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Project Report

Heart Disease Prediction Web Application

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TABLE OF CONTENTS

| | |
|--|------------|
| ACKNOWLEDGMENTS | II |
| TABLE OF CONTENTS..... | II |
| ABSTRACT | III |
| CHAPTER 1 INTRODUCTION | 1 |
| CHAPTER 2 LITERATURE REVIEW..... | 2 |
| Prediction of Heart Disease Using a Combination of Machine Learning and Deep Learning | 2 |
| Diagnosing Coronary Heart Disease using Ensemble Machine Learning | 3 |
| Survey of Machine Learning Algorithms for Disease Diagnostic | 3 |
| Improving risk prediction in heart failure using machine learning..... | 3 |
| A Clinical support system for Prediction of Heart Disease using Machine Learning Techniques | 4 |
| Heart Disease Prediction and Classification Using Machine Learning Algorithms Optimized by Particle Swarm Optimization and Ant Colony Optimization | 4 |
| CHAPTER 3 RESULTS AND CONCLUSION | 5 |
| REFERENCES..... | 7 |

ABSTRACT

Disease related to heart or blood arteries is the leading death cause in today's world. The risk rate can be possibly reduced by proper care and treatment which is costly for many people. To get better decisions and diagnosis machine learning can be implemented in this field. To deal with complex nonlinear problems with accurate suppleness optimization algorithms are showing great views. This is also named as computing aided diagnosis where ML are broadly used along with other researching objects. In this paper, we utilized the Logistic Regression Model for prediction with Django for website design to improve the way of predicting heart disease.

CHAPTER 1

INTRODUCTION

Heart disease is a type of illness that affects the heart or blood arteries. Smoking, high blood pressure, high cholesterol, a poor diet, insufficient exercise, and obesity may all raise one's chance of developing various cardiac problems. Coronary artery disease, or narrowed or blocked coronary arteries, is the most prevalent kind of heart disease and can cause chest pain, heart attacks, or strokes. According to WHO, 17.5 million people die from CVDs every year. 85 percent of these deaths were caused by heart attack and stroke. In the United States, a CVD death occurs every 37 seconds on average.

According to data from 2017, there are 2,353 deaths from CVD every day. According to the most recent WHO data, 108,528 deaths from coronary heart disease, or 15.16% of total deaths occurred in Bangladesh in 2020[1]. Deaths like these are very unacceptable. Premature deaths can be avoided by identifying those who are most at risk for CVDs and ensuring they receive the right care. So, we decided to make an application that can be an indicator of heart disease. This application will collect the data on the patient's symptoms and detect the disease by machine language. It will not only detect the disease but in return will provide the list of the doctors of the patient's

nearby hospital so that the patient can consult and receive immediate medication without any hassle. |

CHAPTER 2

LITERATURE REVIEW

Prediction of Heart Disease Using a Combination of Machine Learning and Deep Learning

One of the most important organs of our human body is our heart. But the percentage of heart disease is increasing very fast day by day. Because of this rapid growth rate, many types of research have been done and applications have been made to predict and classify the types of heart diseases using machine learning. This research paper will discuss much of the research which has been done so far to predict heart diseases using machine learning. Wettschereck and Dieterich designed a model in 1995 using a nested generalized example. This model helped to classify different types of heart disease. In 2012, Parthiban and Srivatsa proposed a model using SVM. In their work, they focused on classifying diabetes which is one of the main causes of heart disease. Almost similar research has been done by Amma and Keogh, Mueen in the same year. Melillo et al. (2013) proposed a system that could find out the risk zone of the patients. Two types of public Holster databases and a Cart algorithm were used to make this system. Recently, in 2020 Harvard medical school has done research using different types of machine learning classifiers and Hungarian-Cleveland datasets to predict the type of heart disease. PCA was also used to select features and reduce dimensionality. The same year, Garate-Escamilla et

al. designed an X^2 statistical model. DNN, ANN, and the clinical data parameters were used in this model to confirm the predictions. After elaborating on the research, we propose a model using different types of Machine Learning language which will help one to find out or predict the type of heart disease. [2]

Diagnosing Coronary Heart Disease using Ensemble Machine Learning

By using ‘meta-algorithm’ machine learning is introduced as an adaptive boosting algorithm. This helps to classify the presence and absence of coronary disease. In this process, generating iteration works to solve the learning method. Different types of weak classifiers are used here. This process is also considered “AdaBoost”. It turns the weak classifier into a strong language. To find out the errors and corrections this method is best. It is also used for finding the K-S measurement, finding F-score, etc.[3]

Survey of Machine Learning Algorithms for Disease Diagnostic

A hybrid method by two ML introduced by Tan et al. named SVM and G.A. This is also connected with the wrap approach. To complete this method data mining is also used. [4]

Improving risk prediction in heart failure using machine learning.

A medical team from San Francisco identified the data script by underlying a system named EMR. UCSF Health Institutional Review Board approved this study.[5]

A Clinical support system for Prediction of Heart Disease using Machine Learning Techniques

From several experiments to find out the probability of heart disease by cross-validation technique, there is an outcome based on the accuracy of the cross validity and train test. And from that, the multi-data validation techniques are suggested by many of them.[6]

Heart Disease Prediction and Classification Using Machine Learning Algorithms Optimized by Particle Swarm Optimization and Ant Colony Optimization

Another algorithm also for diagnosing heart problems by Vembandasamy et al. named the Naive Bayes algorithm. This process acquires strong assumptions. In Chennai, research based on this theorem took place, and accuracy of more than 85% was shown.[7]

CHAPTER 3

RESULTS AND CONCLUSION

Heart disease is a web application and we built using machine learning (ML). Our system will be using Logistic Regression. Logistic Regression will predict the outcome using probability. We used a dataset from Kaggle.

Dataset :

1. age (Age of the patient in years)
2. sex (Male/Female)
3. cp chest pain type ([typical angina, atypical angina, non-anginal, asymptomatic])
4. trestbps resting blood pressure (resting blood pressure (in mm Hg on admission to the hospital))
5. chol (serum cholesterol in mg/dl)
6. fbs (if fasting blood sugar > 120 mg/dl)
7. restecg (resting electrocardiographic results)
-- Values: [normal, stt abnormality, lv hypertrophy]
8. thalach: maximum heart rate achieved
9. exang: exercise-induced angina (True/ False)uc
10. oldpeak: ST depression inded by exercise relative to rest
11. slope: the slope of the peak exercise ST segment
12. ca: number of major vessels (0-3) colored by fluoroscopy

13. thal: [normal; fixed defect; reversible defect]

14. target: the predicted attribute

Backend:

We used Django Admin, which is an built-in tool and using this we created the database for our new entries data made by the user and for doctor information database.

Results:

After running our model on training dataset we got an accuracy rate of 0.85 (85%) and then on test dataset our accuracy rate was 0.82 (82%). As both accuracy results are close to each other we do not have a overfitting issue.

For backend, using Django Models we created the databases.

Conclusion:

As our accuracy score is between acceptable range (i.e. 70% to 90%), our predicted results are reliable. We included doctor information from cities around Bangladesh so depending on the results the patient can make a quick appointment for consulting.

References

- [1] Coronary Heart Disease in Bangladesh. (2020). World Life Expectancy. https://www.worldlifeexpectancy.com/bangladesh-coronary-heart-disease?fbclid=IwAR1Gy5qah9kolSshSjks708yQaRBKKfQ4xkvbk26slg0ey3ds_Ymh61QfRA
- [2] Bharti, R., Khamparia, A., Shabaz, M., Dhiman, G., Pande, S., & Singh, P. (2021). Prediction of Heart Disease Using a Combination of Machine Learning and Deep Learning. *Computational Intelligence and Neuroscience*, 2021, 1–11. <https://doi.org/10.1155/2021/8387680>
- [3] H., K., H., J., & J., G. (2016). Diagnosing Coronary Heart Disease using Ensemble Machine Learning. *International Journal of Advanced Computer Science and Applications*, 7(10). <https://doi.org/10.14569/ijacsa.2016.071004>
- [4] Fatima, M. and Pasha, M., 2017. Survey of Machine Learning Algorithms for Disease Diagnostic. *Journal of Intelligent Learning Systems and Applications*, 09(01), pp.1-16.
- [5] Adler, E. D., Voors, A. A., Klein, L., Macheret, F., Braun, O. O., Urey, M. A., Zhu, W., Sama, I., Tadel, M., Campagnari, C., Greenberg, B., & Yagil, A. (2019). Improving risk prediction in heart failure using machine learning. *European Journal of Heart Failure*, 22(1), 139–147. <https://doi.org/10.1002/ejhf.1628>
- [6] Hamdaoui, H. E., Boujraf, S., Chaoui, N. E. H., & Maaroufi, M. (2020). A Clinical support system for Prediction of Heart Disease using Machine Learning Techniques. 2020 5th International Conference on Advanced Technologies for Signal and Image Processing (ATSIP). <https://doi.org/10.1109/atsip49331.2020.9231760>
- [7] Khourdifi, Y., & Bahaj, M. (2019). Heart Disease Prediction and Classification Using Machine Learning Algorithms Optimized by Particle Swarm Optimization and Ant Colony Optimization. *International Journal of Intelligent Engineering and Systems*, 12(1), 242–252. <https://doi.org/10.22266/ijies2019.0228.24>