Improved Prediction Model For The Recommendation of Post Covid Exercises

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Abstract- *Most of the people affected by COVID even after recovery, they struggle a lot to return to normal health conditions. People prefer doing exercises or gym workouts at their home itself. A gym workout or exercise done without following the right procedure or positions and done without the proper guidance of a trainer can damage the muscles. This application will guide the users on various body exercises with step-by-step postures. The users can keep a track of their workout data on a day- to-day basis. This application contains a list of all exercises based on different types. The users can also keep a track of the quantity of weights they used in one particular workout so that they can increase or decrease its capacity accordingly. Thus our proposed web-based gym workout application will act as a virtual guide to the users & will provide a user-friendly gym experience. In this system, the user will be able to view all kinds of exercises based on type or category. Each Workout or exercise is well explained in detail, so that the user can check his posture and can imitate it properly. Users can enter weight or set based on current date and can add multiple entries for each date.*

Keywords- COVID 19, Patients data, Infection, Random Forest algorithm , Post COVID syndrome, Adobe boost algorithm.

I. INTRODUCTION

Exercise is physical activity that is planned, structured, and repetitive for the purpose of conditioning the body. Strength or resistance training exercises make your muscles stronger. Taking out some time from your busy schedule to attend a gym daily for a workout seems difficult for working professionals & college students due to workload & studies. As a result of which many people prefer doing exercises or gym workouts at their home itself. A gym workout or exercise done without following the right procedure or positions and done without the proper guidance of a trainer can damage your muscles. Also, hiring a personal trainer may not fit everyone's budget. So, to tackle this issue we have developed a web based GYM Buddy application that will act as a virtual trainer. This application will guide the users on various body exercises with step-by-step positions with images.

Patients have residual symptoms which may or may not be causally linked to COVID-19.In the absence of universally accepted definition, POST COVID Syndrome by consensus is defined as “signs and symptoms that develop during or after an infection consistent with COVID 19.”The COVID-19 pandemic is a massive global health crises and rapidly spreading pandemic of recent times.

The whole world is affected simultaneously and struck strongly in every short span of time. Initially the death rate due to COVID was very high. Pandemic is now on the top of the list in terms of worldwide coverage.

Due to covid, the death rate has been around 2%, which has now increased to around 4% - 6%.

The statistics do not look so severe, but the total number of cases and the rate at which these cases and the rate at which these cases are increasing day by day make the situation alarming. The main objective of COVID 19 exercise is to maintain the body and mind. It is important for controlling diabetes, lungs and high blood pressure. Maintaining bone strength and muscle tone through exercise is important especially as the regular outdoor activity is curtailed during the COVID-19 pandemic.

II. PROBLEM DEFINITION

”Patient Health Prediction Using Boosted Random Forest Algorithm” analyzed the healthcare industry that requires the real time collection and processing of medical data. Authors and researchers analyzed that ,according to May 2020 the death rate is 4% - 6% and confirmed cases are 8% - 10%. The availability of data for processing the patients data set and identifying the boosted random forest is the best method for processing data. However, these models included in the study are decision tree classifier, support vector classifiers. The boosted random forest classifier was implemented using default parameters for the optimal performance of the model. The author proposed that a real time collection and processing of medical data, and a fine-tuned random forest model boosted by the boost algorithm.[2]

"Physical fitness and exercise during the COVID-19 Pandemic" analyzed the studies that have very common symptoms in covid patients. Regular physical exercise can be helpful in dealing with the health related problems during covid 19 pandemic. Authors and researchers suggest that regular exercise might significantly reduce the risk of acute respiratory distress syndrome which is one of the main causes of death in covid 19 patients.

Research explains about the e health issues experienced by the covid patients are stress, frustration, respiratory problems, cold, fever, fatigue. The recommendations suggested by the authors and organization is to engage the patients in home based exercises like mediation , yoga, aerobic activities. The workflow can be used to run repeatable experiments using input data set to obtain reproducible results. The baseline will motivate the use of web application in large- scale for post covid patients. [1]

"Post-COVID-19 Syndrome and the Potential Benefits of Exercise " analyzed that the symptoms which affect COVID patients are of short-term and long-term health benefits. The data and methods they used may not be transferable to other places and locations. The baseline is a workflow emphasizing correctness and modularity. Author described the long duration of covid However, according to the year 2021,more than 20,000 cases are recorded per day throughout India. From this extended model , the survey says that females are more affected than males, the association of fatigue is more frequent and common in females than males Finally, this application is user-friendly. Healthy food and good exercise can be the main source to avoid covid.[9]

"Remote home-based resistance exercise acutely improves mood profile in older individuals under social isolation during the COVID -19 pandemic." In this paper we analyzed the importance of health exercises. It is the effect of a remote home based resistance exercise for every individual, during the covid pandemic. The remote based exercise session in video call, during pandemic will be the best for health fitness especially for covid patients. The authors and the researchers promote that ,in addition, isolating themselves will be an advantage to the covid patients.

Based on the age and the immunity power , the covid gets cured. The difference between the pre-covid and post covid can be identified by standard deviation. To assess the effect of a remote home based resistance exercise session on mood profile in older individuals under social isolation during coronavirus disease pandemic. Remote home-based resistance exercise may be safe and effective to mitigate the negative impacts of covid 19 pandemic.[10]

"Health resort medicine can be a suitable setting to recover disabilities in patients tested negative for COVID 19"0.This paper predicts and suggests exercise for the patients who are recovered from COVID-19. These exercises are to be maintained such as muscle strength, cardio respiratory and other possible post infectious syndromes. The authors and the researchers suggest that the post Covid patients must have good health may have lung diseases in older days. Even after the recovery the post covid patients may have lung diseases in older days. Covid 19 respiratory outcomes may find benefits with climatotherapy intervention. Stefano Masiero, Maria Chiara Maccarone, Francesco Agostini.[6]

III. METHODOLOGY

In this system, a dataset will be collected from the user. Selecting the dataset and training the application accordingly with the dataset. Assign the output for each iteration according to their health. So, this process continues until the data fits without any error. Based on the health issues of the patient, we predict whether the patient is affected by covid or not.After identification the patient undergoes the health exercise. The patient undergoes to measure lung rate, heart rate, blood pressure etc. With those results, we predict some recommendations on healthy exercise. Under each exercise the user can mark the results based on the daily basis. So that the user can refer and keep on increasing his results. We are trying to implement the collaborating filtering based on the recommendation and accuracy.

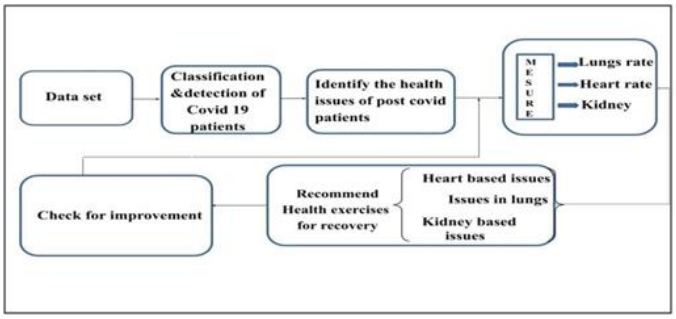


figure 1: Block Diagram of the system

3.1 DATA SET

- Collect the basic details from the user such as name, gender, location, mail id etc…
- Symptoms of the user also collected here fever, cough, cold, fatigue, headache etc….

3.2 CLASSIFICATION AND DETECTION OF COVID-19 PATIENTS

- Select the data set and train the machine iteratively with the data set.
- Assign the output for each iteration according to their health. So this process continues until the data fits without any error.

3.3 IDENTIFY THE HEALTH ISSUES OF POST COVID PATIENTS:

- Based on the health issues of the patient, we predict whether the patient is affected by COVID-19 or not.
- After identification the patients undergo health exercises.

3.4 MEASURES AND RECOMMENDATION:

- The patients undergo measures to measure lungs rate, heart rate, blood pressure etc…
- With those measurements we predict some recommendations on the exercises.
- Under each exercise, the user can mark how much exercise he/she did on the particular date, so that he can refer and keep on increasing this mark.
- We are trying to implement collaborative filtering based on recommendation.
- Measurements of accuracy.

3.5 CHECK FOR IMPROVEMENT:

- With the user's health data set,the application suggests some exercise.
- After the user completes his exercise ,he must undergo improvement. If the user's health is improved the user can maintain the same or the user should undergo other exercises.

IV. IMPLEMENTATION AND RESULTS

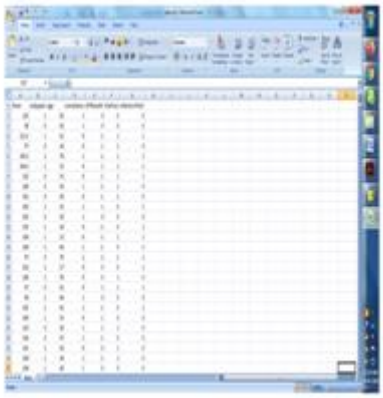
4.1 RANDOM FOREST ALGORITHM:

We are interested in predicting the health of post covid patients that would give best results in doing and recommendation of exercises based on their health issues. We have a data set with optimal characteristics for postcovid patients. Hence, this is a supervised learning problem. The Random Forest (or decision tree forests) is an ensemble-based method that focuses only on ensembles of decision trees. It is a model made up of many decision trees and after the ensemble of trees (the forest) is generated, the model uses a vote to combine the tree's predictions. Each tree's vote has equal weight. Supervised algorithm is a machine learning method in which models are trained using the labeled data set. A Boosted Random Forest is an algorithm, which consists of two parts; the boosting algorithm: AdaBoost and the Random Forest classifier algorithm which in turn the actual tree consists of multiple decision trees.

A decision tree builds models that are similar to a Supervised learning model and is used to identify whether the person is affected by COVID or not based on the health sectors provided by the user. The variety of the bootstrapped datasets and only considering a subset of features result in a large variety of trees, which make the random forest algorithm more effective than individual decision trees. Bagging (testing) at test time, predictions are made by aggregating the predictions of each decision tree (voting as explained earlier).

Each tree outputs an outcome (a class) as its vote and the class with the most "votes" from all the trees is the final prediction made by this random forest algorithm.

4.2 Sample data set:



4.3 Sample Output:

Table 1: Comparison table

Parameters	MLP Classifier	Linear Regression	Random forest regressor
TECHNIQUES USED	Both supervised and unsupervised learning technique	Supervised learning technique	Supervised learning technique
APPLICATION USED	Social media, Medical fields, Automatic vehicles etc…	Business, Sales & marketing, Crop yield production etc…	Bank sector, Medical fields, Marketing etc…
TIME COMPLEXITY	O(n) , where n is the number of connections in a neural network.	O(k) , where k is the dimension of data.	O(T. D) , where T is the size and D is the depth of the data.
TRAINING TIME	Depends upon the dataset.	It has more training time.	It has less training time.
AVERAGE	It has average of 80%	It has average of 71%	It has average of 81%

VI. CONCLUSION

In this project we have built a web portal for the post COVID patients which would help them to get assistance regarding post COVID exercises strategies, primarily for the services of recommendation and information of COVID exercises using Random Forest Algorithm. In this project, we have effectively proposed and have implemented an intelligent exercise recommendation system, which can be easily used by all the users and especially for post COVID patients. Thus an application is built for the post-COVID patients, to focus on their health & body state exercise and fitness plays a major role in POST-COVID**.** This proposal works especially to overcome the difficulties faced by post-COVID patients. Overall this work is implemented from scratch and produces a decent result/accuracy. The future work is to increase the number of images present in the predefined database and to modify with the predefined database and to modify with the dataset for achieving better results.

VII. FUTURE ENHANCEMENT

Future work will focus on creating an online website for covid exercise and upload in cloud, so that any user can use the website, and it can be developed as a mobile application. In future to improve the accuracy, we can use algorithmic efficiency and we can increase the number of dataset. This can provide a step towards working on any efficient algorithm.

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