Neural Net: Machine Learning Web Application

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Abstract- *The Neural Net is a "machine learning" embedded web application. Its sole purpose is to implement the applications of machine learning and making it easily available for users in just one click. In this, Machine learning algorithms like linear regression and logistic regression have been used. There are many live web applications like "covid predictor"; "used car price predictor" on our web app. Many more projects are coming soon like "stock trend predictor" etc. Model has been trained to give minimal error. (Please note: These models cannot be 100% accurate*)

Key Words: **machine learning, deep learning, Linear regression, logistic regression, front-end, back-end, web application, prediction, Covid19 Prediction, used car price prediction**

1. INTRODUCTION

Neural Net it is a web based application. The main purpose of this web application is to integrate the facilities of websites and web apps through machine learning. A web app is similar to website but a web app serves a specific purpose. Different machine learning algorithms are being used in this application which can ease the day to day life of its users. The initial phase of the web application doesn't have many features but with time and more expertise we are aiming to make this an all in one machine learning web app.

With the advancements in this era, technologies such as machine learning and deep learning are used in day to day life applications without even realization. Here in this prototype of this web app we've provided the facility of used car price predictor and covid predictor Used car predictor takes different inputs from the user and runs an algorithm to calculate the price in which the car can be sold. Covid predictor also works in a similar manner. It also takes inputs from the user in the form of symptoms and predict the probability of him/her of being infected. Although, after prediction the user is advised to do further investigations under medical supervision since this web app just merely works on predictions based on external symptoms no on the basis of any test.

Machine Learning:

Machine learning (ML) is the study of computer algorithms that may better themselves over time by gaining experience and using different data. Machine learning algorithms create a model based on training data to make predictions or judgments without having to be explicitly programmed to do so.

Types of Machine Learning Techniques

1.1.Supervised Learning: It is a type of machine learning which includes features and labels for training the model.Features are the inputs on which the model is trained and labels are the outputs which the model predicts. Here, the whole dataset is divided into train set and test set and sometimes into train set, validation set and test set. Linear regression is an example of supervised learning

1.2.Unsupervised Learning:

Here, no labels are provided to the model. Based on the inputs/features provided to the model, it applies some algorithm on it. For example, let's assume that were in a party and there are people chattering and some music is also being played in the background. Now since there is no clear labels thus the algorithm will try to separate the incoming inputs (sounds) on the

basis of similarities. Thus it will divide the whole noise into 2 broad categories first, the sound of the music and second the voice of people chattering.

1.3.Reinforcement Learning:

The best possible way to get the desired output, is Reinforcement Learning. It has different probabilities of output for the same problem and it keeps on learning until it gets the desired output. Even if there is no training dataset like supervised learning, it can predict the output by trial and error basis. It is similar to sequential circuits, where your output depends on previous stage output and current input.

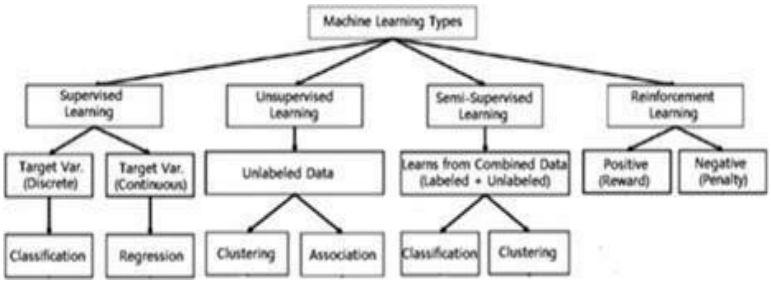

Fig. 1. Varioustypes of "Machine Learning Techniques"

2. MACHINE LEARNING TASKS ANDALGORITHMS USED IN PROJECT

2.1. Logistic regression (LR) :

To estimate probabilities, logistic regression commonly employs a logistic function, often known as the mathematically defined sigmoid function. It can be used to solve both classification and regression problems, but the former is the more popular application.

This algorithm has been used in the covid predictor to predict the probability of the user being infected. Later on, the probability has been converted into percentage to make the output more comprehendible. Since it is not necessary that the best fitted line is always a straight line, it may happen that the outputs are best fitted by some irregular shape like a circle or some log function, in these cases logistic regression is mostly used.

$$g(z) = \frac{1}{1 + \exp(-z)}. \qquad (1)$$

2.2. Linear Regression

The dependent variable is continuous in this approach, the independent variable(s) might be continuous or discrete, and the regression line is linear. Linear regression uses the best fit straight line to build a link between the dependent variable (Y) and one or more independent variables (X) (also known as theregression line). The equations that define it are as follows:

$$y = a + bx + e \qquad (5)$$

$$y = a + b_1x_1 + b_2x_2 + \cdots + b_nx_n + e, \qquad (6)$$

where a is the intercept, b is the slope of the line, and e isthe error term.

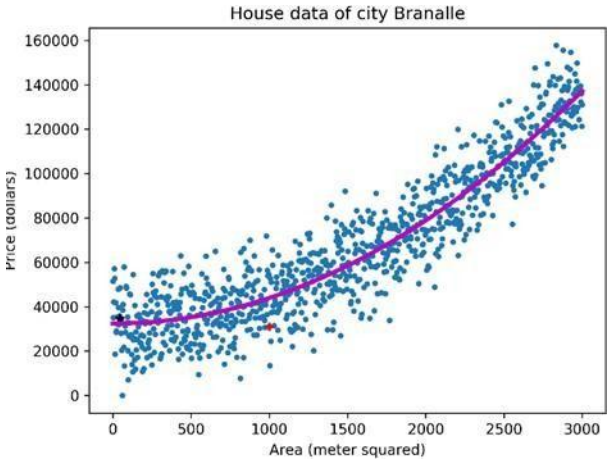

Fig. 2. Supervised Learning

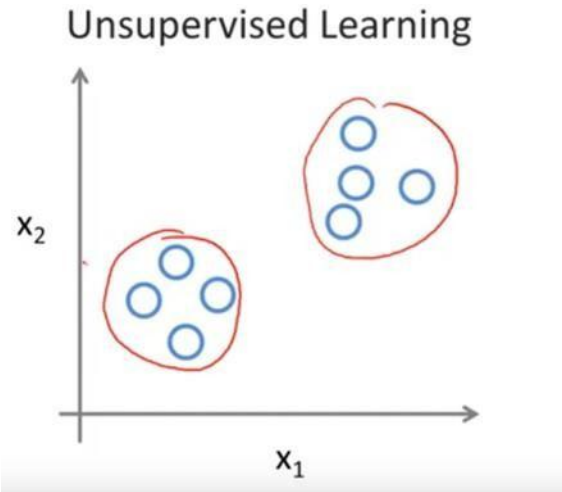

Fig. 3. Unsupervised Learning

Fig. 4. Reinforcement Learning

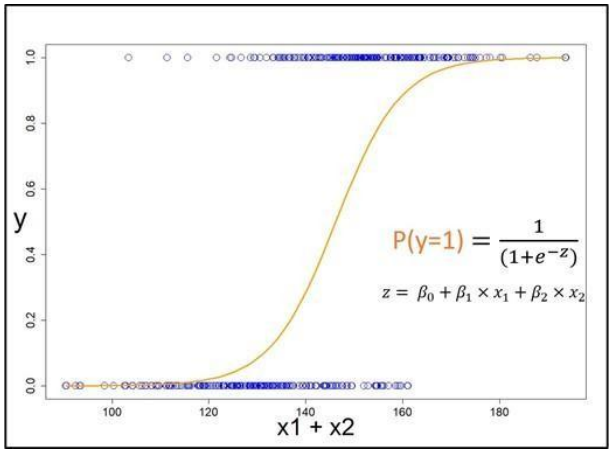

Fig. 5. Logistic Regression

3. SIMULATION AND TECHNOLOGIES USED

Frontend language : html, CSS, Javascript Backend language : node.js, Javascript ,flask

Web framework: flask (python)

ML library used: pandas, numpy, tensorflow, scikit-learn Dataset for Covid Predictor - randomly generated since there is no such official available

Dataset for Car Price Predictor : Quickr

4. Front-end:

The front-end is the user interface part of the web app which the user interacts with. The designes and looks of the webapp comes under the front-end. There are many languages to do front-end designing but we've majorly used HTML , CSS, JavaScript, Node.js, Express.js.

HTML – It is mostly used in creating the skeleton of the webapp.

CSS – It is mostly used in designing the webapp for attractive colors and fonts.

JavaScript – This is responsible for the functioning of the webpage. Drop down menus and other interactive movements takes place under script tag of JavaScript.

5. Back-end:

A machine learning algorithm is trained using a containing symptoms of people and whether they are tested positive or not. Since right now no govt approved is available for people, we have created a random having around 2500 inputs and outputs to train the model This machine learning algorithm uses linear regression to train the model with minimal error.

For the other project, i.e. used car price predictor, the machine learning algorithm is trained using a data set obtained from an open source website that contains many input values that aids in the prediction of the car price based on various factors on which it depends. Here, logistic regression is used to train the model .

It is responsible for all the background functioning of a website which the user cannot see. Suppose we click on a link in the web page and we are redirected to that particular page, this process comes under backend of the website. There are many languages used for backend. We've used Express.js for writing backend codes. Further the machine learning algorithms are

integrated with the web page using Python supported Flask which works as a bridge between the web app and the machine learning models.

6. Result and Discussion:

In the application Neural Net, HTML is used for the basic structuring and CSS for styling. JavaScript is used as the scripting language.

Once a user opens the domain www.neuralnet.co.in the home page of Neural Net opens up.

The Home Page displays four more options. By clicking on these options, the user will be redirected to the respective pages.

This front end website is completely responsive. It can be viewed in split screen on in tablets, desktops as well as mobiles. On mobile and tablets the user will get a drop down menu for these options

Fig. 6 Interface of Web App

The options are as follows:

Home: Displays home page of the web application.

About: Gives detailed information about the creators.

Project: Contains all the services provided by the web application.

Contact Us: Provides the user with a feedback form to contact the domain administrators.

As of now, the domain only displays a prototype of the web application, hence it contains only few services.

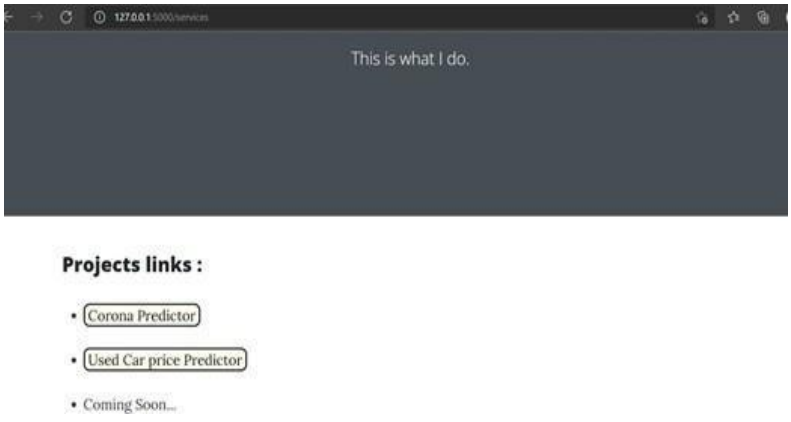

Fig. 7. Interface of the service page of web application

7. Working :

Covid Prediction –

Once the user clicks on the Covid Prediction service, a form is displayed on the screen with multiple questions for them to answer. These questions are fed to the machine learning algorithm as features/inputs, and the label/output is displayed.

Fig. 8. Interface of Corona Predictor

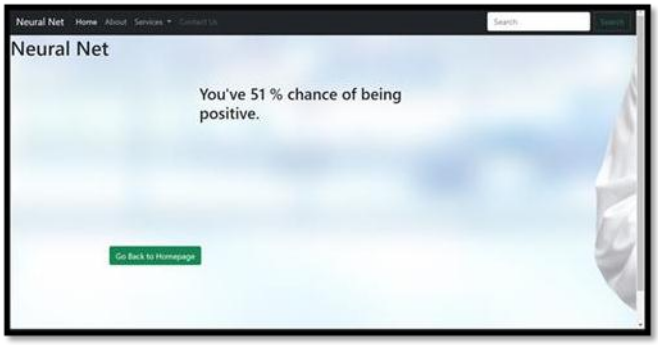

Fig. 9. Output interface of the corona predictor

Features /input: symptoms

Labels/output : probability of them being infected

Form Components: Features/input/symptoms:

1. Do you have fever? The user has to enter their body temperature. The input will be fed to machine learning model in continuous values.

2. Enter your age: The User have to enter their age. The input will be fed to machine learning model as continuous value from 1 to 100.

3. Do you have body pain**?** The User will be provided with 2 options, yes or no. The input will be fed to machine learning model as discrete 1 for yes and 0 for no.

4. Do you have a runny nose? The User have to enter whether they have runny nose or not. The input will be fed to machine learning model as discrete 1 for yes and 0 for no.

5. Do you have breathing difficulties? The User will be provided with 3 options to enter, whether they have breathing difficulties or not. The input will be fed to machine learning model as discrete 1 for extreme difficulty and 0 for milddifficulty and -1 for no difficulty.

Labels/output: 0%-100% (of getting covid 19)

This project will help users to predict chances of a person being infected by the novel Covid19 virus. This can help in speeding up the testing process and isolation as it will be easier to diagnose the ailment. People having high percentage output should be treated earlier compared to those having low percentage output.

A. Used Car Price Predictor:

It is another service of neural net web app which uses linear regression to predict the price of any used car. Inputs taken by this service are car brand, car model, year of purchase, how many kilometers driven, petrol/diesel variant etc. After entering the inputs, it predicts the output price of the car at which it should be sold. This model has been tested for minimal error and maximum accuracy. This model has been trained on a dataset containing more than 890 data of different models of different car brands.

Python libraries used : Pandas, numpy, matplotlib, scikit- learn

Linear regression classifier is used to train the model.The output cannot be predicted with 100% accuracy Features/Input :

1. Select the company: A wide range of car brands will be available for options

2. Select the model: After selecting the particular car brandthe user will be provides with a wide range of car models underthat brand

3. Select the year of purchase: User has to the year of purchase of the car

4. Select the fuel type: Two options are provided petrol or diesel.

5. Enter the number of kilometers that the car has been driven: User has to enter the total distance the car has already travelled.

Flask has been used to deploy the machine learning model into the web application

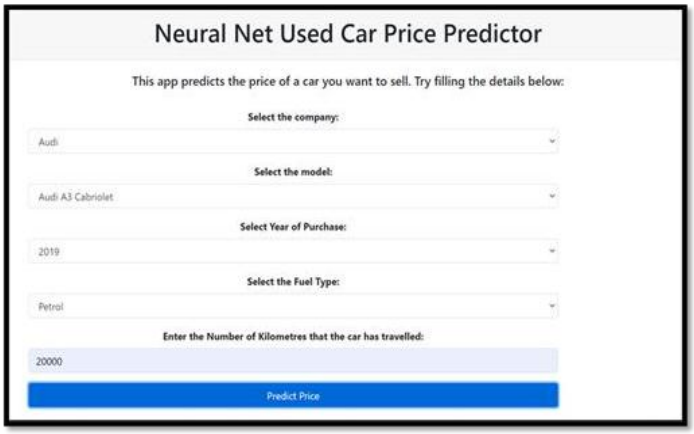

Fig 10. Interface of the used car price predictor

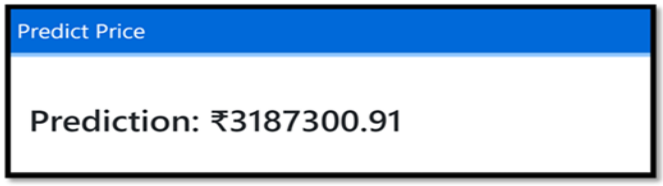

Fig. 11. Output of the used car price predictor

8. CONSLUSIONS

The website displayed the web app with projects in working condition with absolute proficiency and minimum errors. The Covid19 predictor and Used Car price predictor work fine when the user inputs the data and clicks on calculate. The result is then displayed as an output on the screen. The web application uses machine learning algorithms to successfully give a desired output to the user.

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BIOGRAPHIES

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Founder of Neural Net Web App
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