

**California State University, San Bernardino  
Computer Science Department**

**Masters Project Preliminary Proposal**

For  
**Predicting hospitalization using Artificial Intelligence**

By  
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**PROPOSED COMMITTEE**

**ADVISOR: Dr. Fadi Muheidat**  
**MEMBERS: Dr. Amir Ghasemkhani**  
**Dr. Ronald Salloum**

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## **ABSTRACT**

The current hospital admission process is often inefficient and time-consuming. Especially in the Emergency Room, patients have to wait for hours if the hospital is busy. This can lead to overcrowding and a decreased quality of care. To address this problem, we will create predictive models using machine learning techniques to predict whether a patient should be admitted to the hospital. The models will be trained on patient data such as age, medical history, gender and will be able to predict the probability of a patient's hospitalization. This will allow healthcare professionals to make better decisions about patient admissions and reduce overcrowding. The expected outcome of this project is to develop a reliable and accurate predictive model that can be used to assist healthcare professionals in making decisions about hospitalization.

## **OBJECTIVE & SCOPE OF THE PROJECT**

### **OBJECTIVE:**

The primary goal of this project is to construct a model that can reliably predict whether or not a patient seen in the emergency room will be admitted to the hospital or not. With help of this model, we can better manage resources and prioritize patients who need urgent medical attention.

### **SCOPE:**

Due to the scarcity of the necessary personnel, waiting periods in hospitals are expected to increase significantly. Any action taken to address this issue may be too late by the time it is noticed. In order to reduce patient congestion and improve patient flow, effective strategies must be developed. Machine Learning (ML) algorithms have proven to be an effective method for data mining to predict the health of hospitalized emergency patients.

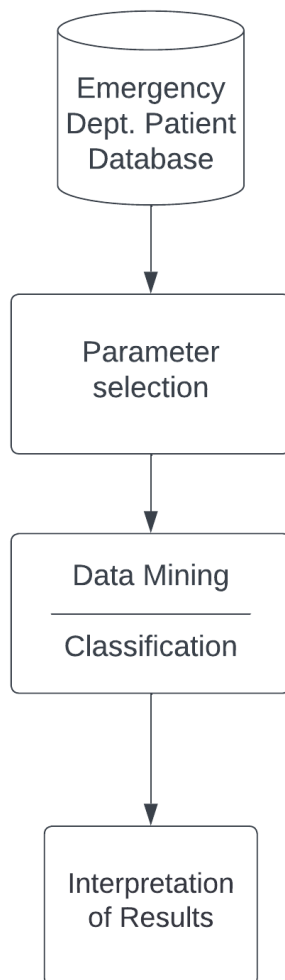
### **PROPOSED SYSTEM:**

To predict hospitalization of patients in the emergency room, we build machine learning models based on Naive Bayes, Support Vector Machine (SVM), and Random Forest. The reason these models were selected is that Naive Bayes is a fast and simple algorithm that is often used for binary

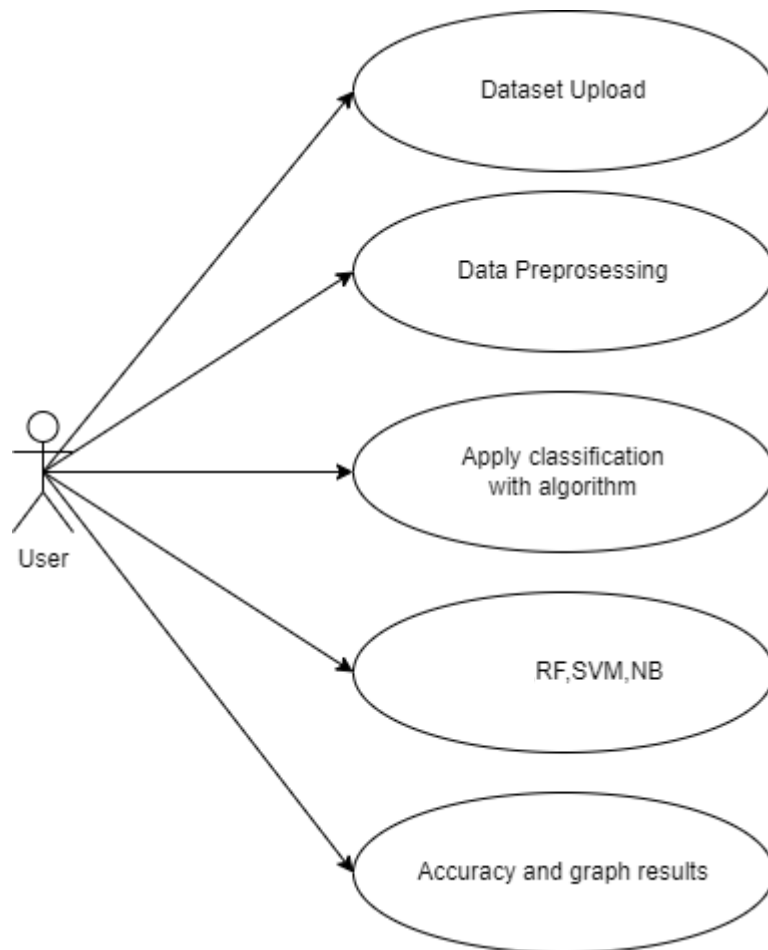
classification problems, Support Vector Machine (SVM) is a strong algorithm that can analyze complex data, and Random Forest is an ensemble method that combines a large number of decision trees and can work well with our dataset. The dataset we are using contains many features such as age, gender, diabetes status, and medical history, which can work well with the algorithms we have chosen. We will also tune the hyperparameters to improve accuracy and compare the performance of these models. Most hospitals will benefit from this model's ability to improve patient flow, prevent overcrowding, and manage emergency room resources according to patient status.

## **PROJECT DESIGN:**

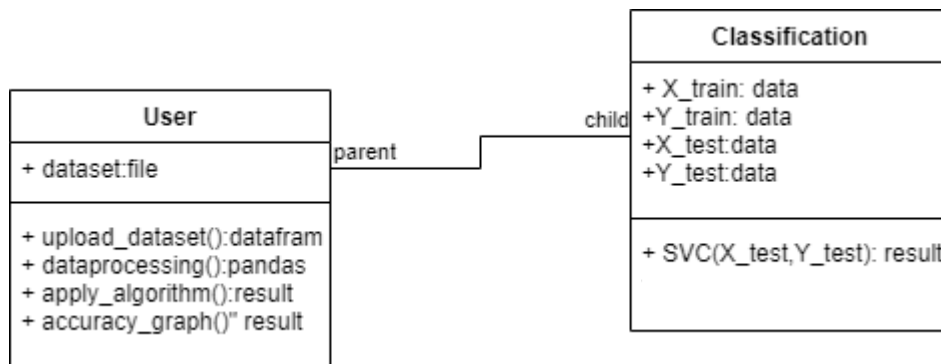
### **DATA FLOW DIAGRAM:**



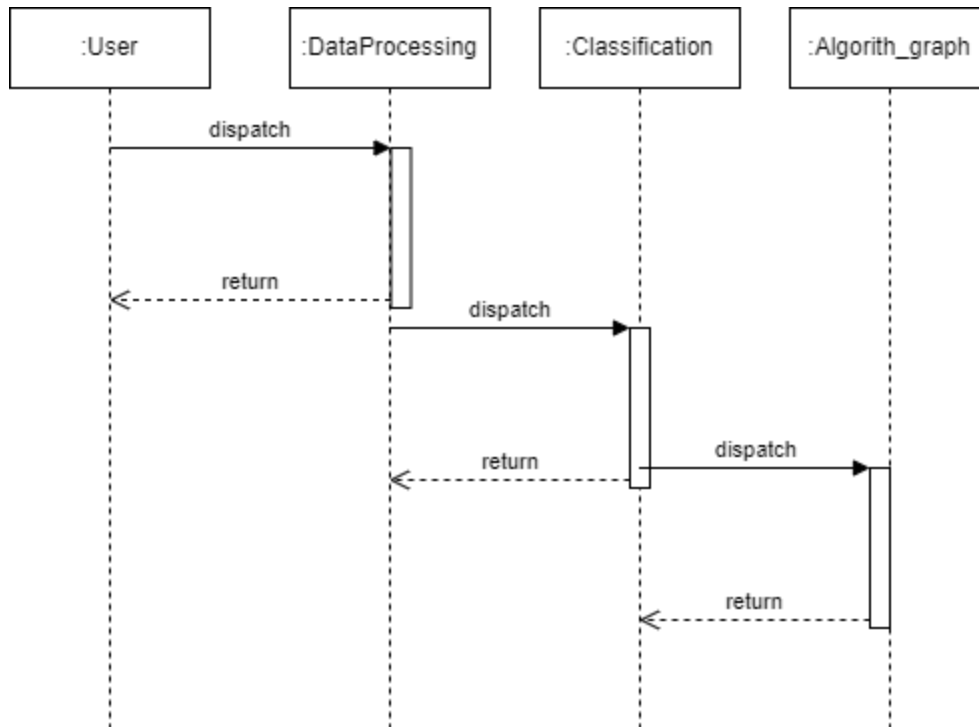
## USE CASE DIAGRAM:



## CLASS DIAGRAM:



## SEQUENCE DIAGRAM:



## PROJECT IMPLEMENTATION:

### Project Implementation Technology:

The project will be developed using Python and Google Colab. Some of the libraries I use in my project are pandas, NumPy, Matplotlib, and SKLearn.

### Data set description:

For hospital admission prediction, we take patients' data. We will use the dataset from Kaggle, and this dataset consists of over 100,000 records.

## MODULES:

- ❖ Upload patient database
- ❖ Data mining
- ❖ Model Training, Evaluation & Tuning
- ❖ Interpretation of Results

## **HARDWARE REQUIREMENTS:**

- System : Intel core I5.
- Hard Disk : 512 GB.
- Monitor : 15 LED
- Input Devices : Keyboard, Mouse
- Ram : 8 GB

## **SOFTWARE REQUIREMENTS:**

- Operating system : Windows 10
- Programming Language : Python
- Tool : Google Colab

## **REFERENCES:**

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**PROPOSED COMMITTEE COMMENTS/SUGGESTIONS**  
**ADVISOR: Dr. Fadi Muheidat**

☒ **APPROVE**      ☐ **DISAPPROVE** *Fadi Muheidat* Feb 17, 2023  
**Signature/Date**

**COMMITTEE MEMBER 1: Dr. Amir Ghasemkhani**

Add a systematic method to tune the parameters of the classification models. Add a literature review to the final report!

☒ **APPROVE**      ☐ **DISAPPROVE** *Amir Ghasemkhani* Feb 17, 2023  
**Signature/Date**

**COMMITTEE MEMBER 2: Dr. Ronald Salloum**

☒ **APPROVE**      ☐ **DISAPPROVE** *Ronald Salloum* Feb 17, 2023  
**Signature/Date**

