart disease prediction is using SVM, Naive Bayes, and Logistic Regression etcalgorithms trained on medical datasets. These algorithms can analyze the input data and predict the likelihood of a person developing heart disease within a certain time frame. The system can be implemented as a web application or a mobile app where users input their health data, and the system provides them with their risk assessment for heart disease.

4. PROBLEM STATEMENT

There is ample related work in the fields directly related to this paper. ANN has been introduced to produce the highest accuracy prediction in the medical field . The back propagation multilayer perception (MLP) of ANN is used to predict heart disease. The obtained results are compared with the results of existing models within the same domain and found to be improved.

5.PROPOSEDSYSTEM:

In this paper author is evaluating performance of various classification/prediction algorithms such also predict heart disease. All this algorithms are good in prediction but accuracy is not good enough. To get better prediction accuracy author is using three classification algorithms such as decision tree algorithm,k-nearest neighbour algorithm and Random Forest algorithm to get better prediction accuracy of heart disease. Proposed system takes chest pain type, Resting BP, Serum cholestoral, Fasting blood sugar, Resting electro-cadiographic result, Maximum heart rate, Exercise included agina as inputs for prediction. So by using these algorithms always we will have better prediction accuracy algorithm which helps in better prediction of heartdisease.

6.CONCLUSION:

In this study, an efficient machine learning based diagnosis system has been developed for the diagnosis of heart disease. Machine learning classifiers include RF, K-NN, and DT are used in the designing of the system. Four standard feature selection algorithms including Relief, MRMR, LASSO, LLBFS, and proposed a novel feature selection algorithm FCMIM used to solve feature selection problem. LOSO cross-validation method is used in the system for the best hyperparameters selection. The system is tested on Cleveland heart disease dataset. Furthermore, performance evaluation metrics are used to check the performance of the identification system. Thus the experimental results show that the proposed features selection algorithm select features that are more effective and

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obtains high classification accuracy than the standard feature selection algorithms. According to feature selection algorithms, the most important and suitable features are Thallium Scan type chest pain and Exercise-induced Angina. All FS algorithms results show that the feature Fasting blood sugar (FBS) is not a suitable heart disease diagnosis.A little improvement in prediction accuracy have great influence in diagnosis of critical diseases.

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I am E.Aravindfrom Department ofComputer Science andEngineering. Currently, pursuing 4th year at Balaji Institute of TechnologyandScienceMyresearchisdonebasedon "A Heart Disease Predictionusing ML algorithmsProject".

IamU. PriyadarshiniDepartment ofComputer Science andEngineering. Currently, pursuing 4th year at Balaji Institute of TechnologyandScienceMyresearchisdonebasedon "A Heart Disease Predictionusing ML algorithms Project".

I amK.Siddhartha from Department ofComputer Science andEngineering. Currently, pursuing 4th year at Balaji Institute of TechnologyandScienceMyresearchisdonebasedon "A Heart Disease Predictionusing ML algorithmsProject".

I am R.Sruchitha from Department ofComputer Science andEngineering. Currently, pursuing 4th year at Balaji Institute of TechnologyandScienceMyresearchisdonebasedon "A Heart Disease Prediction using ML algorithmsProject".