Predicting Acute Liver Failure using Supervised Machine Learning Approach

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Abstract — The function of liver is to filter blood that circulates through the body, converting nutrients and drugs absorbed from the digestive tract into ready-to-use chemicals. The liver performs many other important functions, such as removing toxins and other chemical waste products from the blood and readying them for excretion. Liver failure that begins in the cells of your liver. Nowadays machine learning is applied to healthcare system where there is a chance of predicting the disease early. The main necessity of Artificial intelligence is data. The past dataset is collected and that dataset is used to build a machine learning model. The necessary pre-processing techniques are applied like univariate analysis and bivariate analysis are implemented. The data is visualised for better understanding of the features and based on that a classification model is built by using machine learning algorithm and comparison of algorithms are done based on their performance metrics like accuracy, F1 score recall etc.

Keywords—Machine learning algorithm, univariate analysis, bivariate analysis.

1. 1.INTRODUCTION

Data science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data, and apply knowledge and actionable insights from data across a broad range of application domains.
The term "data science" has been traced back to 1974, when Peter Naur proposed it as an alternative name for computer science. In 1996, the International Federation of Classification Societies became the first conference to specifically feature data science as a topic. However, the definition was still in flux.
The term “data science” was first coined in 2008 by D.J. Patil, and Jeff Hammerbacher, the pioneer leads of data and analytics efforts at LinkedIn and Facebook. In less than a decade, it has become one of the hottest and most trending professions in the market.
Data science is the field of study that combines domain expertise, programming skills, and knowledge of mathematics and statistics to extract meaningful insights from data.

2. 2.LITERATURE SURVEY

1.Title:The Diagnosis of Chronic Liver Disease using Machine Learning Techniques

Author: Golmei Shaheamlung, Harshpreet Kaur

Year : 26-March-2021

In the 21st-century, the issue of liver disease has been increasing all over the world. As per the latest survey report, liver disease death toll has been rise approximately 2 million per year worldwide. The overall percentage of death by liver disease is 3.5% worldwide. Chronic Liver disease is also considered to be one of the deadly diseases, so early detection and treatment can recover the disease easily. The hidden knowledge of liver disease is recognized and extracted using a historical liver disease database. The complex queries are responded to diagnose liver disease The proposed model improved by applying a combination of three classifiers, Logistic regression, Random forest, and KNN algorithm.

2.Title : Prediction and Analysis of Liver Disorder Diseases by using Data Mining Technique: Survey

Author: Shambel Kefelegn , Pooja Kamat

Year : 2018

Liver disorder diseases one of the major diseases in the world, Liver is one of the huge solid organ in the human body; and is also considered a gland because, among its many functions, it makes and secretes bile. The liver theatre's vital role in many physical functions from protein manufacture and blood clotting to fat, sugar and iron metabolism. Liver disorder diseases are any trouble of liver purpose that reason for sickness . The study of paper to predicting and analyzing liver disorder diseases to produce better performance accuracy by comparing various data mining classification algorithm and the performance of the accuracy is measured by confusion matrices.

3.Title LIVER DISEASE PREDICTION BY USING DIFFERENT DECISION TREE TECHNIQUES

Author: Nazmun Nahar and Ferdous Ara2

Year : 2018

Early prediction of liver disease is very important to save human life and take proper steps to control the disease. Decision Tree algorithms have been successfully applied in various fields especially in medical science. This research work explores the early prediction of liver disease using various decision tree techniques. The liver disease dataset which is select for this study is consisting of attributes like total bilirubin, direct bilirubin, age, gender, total proteins, albumin and globulin ratio. The main purpose of this work is to calculate the performance of various decision tree techniques and compare their performance. The study employed some decision tree algorithm such as J48, LMT, Random Forest, Random tree, REPTree, Decision Stump and Hoeffding Tree to predict the liver disease at an earlier stage. These algorithm gives various result based on Accuracy, Mean Absolute Error, Precision, Recall, Kappa statistics and Runtime.

4.Title A Comparative Study On Liver Disease Prediction Using Supervised Machine Learning Algorithms

Author: A.K.M Sazzadur Rahman, F. M. Javed Mehedi Shamrat, Zarrin Tasnim, Joy Roy, Syed Akhter Hossain

Year : 11, NOVEMBER 2019

Chronic Liver Disease is the leading cause of global death that impacts the massive quantity of humans around the world. This disease is caused by an assortment of elements that harm the liver. For example, obesity, an undiagnosed hepatitis infection, alcohol misuse. Which is responsible for abnormal nerve function, coughing up or vomiting blood, kidney failure, liver failure, jaundice, liver encephalopathy and there are many more. This disease diagnosis is very costly and complicated. Therefore, the goal of this work is to evaluate the performance of different Machine Learning algorithms in order to reduce the high cost of chronic liver disease diagnosis by prediction. In this work, we used six algorithms Logistic Regression. We just explored some popular supervised machine learning algorithms more algorithms can be picked to assemble an increasingly precise model of liver disease prediction and performance can be progressively improved.

5.Title Performance Evolution of Different Machine Learning Algorithms for Prediction of Liver Disease

Author: Muktevi Srivenkatesh

Year : December 2019

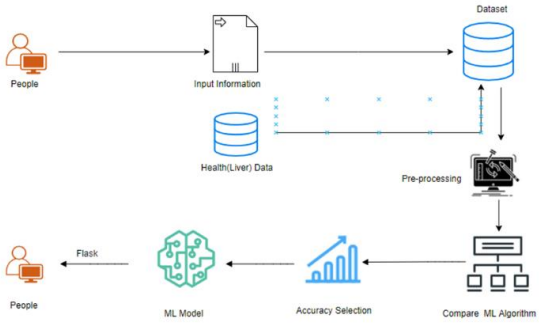
Liver malady is an overall medical issue that is related with different inconveniences and high mortality. It is of basic significance that illness be recognized before such huge numbers of these lives can be spared. The phases of liver ailment are a significant viewpoint for focused treatment. It is a terribly troublesome undertaking for therapeutic analysts to foresee the disease inside the beginning times on account of sensitive manifestations. Generally the side effects become evident once it's past the point of no return. To beat this issue, we have liver infection forecast. Liver sickness might be distinguished with incalculable order systems, and these have been classified the utilization forecast of a number highlights and classifier blends

PROPOSED SYSTEM:

Liver failure is a condition or disease that happens when normal cells in the liver become abnormal in appearance and behaviour. The failure cells can then become destructive to adjacent normal tissues, and can spread both to other areas of the liver and to organs outside the liver. The proposed method is a machine learning model based on the past data of liver failure like the features and target column is identified first using our domain knowledge related to health care. Then dataset is viewed for better understanding of features and then the dataset is split into two parts normally in 7:3 ratio where the data is used for training and testing . The algorithm is applied on the trained data to get better understanding of the features and a classification model is built based on the their learning and different algorithms are compared and performance is measured and compared using their performance metrics.

SYSTEM ARCHITECTURE

Our architecture work flow diagram is given below.



From people

We are collecting the input information from the people then the inappropriate data and repeated data are removed before entering the inputs in the data set. Then we are pre processing it using the machine learning algorithms then we are comparing the machine learning algorithms one by one .Then we have to find the accuracy based on which algorithm gives more efficiency .Then in ML model it will recognize patterns or behavior based on previous data. Then by using flask we are generating the result by categorizing the liver patients affected and the people who are not affected

Work flow diagram:

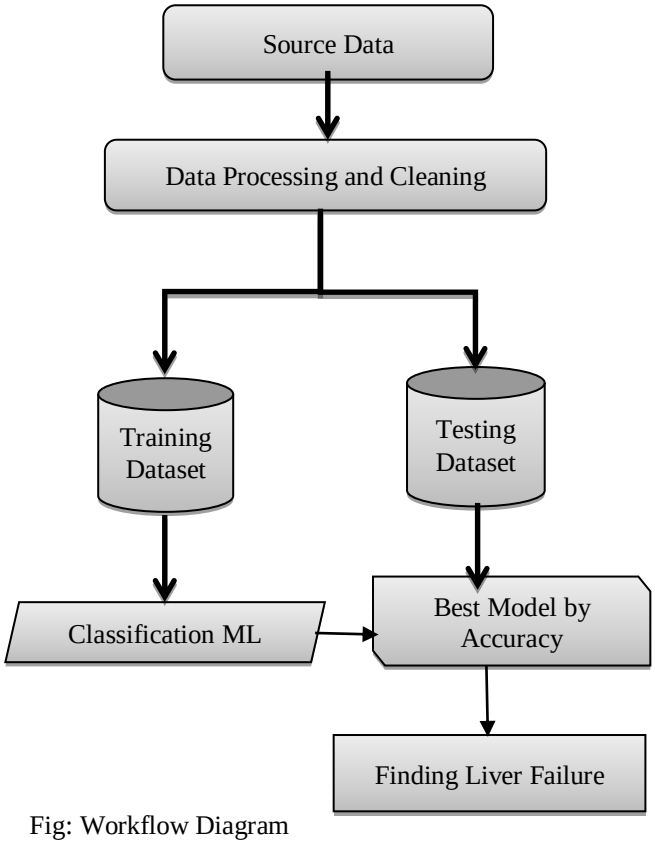
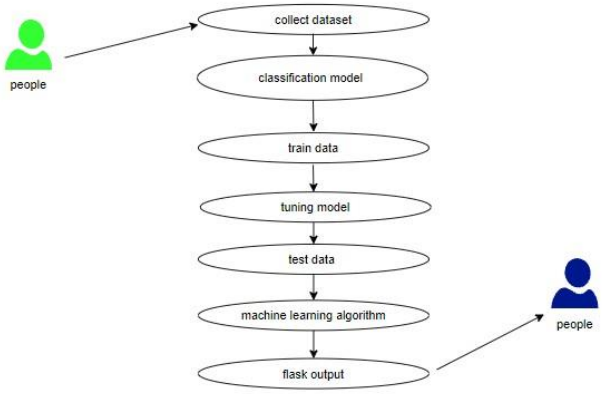


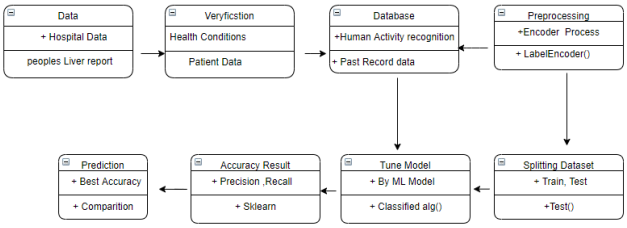
Fig: Workflow Diagram

Use Case Diagram:



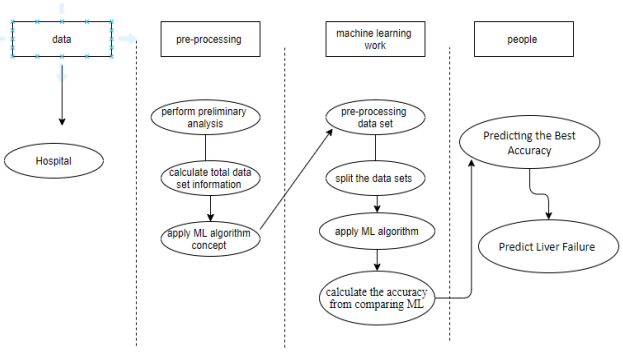
Use case diagrams are considered for high level requirement analysis of a system. So when the requirements of a system are analyzed the functionalities are captured in use cases. So, it can say that uses cases are nothing but the system functionalities written in an organized manner.

Class Diagram:



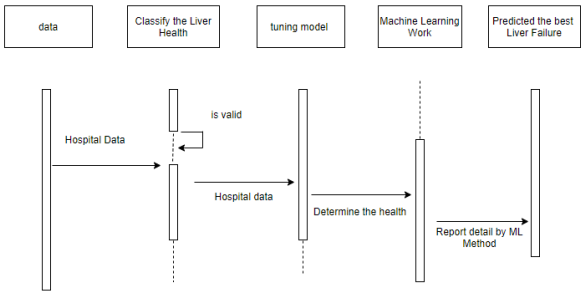
Class Illustration is principally a graphical representation of the stationary view of the system and represents different aspects of the operation. So a collection of class plates represent the whole system. The name of the class illustration should be meaningful to describe the aspect of the system. Each element and their connections should be linked in advance Responsibility of each class should be easily linked for each class minimal number of parcels should be specified and because, gratuitous parcels will make the illustration complicated. Use notes whenever needed to describe some aspect of the illustration and at the end of the drawing it should be accessible to the inventor/ coder.

Activity Diagram:



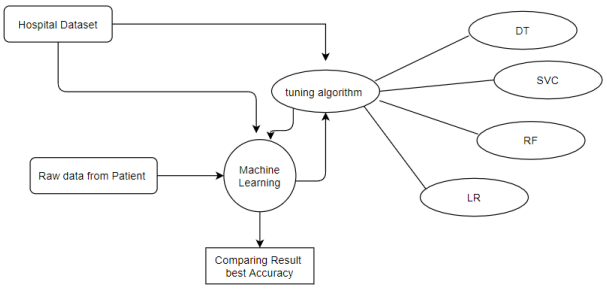
Exertion is a particular operation of the system. exertion plates aren't only used for imaging dynamic nature of a system but they're also used to construct the executable system by using forward and reverse engineering ways. The only missing thing in exertion illustration is the communication part. It doesn't show any communication inflow from one exertion to another. exertion illustration is some time considered as the inflow map. Although the plates looks like a inflow map but it's not. It shows different inflow like parallel, fanned , concurrent and single.

Sequence Diagram:



Sequence Plates model the inflow of sense within your system in a visual manner, enabling you both to validate and validate your sense, and are generally used for both analysis and design purposes. Sequence plates are the most popular UML artifact for dynamic modeling, which focuses on relating the gest within your system.

Entity Relationship Diagram (ERD):



An reality relationship illustration(ERD), also known as an reality relationship model, is a graphical representation of an information system that depicts the connections among people, objects, places, generalities or events within that system. An ERD is a data modeling fashion that can help define business processes and be used as the foundation for a relational database. reality relationship plates give a visual starting point for database design that can also be used to help determine information system conditions throughout an association. After a relational database is rolled out, an ERD can still serve as a referral point, should any debugging or business processer-engineering be demanded latterly.

Conclusion:

The logical process started from data drawing and recycling, missing value, exploratory analysis and eventually model structure and evaluation. The stylish delicacy on public test set is advanced delicacy score is will be find out. This operation can help to find the Liver Failure Grounded on the patient health.

Future work:

- Case Liver Health data connect with real time AI model.
- To automate this process by show the vaticination result in web operation or desktop operation.
- To optimize the work to apply in Artificial Intelligence terrain.

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