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# Food Nutrition and Healthy diet During Covid-19 Using AI/ ML

Gaurav Jambhulkar<sup>1</sup>, Anushree Panhale<sup>2</sup>, Prof. Swapnil Shinde<sup>3</sup>

B.E Student, Department of Computer Engineering, K J College of Engineering & Management Research, Pune, Maharashtra, India<sup>1,2</sup>

Professor, Department of Computer Engineering, K J College of Engineering & Management Research, Pune, Maharashtra, India<sup>3</sup>

**ABSTRACT:** The COVID-19 outbreak has wreaked havoc on our daily lives. Food nutrition and a healthy diet are even more essential since a well-balanced diet rich in nutrients supports a healthy immune system. In our approach, we take the symptoms of covid-19 and classify them using a DNN classifier, resulting in the conclusion that dietary nutrition and a balanced diet are important during covid-19. Following the categorization, a Decision Tree is utilized to make a decision on the patient's replies and to provide the decision and answers. Decision Tree is simple to learn since it has the capacity to think like a human while making a decision.

**KEYWORDS:** DNN Classifier, Decision Tree, Food Nutrition and Diet.

## I. INTRODUCTION

It is vital to have a healthful diet during the COVID-19 outbreak. What we eat and drink has an impact on our body's ability to avoid, fight, and recover from infections. Healthy diets are vital for maintaining immune systems, even if no foods or dietary supplements may prevent or treat COVID-19 illness.

A healthy diet is critical for overall health, especially when the immune system is compromised. Access to fresh foods may be limited, limiting possibilities to maintain a healthy and diverse diet. It may also lead to an increase in the intake of highly processed meals that are heavy in fats, carbohydrates, and salt. Nonetheless, a diet that promotes excellent health may be maintained even with few and limited foods.

A healthy diet helps keep the body in tip-top shape to fight the infection. Food safety management and appropriate food practices are, however, required in addition to the dietary control requirements.

A balanced and nutritious diet can help to build a strong immune system that can withstand the virus's attack. A set amount of a certain vitamin saturates cells, preventing any nutritional shortage. People who consume a well-balanced diet have stronger immune systems and are less likely to get chronic illnesses and infections. The major goal of this system to promote good eating habits that help people maintain their physical health in covid-19. The COVID-19 epidemic has caused damage on our daily lives. We're socially withdrawing, keeping at home, and unable to eat out. It's easy to fall into bad eating habits during this time at home, but sticking to a healthy diet doesn't have to be a pain with a little planning and preparation.

Nutrition is important at any time, but it's more important during a pandemic since a well-balanced diet of healthful foods aids in immune system health. Eating the appropriate foods in the proper quantity is crucial for our health. The COVID-19 outbreak has had a significant impact on people's daily life. Maintaining a healthy lifestyle has become more vital than ever in these trying times. While there are no foods or dietary supplements that will prevent COVID-19 infection, consuming a good diet can help our immune systems battle the disease. Using the DNN algorithm, we provide a way for obtaining exact food nutrition and a nutritious diet during Covid-19..

## II. RELATED WORK

Rencita Maria Colacoet.al[1] When a nutritious diet is followed on a regular basis, the immune system's ability to combat this illness improves. People must be educated about the importance of eating a nutritious diet. They can estimate what sort of diet a person requires using a collection of healthy dietary data and various machine learning algorithms. They can predict the type of diet and recovery likelihood using algorithms like Random Forest, KNN,



logistic regression, and Support Vector Machines. All of the information about the diet must be included in the dataset necessary for analysis. The Decision Tree technique is used to make a forecast based on the dataset.

NafisehJafar et.al [2] A survey of about 16000 Iranian households was done online using an authors-report questionnaire survey (who were the residents of 1000 urban and rural areas of Iran). Over 1 M records of data and over 1G records of automatically inferred information were stored as a consequence of the process. A series of machine learning experiments were undertaken based on this data storage to study the association between diet and the risk of getting COVID-19. The findings clearly imply that foods and water sources containing particular natural bioactive and photochemical agents may assist to minimize the likelihood of apparent COVID-19 infection, based on the high accuracy of the scores.

Chung-Cheng Yang et.al [3] The fast spread of COVID-19 throughout the world has become one of the primary topics of worry in practically every country since the onset of the pandemic, and governments have taken several efforts to prevent/mitigate the disease's spread. COVID-19 has had a major influence on consumers' food consumption behavior and healthy eating habits/behaviors as an important social factor. The major objective of this study by the authors was to investigate the potential difficulties (such as food waste and weight gain) induced by changes in food consumption behavior during the pandemic.

Valentin Nastasescuet.al [4] The SARS-CoV-2 pandemic has resulted in substantial changes in sociocultural life, diet, and interpersonal connections throughout the world's population. The goal of this study is to determine changes in lifestyle and diet among Romanians one year after the COVID-19 epidemic began. Using institutional mailing lists and social media, a 58- item online questionnaire (addressing socio-demographic and anthropometric data, current eating habits, and lifestyle modifications) was circulated. The survey had a total of 2040 participants, 1464 of whom were women and 576 of whom were males. There were 1598 responders from metropolitan regions and 442 from rural areas. The analysis of the obtained data revealed considerable changes in respondents' behavior as a result of the pandemic condition, including mental emotional shifts in certain cases. An rise of up to 20% in the number of persons suffering from anxiety, sadness, and uneasiness was observed. The bulk of respondents (almost 57%) were between the ages of 18 and 30, and were either students (43.50%) or workers heading to work (33.20 percent ).

Claire Theobald et.al [5] The post by this author gives an outline of the British Nutrition Foundation's Healthy Eating Week, which will take place in 2020. A summary of the Week is included, as well as resources developed, activities completed by participants, the results of two surveys of the impact of the COVID-19 pandemic on children's and adults' healthy eating habits and levels of physical activity in the UK, and an evaluation of the Week, as well as details for future plans.

Lucile Martyet.al [6] Between March 17th and May 10th, 2020, a statewide lockdown was implemented in France to halt the spread of COVID-19. Food consumption patterns were likely affected as a result of the disruption in people's daily routines. They looked at how changes in food choice motivations correlated with changes in nutritional quality during and after the lockdown. At the end of April 2020, a convenience sample of 938 French individuals answered online questions on the Qualtrics platform. Participants were questioned about their food choices and intake in the month leading up to the lockdown and throughout the first month of the lockdown. Health, convenience, sensory appeal, natural content, ethical concern, weight control, mood, familiarity, and pricing were scored on a scale of 1 to 4 on the value of nine food choice motivations.

Stefanie Vandevijver et.al [7] Between March and May 2020, three cross-sectional online health surveys were performed. Adjusted for gender, household composition, educational attainment, and household income, multinomial logistic regression models were used to determine associations between self-reported changes in fruit, vegetable, soft drink, and sweet and salted snack consumption or weight as dependent variables and food insecurity indicators as independent variables. Belgium is the setting.

R. Ramachandran et.al [8] In order to establish the impact of COVID-19 lockdown on eating patterns, food intake, and weight in different nations, a statistical analysis was done. The major goal of this study was to undertake a statistical analysis to determine the influence of the pandemic on human food patterns. Data from a data repository called Kaggle was used to create a retrospective research containing dietary status, nutrient, and calorie variables. It was feasible to infer changes in food patterns between nations of similarity by statistically analyzing the data with RStudio. According to statistical study, fat consumption changes depending on the availability of meat or vegetables during the COVID-19 pandemic, putting the human population at risk of infection due to weakened consumption-based immunity.

Yueching Wong et.al [9] According to the authors' research, a well-balanced diet rich in numerous nutrients, particularly micronutrients, has a critical role in recovering from and avoiding COVID-19-related health problems. Obesity reduction may minimize the risk of COVID-19 infection by reducing the number of angiotensin-converting enzyme 2 receptors in the body, while also increasing the effectiveness of immunization. The relevance of numerous food bioactive, as well as dietary supplements (balanced diet) rich in various micronutrients, against



COVID-19 and its linked abnormalities, is highlighted in this author’s review. Furthermore, based on the supplementation recommendations provided by many popular nutritional, dietary, or health organizations, this contributions, this contribution assists non-specialists in understanding the value of various functional foods/nutraceuticals. To summaries this contribution, a healthy lifestyle and a well-balanced diet have a significant impact on the immune system. Obesity reduction becomes a crucial aspect of the COVID-19 infection. The most essential goal is to identify a possible and effective dietary bioactive that may be used as a supporting or supplemental therapy (prophylactic) to reduce COVID-19-related risk and morbidity.

Michelle M. Littonet.al [10] Food purchasing habits have been radically affected as a result of the corona virus disease 2019 (COVID-19) pandemic, and the subsequent economic slump has resulted in an increase in food poverty. Food poverty is linked to a poor diet, particularly a low consumption of fruits and vegetables, hence foodinsecure people may be disproportionately affected by the pandemic's bad diet-related health effects. They performed an online poll of adult inhabitants of the US state of Michigan in June 2020 to investigate the association between food security status and fruit and vegetable intake during the COVID-19 pandemic. Food insecurity was identified in 36.2 percent of the 484 survey respondents. Food-insecure people ate fruits and vegetables fewer times per day than food-secure people, and they were more likely to say they had cut back on all types of fruits and vegetables (total, fresh, frozen, and canned) since the epidemic began. Poor quality, limited availability, high prices, fewer trips to the market, and fears about contamination were among the reasons for those who cut back on their fresh fruit and vegetable purchases. These findings emphasise the importance of proper food assistance during the COVID-19 pandemic and future pandemics, as well as public health messaging encouraging good eating.

### III. PROBLEM STATEMENT

There are several health-related issues that exist throughout the Covid-19 period. Healthy diets are vital for maintaining immune systems, even if no foods or dietary supplements may prevent or treat COVID-19 illness. Obesity, heart disease, diabetes, and certain types of cancer can all be avoided by following a healthy diet. To address all of these issues, we suggested a method that uses AI/ML to provide food nutrition and a balanced diet during Covid-19.

### IV. PROPOSED SYSTEM

In our proposed system we use DNN algorithm as well as Design Tree for the accurate result.

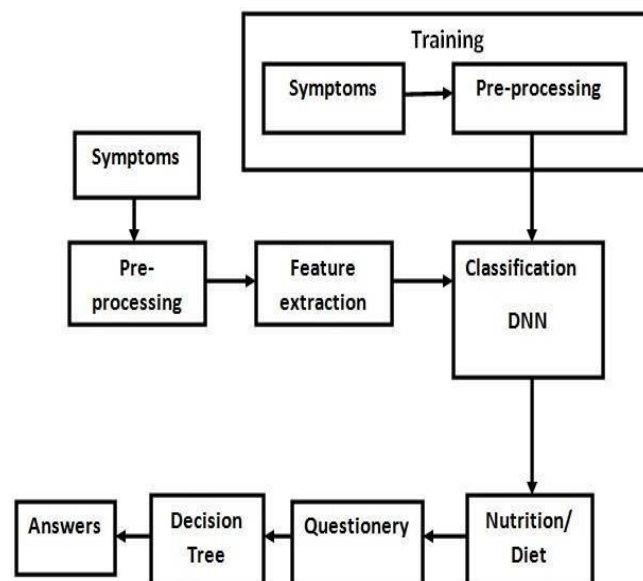


Figure 1: Architecture of proposed system

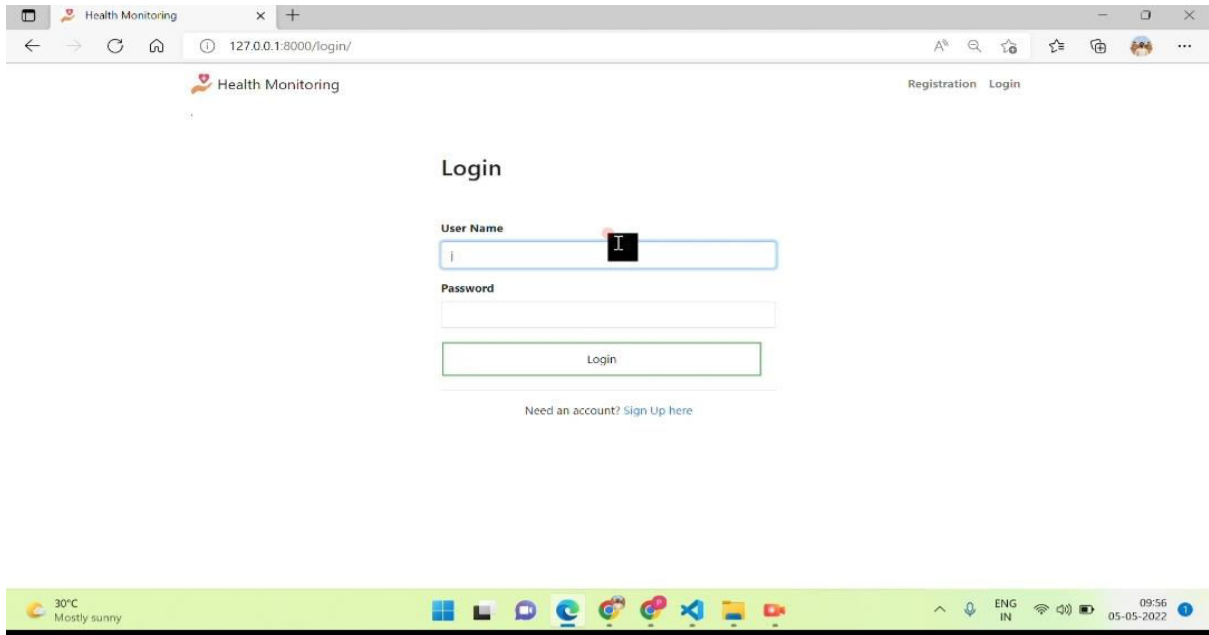
We can observe from the above that the system's input is the symptoms of covid-19 times. After the system gets the data, it does preprocessing and feature extraction on the symptoms.



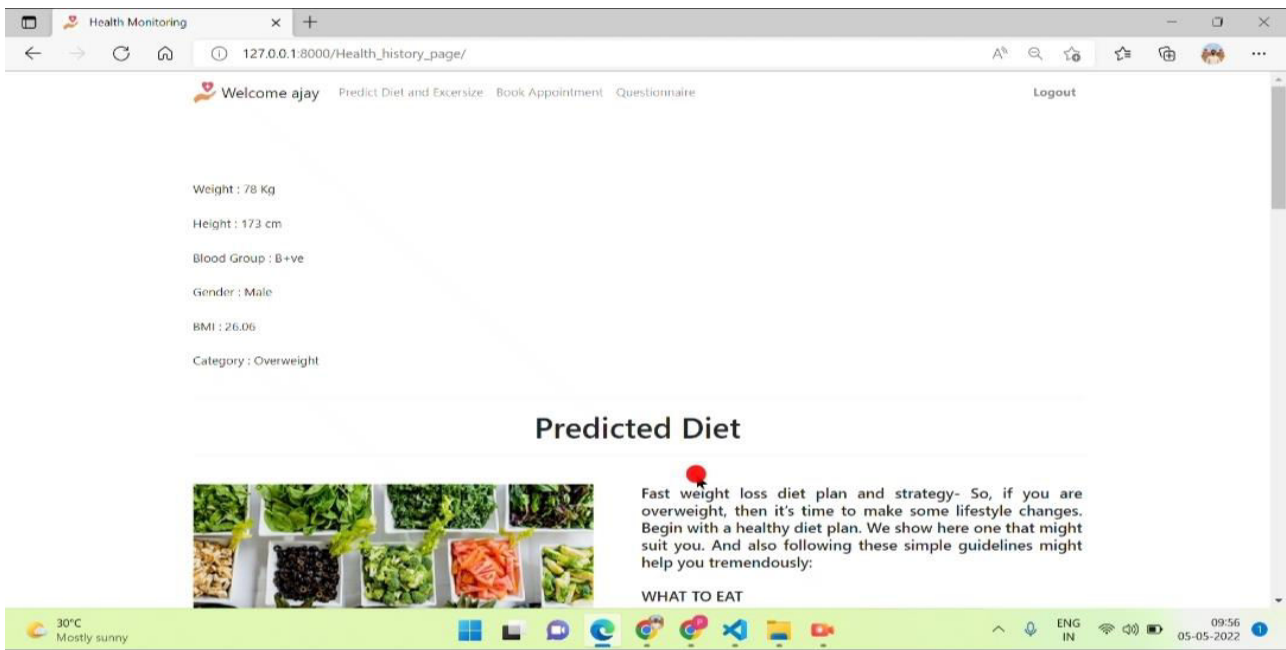
After the system get input then classification of DNN is done and by completes the classification of DNN the system gets the Food Nutrition and healthy diet. Then the patient follows this diet or not. The patient login the second time system questionery on the patient that How are you feeling now?

Patients answer that questions that may be Yes or No. And Decision Tree applies on that answers on that questionery. If the patients answer is Yes then fine, system send the message that you follows the following diet. And if the patients answer is No then the system send message that you have not taken any diet that system gives by DNN. You will definite follow this diet as well as if the patient takes the diet but not feeling well then the system get another diet to that patient

Stepwise approach for getting accurate results in following diet:



Step 1. A user registers to the service. An account a created using user id and password. User has to provide parameters like height, weight, blood group, gender.

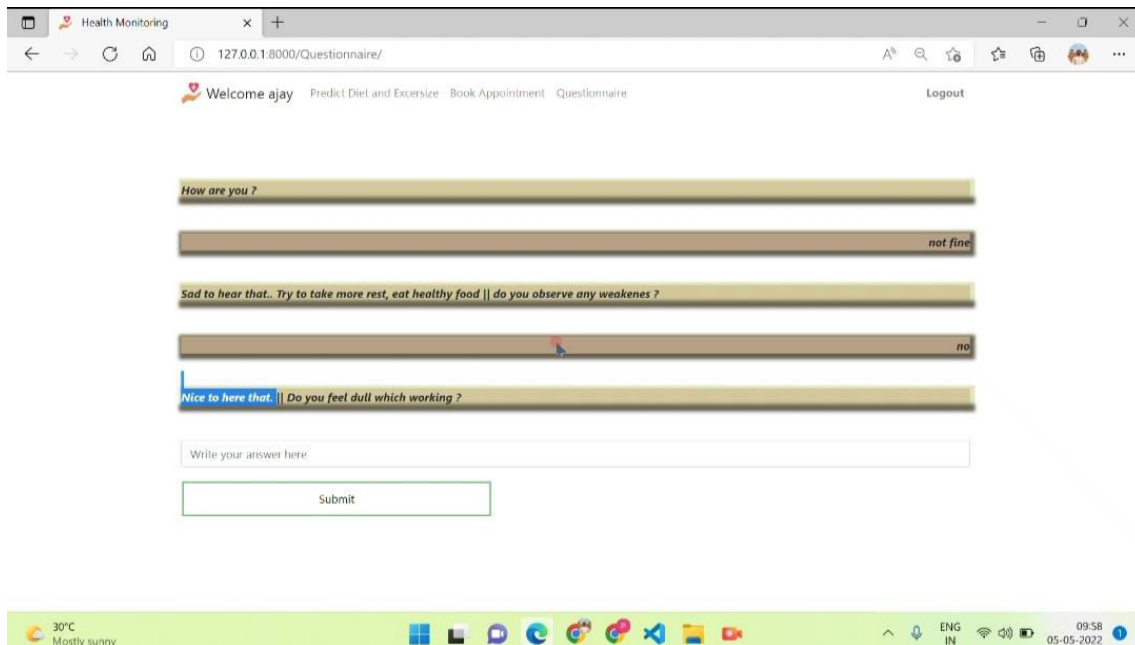




Step 2. On the basis of above information provided, the AI will generate a proper BMI (Body Mass Index) and decide if the person is in which category – overweight, normal, underweight. According to the category, using Deep Neural Network, diet and exercise is provided to the user. Videos are also provided.

Step 3. For interaction purpose, a questionnaire is provided. Here, server interacts with the user for regular check-up of the user – if the user is doing well and following all the prescribed diet or not. For this decision tree is used.

Step 4. To book an appointment with the doctor, a ‘Book Appointment’ window is given to book time slot with the doctor



## V. ALGORITHM

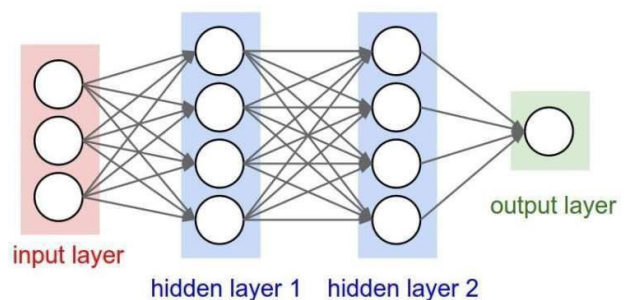
### DNN Algorithm

DNN Algorithm is used for the classification of the symptoms in the system that gives very accurate result comparing with the another systems.

Deep learning (also known as deep structured learning) is a type of machine learning technology that uses artificial neural networks to learn representations. There are three types of learning: supervised, semi-supervised, and unsupervised.

Deep-learning architectures such as deep neural networks, deep belief networks, deep reinforcement learning, recurrent neural networks, and convolutional neural networks have been used in fields such as computer vision, speech recognition, natural language processing, machine translation, bioinformatics, drug design, medical image analysis, climate science, material inspection, and board game programmes, producing results that are comparable to, and in some cases superior to, traditional approaches.

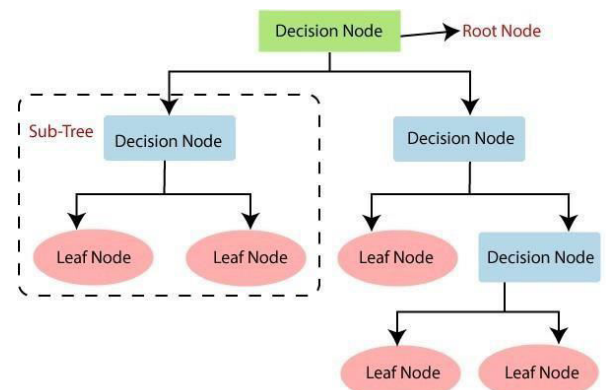
A deep neural network (DNN) is a type of machine learning algorithm that seeks to emulate the brain's information processing. It is similar to an artificial neural network. Between the input and output layers, DNN has more than one hidden layer (1). An artificial neural network (ANN) having numerous layers between the input and output layers is known as a deep neural network (DNN). Neural networks come in a variety of shapes and sizes, but they all include the same basic components: neurons, synapses, weights, biases, and functions.



### Decision Tree

The Decision Tree is used to make decisions and offer those decisions and responses based on the patient's reactions. Because it can think like a human when making a choice, Decision Tree is easy to understand. Decision Tree is a supervised learning technique that can be used to solve classification and regression problems, however it is most often used to solve classification problems. In this tree-structured classifier, internal nodes represent dataset properties, branches represent decision rules, and each leaf node delivers the conclusion. A Decision tree's two nodes are the Decision Node and the Leaf Node.

Decision nodes are used to make any decision and have numerous branches, whereas Leaf nodes are the output of such decisions and do not have any further branches. The features of the given dataset are used to make judgments or run tests



## VI. CONCLUSION

For the categorization of symptoms in our system, we employed the DNN method. The DNN algorithm produces an accurate classification result, as well as appropriate food nutrition and a healthy diet for the patient. Following the DNN method, the Decision Tree is employed in this system to make decisions on the patient's replies and provide decisions and answers. Decision Tree is simple to understand since it has the capacity to think like a human while making a decision. Our method gives reliable results when compared to other systems.

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