Prediction of Heart Disease Using Machine Learning Techniques

P. Srinivas Kumar1, G.R.N.S. Anjani2, M. Dharani Sai Lakshmi2, U. Geetha2, G. Vindhya sri2.

1Associate Professor, Department of Computer Science and Engineering, SRK Institute of Technology, Vijayawada, Andhra Pradesh, India
srinivaskumarpalvadi@gmail.com
2 B. Tech Students, Department of Computer Science and Engineering, SRK Institute of Technology, Vijayawada, Andhra Pradesh, India
rochirmairochi9@gmail.com

Abstract:
This design focuses on developing a prophetic model for coronary heart complaint using logistic retrogression and creating a web operation for stoner commerce. The model predicts the liability of heart complaint grounded on medical attributes similar as age, coitus, casket pain type, blood pressure, and cholesterol situations. Trained on literal case data, the model classifies individualities into two orders those with heart complaint and those without. A stoner-friendly web operation, erected with ultramodern technologies like HTML, CSS, JavaScript, and the Flask microframework for Python, allows individualities to input their medical information and admit threat prognostications visually. This integration of machine literacy and web development provides an accessible tool for assessing heart complaint threat, promoting preventative healthcare, and showcasing the crossroad of data wisdom and web development in addressing real- world problems.

Index Words:
Heart Disease, resting blood pressure**,** serum cholesterol in mg/dl, exercise induced angina.

I. Introduction:

Heart complaint remains a leading cause of mortality worldwide, pressing the significance of early discovery and preventative measures. With advancements in machine literacy ways, prophetic models have surfaced as precious tools for assessing an existent's threat of heart complaint grounded on their medical attributes. Logistic retrogression, a classical statistical system, offers a robust frame for erecting similar prophetic models by assaying the connections between input features and double issues.
In this design, we concentrate on developing a logistic retrogression model to prognosticate heart complaint threat and integrating it into a web- grounded frontend operation for stoner-friendly access. The design aims to give individualities with an effective means of assessing their cardiovascular health and taking visionary measures to alleviate the threat of heart complaint. The integration of logistic retrogression into a web- grounded operation allows for flawless commerce, enabling druggies to input their medical information and admit immediate prognostications regarding their heart complaint threat. By using ultramodern web development technologies, similar as HTML, CSS, JavaScript, and the Flask micro- frame, we produce an intuitive and visually appealing interface for druggies to pierce prophetic perceptivity. This design paper presents the development process, perpetration details, and results of the logistic retrogression model and web operation. It discusses the dataset used for model training, the features considered for vaticination, and the evaluation criteria employed to assess the model's performance. also, it highlights the significance of using machine literacy in preventative healthcare and the implicit impact of furnishing accessible tools for threat assessment. Overall, this design serves as a demonstration of the community between data wisdom and web development in addressing real- world health challenges.

I. Literature Work:

According to S M Awan etal., [1]In this paper, we enlighten the number of ways in Artificial Neural Network(ANN). The delicacy is calculated and imaged similar as ANN gives94.7 but with Principle Component Analysis(PCA) delicacy rate ameliorate to97.7. Authors of achieved 77 vaticination delicacy by applying logistic retrogression algorithm on this dataset.
According to Bayu Adhi Tamaet.al [2] in their work suggested exploration related to the identification of diabetes sickness with application of ML procedures. This complaint was viewed as incredibly a thrust area of ML. Roughly 285 million individualities around the globe were passing diabetes as per a study directed by International Diabetes Federation(IDF).
According to Yu- Xuan Wang,et.al. [3] have explored different operations that demonstrated the significance of the ML styles in colorful areas. They proposed a new fashion for the designing of a working frame. Then they've explored 8 unsupervised and 10 supervised literacy algorithms. In their exploration, they showed an operation work for the semi-supervised type learning algorithms. In assiduity system, it was seen that roughly 90- 95 operations employed both the unsupervised and supervised machine

literacy procedures.
Problem Statement
Previous exploration in the field of heart complaint vaticination has explored colorful machine learning algorithms and datasets to develop prophetic models. Being studies have employed ANN along with datasets containing medical attributes similar as age, coitus, blood pressure, cholesterol stimulations, and electrocardiogram results to prognosticate the liability of heart complaint. They set up Only Accuracy.

II. Proposed Methodology

previous exploration in the field of heart complaint vaticination has explored colourful machine learning algorithms and datasets to develop prophetic models. Logistic retrogression, as a classical statistical system, has been extensively studied and employed due to its simplicity and interpretability. Being studies have employed logistic retrogression along with datasets containing medical attributes similar as age, coitus, blood pressure, cholesterol situations, and electrocardiogram results to prognosticate the liability of heart complaint. still, while logistic retrogression offers a solid foundation for double bracket tasks, there's still room for enhancement in terms of model performance, point selection, and stoner availability. They set up only Accuracy but In this design, we propose the development of a logistic retrogression- grounded heart complaint vaticination model integrated into a web-grounded front- end operation. Building upon being exploration, we aim to influence logistic retrogression's interpretability and prophetic power to produce an accurate and stoner-friendly tool for assessing heart complaint threat. Our proposed work involves the collection and preprocessing of a comprehensive data set containing applicable medical attributes. We'll train and estimate the logistic retrogression model using the dataset, considering point selection ways and performance criteria to optimize its prophetic capabilities. also, we will develop a web- grounded frontend operation using ultramodern web technologies and the Flask micro- frame, furnishing an intuitive interface for druggies to input their medical information and admit immediate prognostications regarding their heart complaint threat. Through this design, we aim to contribute to the advancement of preventative healthcare by offering individualities a accessible and accessible means of covering their cardiovascular health and taking visionary measures to alleviate the threat of heart complaint.

III. Algorithm:

We Use Logistic Regression Algorithm. Steps Involved in Our algorithm is:
1.Datacollection: We collected the data from Kaggle
2.DataPreprocessing: We handle the missing values by removing those values.

```
heart_data.isnull().sum()
```

```
age         0
sex         0
cp          0
trestbps    0
chol        0
fbs         0
restecg     0
thalach     0
exang       0
oldpeak     0
slope       0
ca          0
thal        0
target      0
dtype: int64
```

Figure 1: Handling Missing Values.

3. Split Data: The Data was splitted for training and Testing**.**

```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2, stratify=Y, random_state=2)
print(X.shape, X_train.shape, X_test.shape)
```

```
(1025, 13) (820, 13) (205, 13)
```

Figure 2: Splited Data.

4. Train the Model:We trained the model with algorithm.

```
model = LogisticRegression()
model.fit(X_train, Y_train)
```

```
C:\Users\rock\Miniconda3\lib\site-packages\sklearn\linear_model\_logistic.py:458: ConvergenceWarning: lbfgs failed to converge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  n_iter_i = _check_optimize_result(
```

Figure 3: Trained the model

5. Evaluate the model:

```
✓ 0.0s

Prediction: [1]

The Person has Heart Disease
```

Figure 4:Model Evaluation And prediction.

6.Monioring and Maintaning :

We continuously monitor and maintains the model.

Results and Discussions:

At the end of our experiment, results shows that by using Logistic Regression the accuracy score is:

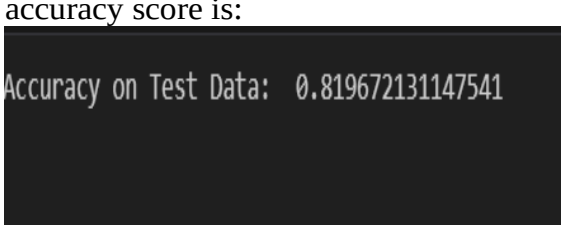

Figure 5: Accuracy Value

Precision:

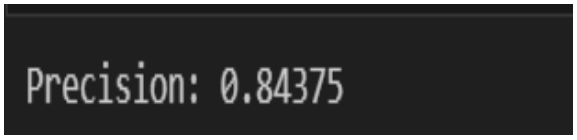

Figure 6: Precision Value

F1 Score:

Figure 7: F1 Score

Confusion Matrix:

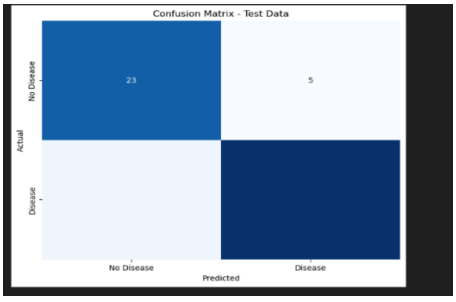

Figure 8: Confusion Matrix

The developed heart disease prediction project successfully integrated a logistic regression model into a user-friendly web- based frontend application. Leveraging a comprehensive dataset containing medical attributes such as age, sex, blood pressure, and cholesterol levels, the logistic regression algorithm accurately predicted the likelihood of heart disease for individual users.

Conclusion:

In conclusion, the development of the logistic regression-based heart disease prediction model integrated into a web- based frontend application represents a significant step forward in preventive healthcare. Throughout the project, we successfully leveraged the simplicity, interpretability, and predictive power of logistic regression to create an accurate and user-friendly tool for assessing heart disease risk. The project involved meticulous data collection, preprocessing, and feature engineering to ensure the quality and relevance of the dataset used for model training. By incorporating a comprehensive set of medical attributes, including age, sex, blood pressure, and cholesterol levels, the model was equipped to make accurate predictions about an

individual's likelihood of developing heart disease. The logistic regression model exhibited strong performance during training and evaluation, achieving high accuracy and other evaluation metrics. Cross-validation techniques further validated the model's robustness and generalization ability, instilling confidence in its predictive capabilities. The integration of the logistic regression model into a web-based frontend application enhanced accessibility and usability, allowing users to easily input their medical information and receive instant predictions regarding their heart disease risk. The application's intuitive interface, responsive design, and visual appeal contributed to a positive user experience, making it a valuable tool for individuals concerned about their cardiovascular health. Overall, this project demonstrates the potential of machine learning and web technologies to democratize access to predictive analytics in healthcare. By empowering individuals with the knowledge and tools to monitor their health proactively, we can work towards reducing the burden of heart disease and improving overall well-being.

References:

[1] S. M. Awan, M. . U. Riaz, and A. G. Khan, "Prediction of Heart Disease using Artificial Neural Network", *VFAST trans. softw. eng.*, vol. 6, no. 1, pp. 51–61, Oct. 2018.

[2] B. Edmonds, "Using localised 'gossip' to structure distributed learning," 2005.

[3] Fsdfsdf BayuAdhi Tama,1 Afriyan Firdaus,2 Rodiyatul FS, "Detection of Type 2 Diabetes Mellitus with Data Mining Approach Using Support Vector Machine", Vol. 11, issue 3, pp. 12-23,2008.

[4] Yu-Xuan Wang, QiHui Sun, Ting-Ying Chien, Po-Chun Huang, "Using Data Mining and Machine Learning Techniques for System Design Space Exploration and Automatized Optimization", Proceedings of the 2017 IEEE International Conference on Applied System Innovation, vol. 15, pp. 1079-1082, 2017.

[5] ZhiqiangGe, Zhihuan Song, Steven X. Ding, Biao Huang, "Data Mining and Analytics in the Process Industry: The Role of Machine Learning", 2017 IEEE Translations and content mining are permitted for academic research only, vol. 5, pp. 20590-20616, 2017.