PROPOSED SOLUTION

PREPARED FOR

Statistical Machine Learning Approaches To Liver Disease

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1. Problem Statement

With a growing trend of sedentary life which promotes lack of physical activities, diseases related to the liver have become a common encounter nowadays. Liver diseases have caused millions of deaths every year. There are about 100 different types of liver infections. Liver diseases are not easily discovered in an early stage as even after being affected and undergoing partial damage, it will be functioning normally. Liver failures are at a high rate of risk among Indians. India is expected to become the World Capital for Liver Diseases by 2025. The widespread occurrence of liver diseases is contributed due to deskbound lifestyle, increased alcohol consumption and smoking.

With such complications, it is necessary to have a concern towards tackling these liver-based diseases. An early diagnosis of liver diseases will definitely increase patients' survival rate. Afterall, we cannot expect a developed and prosperous nation, with an unhealthy population.

In this project, we aim to examine data from liver patients concentrating on relationships between a list of liver enzymes, proteins, age, and gender, using them to try and predict the likelihood of the occurrence of a liver disease. The main objective of this project is to analyse the parameters of various classification algorithms and compare their predictive accuracies to find the best classifier for determining liver disease.

2. Novelty

In this project to find the best classifier for determining the presence of a liver disease, we need to analyse the parameters of various classification algorithms and compare their predictive accuracies.

In spite of using the well-known classification algorithms of Machine Learning alone, we would also be fine tuning the models by continuously tuning the parameters of the machine learning models and ensuring that the right model and parameter values are chosen, and use these fine-tuned models along with the well-known classification algorithms compare their predictive accuracies to find the best classifier for determining the presence of a liver disease.

3. Feasibility

In this project, we will be implementing the prediction part by training the dataset using fine-tuned as well as the well-known classification algorithms of Machine Learning. Then after comparing their predictive accuracies, the best classifier for determining the presence of a liver disease is chosen. This best trained model is integrated to a flask based web application enabling the user to predict the disease by entering parameters in the web application.

This project proves it's feasibility as it is capable of achieving the following:

- ➔ Users can interact with the User Interface built using flask, to upload the input features
- ➔ Uploaded features/input can be analysed by the best trained model which is integrated
- ➔ After the model analyses the uploaded inputs, the prediction can be showcased on the User Interface

4. Business Model

This project would be one of the most useful for the doctors as well as the patients due to the following reasons:

- Liver disease, in the early stage, is hard to discover through traditional tests and by the time in which the disease is diagnosed, the liver would get partially damaged. Our project would diagnose early, therefore protecting the liver from further damage and also protecting the patient's life.
- The time taken to perform traditional tests for liver disease diagnosis is quite a lot. On the other hand, the well-trained accurate model of ours can diagnose in no time thereby saving a lot of time.
- The traditional tests for liver disease diagnosis are very much expensive, making it infeasible for the patients who cannot afford them.
- Even after the traditional tests are performed, discovering the existence of a liver disease is very complex for the doctors. On the other hand, our model would be able to discover liver disease at ease. .

5. Social Impact

In human beings, the liver is one of the most important parts of the body that performs many functions including the production of bile, excretion of bilirubin, metabolism of proteins and carbohydrates, activation of enzymes, storing vitamins, glycogen, and minerals etc. The liver mainly gets affected due to intake of alcohol. Intake of pain killer tablets and unusual food habits etc also contribute to liver damage. Liver diseases disturb the normal functioning of the liver.

Currently, liver related diseases are identified by analysing liver function blood test reports and scan reports. It takes more time to perform these tests and they are expensive as well. Discovering the existence of liver disease at a very early stage is a tedious task for the doctors.

Early prediction of liver disease using classification algorithms is a beneficial task that can help the doctors to diagnose the disease within a short period of time. This method is not just cost-effective but also saves a lot of time by predicting liver diseases even at early stages, preventing further liver damage.

6. Scalability of Solution

In this project, we will be building a model by applying various machine learning algorithms and comparing the models to find the best accurate model. And finally, integrate the best accurate model to a flask based web application. Hence, the users can predict the disease with ease by entering parameters which are well-known to the patient/user in the web application. The result is instantly displayed on the User Interface to the user.