

# Hospital Readmission Prediction Using Machine Learning

## Milestone 1: Project Initialization and Planning Phase

The "Project Initialization and Planning Phase" marks the project's outset, defining goals, scope, and stakeholders. This crucial phase establishes project parameters, identifies key team members, allocates resources, and outlines a realistic timeline. It also involves risk assessment and mitigation planning. Successful initiation sets the foundation for a well-organized and efficiently executed machine learning project, ensuring clarity, alignment, and proactive measures for potential challenges.

### Activity 1: Define Problem Statement

Hospital readmission, defined as a patient being admitted to a hospital within a certain period (usually 30 days) after being discharged, is a significant issue in healthcare. High readmission rates not only indicate potential issues in the quality of care provided but also lead to increased healthcare costs. Accurately predicting which patients are at risk of readmission can help healthcare providers implement targeted interventions, improve patient outcomes, and reduce unnecessary costs.

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Hospital Readmission Prediction Problem Statement Report: [Click Here](#)

### Activity 2: Project Proposal (Proposed Solution)

The proposed project, "Hospital Readmission Prediction," aims to leverage machine learning to predict the likelihood of hospital readmission within 30 days of discharge. By identifying high-risk patients, healthcare providers can implement targeted interventions to improve patient outcomes and reduce readmission rates, thereby lowering healthcare costs and enhancing the quality of care.

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Hospital Readmission Prediction Project Proposal Report: [Click Here](#)

### Activity 3: Initial Project Planning

Initial Project Planning involves outlining key objectives, defining scope, and identifying stakeholders for hospital readmission prediction system. It encompasses setting timelines, allocating resources, and determining the overall project strategy. During this phase, the team establishes a clear understanding of the dataset, formulates goals for analysis, and plans the workflow for data processing. Effective initial planning lays the foundation for a systematic and well-executed project, ensuring successful outcomes.

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## Milestone 2: Data Collection and Preprocessing Phase

The Data Collection and Preprocessing Phase involves executing a plan to gather relevant hospital readmission data from Kaggle, ensuring data quality through verification and addressing missing values. Preprocessing tasks include cleaning, encoding, and organizing the dataset for subsequent exploratory analysis and machine learning model development.

### **Activity 1: Data Collection Plan, Raw Data Sources Identified, Data Quality Report**

The dataset for "Hospital Readmission Prediction" is sourced from Kaggle. It includes patients details and their health condition. Data quality is ensured through thorough verification, addressing missing values, and maintaining adherence to ethical guidelines, establishing a reliable foundation for predictive modeling.

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Hospital Readmission Prediction Collection Report: [Click Here](#)

### **Activity 2: Data Quality Report**

The dataset for "Hospital Readmission Prediction" is sourced from Kaggle. It includes patients details and their health condition. Data quality is ensured through thorough verification, addressing missing values, and maintaining adherence to ethical guidelines, establishing a reliable foundation for predictive modeling.

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Hospital Readmission Prediction Data Quality Report: [Click Here](#)

### Activity 3: Data Exploration and Preprocessing

Data Exploration involves analyzing the hospital readmission prediction dataset to understand patterns, distributions, and outliers. Preprocessing includes handling missing values, scaling, and encoding categorical variables. These crucial steps enhance data quality, ensuring the reliability and effectiveness of subsequent analyses in the loan approval project.

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Hospital Readmission Prediction Data Exploration and Preprocessing Report: [Click Here](#)

## Milestone 3: Model Development Phase

The Model Development Phase entails crafting a predictive model for hospital readmission prediction. It encompasses strategic feature selection, evaluating and selecting models (Random Forest, Decision Tree, KNN, XGB), initiating training with code, and rigorously validating and assessing model performance for informed decision-making in the prediction process.

### Activity 1: Feature Selection Report

The Feature Selection Report outlines the rationale behind choosing specific features (e.g., Gender, readmitted, age) for the hospital readmission prediction. The goal is to identify the most relevant features that significantly impact the likelihood of a patient being readmitted within 30 days of discharge. Effective feature selection can improve model accuracy, reduce overfitting, and enhance interpretability.

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Hospital Readmission Prediction Feature Selection Report: [Click Here](#)

## **Activity 2: Model Selection Report**

The Model Selection Report details the rationale behind choosing Random Forest, Decision Tree, KNN, and XGB models for hospital readmission prediction. It considers each model's strengths in handling complex relationships, interpretability, adaptability, and overall predictive performance, ensuring an informed choice aligned with project objectives.

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**Hospital Readmission Prediction Model Selection Report:** [Click Here](#)

## **Activity 3: Initial Model Training Code, Model Validation and Evaluation Report**

The Initial Model Training Code employs selected algorithms on the hospital readmission dataset, setting the foundation for predictive modeling. The subsequent Model Validation and Evaluation Report rigorously assesses model performance, employing metrics like accuracy and precision to ensure reliability and effectiveness in predicting readmission outcomes.

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**Hospital Readmission Prediction Development Phase Template:** [Click Here](#)

## **Milestone 4: Model Optimization and Tuning Phase**

The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

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**Hospital Readmission Prediction Model Optimization and Tuning Phase Report:** [Click Here](#)

## **Milestone 5: Project Files Submission and Documentation**

For project file submission in Github, Kindly click the link and refer to the flow. [Click Here](#)

For the documentation, Kindly refer to the link. [Click Here](#)

## **Milestone 6: Project Demonstration**

In the upcoming module called Project Demonstration, individuals will be required to record a video by sharing their screens. They will need to explain their project and demonstrate its execution during the presentation.