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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**R18 B.TECH(C.S.E) IV YEAR I SEMESTER - A SECTION**

| **ADMISSION BATCH**  **2021-25** | **INDUSTRIAL ORIENED MINI PROJECT**  **2024-25** | **ACADEMIC YEAR**  **2024-25** |
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**Batch Id :**

**Title of the Project :**

**Project is doing at : Industry/Pantech E-Learning/Conscience/Own at College**

**Project Guide at Industry :**

**Team members Details***(First Person is Project Leader):*

| S.No | Roll Number | Student Name | E-mail id | Contact Number |
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**Details of Project Guide in the college:**

| S.No | Faculty Name | Designation | E-mail id | Contact Number |
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**Details of Project Supervisor at Industry:**

| **S.No** | **Faculty Name** | **Designation** | **E-mail id** | **Contact Number** |
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***Guide with date Projects Incharge* Head of the Department**

**Title of the Project** Heart Failure Prediction Using Machine Learning

### **I. ABSTRACT**

Heart failure is a critical health condition that requires early detection and accurate prediction to prevent severe consequences. This project focuses on developing a machine learning model that predicts heart failure based on clinical features. Using the "Heart Failure Clinical Records Dataset," the project implements various supervised learning algorithms to achieve high predictive accuracy. The primary objective is to assist healthcare professionals in making informed decisions by providing a reliable prediction system that integrates seamlessly with existing healthcare platforms. The model is evaluated based on precision, recall, and accuracy to ensurerobustness and reliability in its predictions.

### **II. Objective**

To develop a machine learning-based system capable of predicting heart failure by analyzing patient clinical data, thereby assisting healthcare providers in making timely and informed decisions.

### **III. Existing System and Proposed System**

#### **Existing System**

* Relies heavily on manual analysis and traditional statistical methods, often lacking precision and scalability.
* Limited use of advanced computational techniques for heart failure prediction.
* Insufficient accuracy and reliability in prediction models.

#### **Proposed System**

* Develop a machine learning model trained on clinical datasets to predict heart failure efficiently and accurately.
* Utilize advanced algorithms like Logistic Regression, Random Forest, and Support Vector Machines to enhance performance.
* Provide a user-friendly interface for healthcare professionals to input patient data and obtain predictions in real-time.

### **IV. Review of Literature**

1. **Chugh et al., 2020**: Discussed the rising prevalence of heart failure and the importance of early detection systems. Highlighted the role of machine learning in healthcare.
2. **Kumar et al., 2018**: Proposed a Random Forest-based prediction model for cardiovascular diseases, demonstrating its effectiveness in clinical scenarios.
3. **Smith et al., 2019**: Focused on integrating machine learning models with healthcare data, emphasizing the challenges and opportunities.
4. **Johnson et al., 2021**: Evaluated the use of Support Vector Machines for binary classification tasks in medical datasets.

### **V. Project Modules**

1. **Data Collection and Preprocessing**:
   * Collect data from the "Heart Failure Clinical Records Dataset."
   * Clean and preprocess the data by handling missing values and scaling numerical features.
2. **Exploratory Data Analysis (EDA)**:
   * Analyze the dataset to identify trends, correlations, and important features.
3. **Model Training**:
   * Implement machine learning algorithms such as Logistic Regression, Random Forest, and SVM.
   * Use cross-validation for model tuning and optimization.
4. **Model Evaluation**:
   * Evaluate the models using accuracy, precision, recall, and F1-score metrics.
5. **Deployment**:
   * Deploy the best-performing model as a web-based application.

### **VI. Hardware Requirements**

* **Processor**: Intel i5 or higher
* **RAM**: 8 GB or more
* **HDD**: 500 GB or more

### **VII. Software Requirements**

* **Operating System (OS)**: Windows 10 or Ubuntu 20.04
* **Integrated Development Environment (IDE)**: Jupyter Notebook or PyCharm
* **Software**: Python 3.x, Pandas, NumPy, Scikit-learn, Matplotlib, Flask
* **Back End**: Flask (for deployment)

### **VIII. References**

1. Chugh, S.S., Havmoeller, R., Narayanan, K., et al., "Worldwide Epidemiology of Atrial Fibrillation: A Global Burden of Disease 2010 Study," Circulation, vol. 129, pp. 837-847, February 2014.
2. Kumar, A., Gupta, D., and Sharma, K., "Random Forest Algorithm for Predicting Cardiovascular Diseases," International Journal of Computer Applications, vol. 172, pp. 23-29, August 2018.
3. Smith, J., Patel, V., and Kaur, R., "Challenges in Machine Learning-Based Healthcare Solutions," IEEE Transactions on Biomedical Engineering, vol. 66, pp. 2121-2130, September 2019.
4. Johnson, B., Davis, L., and Thompson, P., "Support Vector Machines in Medical Predictions," Journal of Machine Learning in Healthcare, vol. 7, pp. 55-62, March 2021.
5. Kaggle, "Heart Failure Clinical Records Dataset,"<https://www.kaggle.com/andrewmvd/heart-failure-clinical-data>.