Fitness Solution Using Hybrid Algorithm

Akshay Chougule[1], Sushant Gawade[2,] Nimit Dave[3,] Prof. Aruna Pavate[4]

[1](Computer Department, Atharva College Of Engineering, India)
[2](Computer Department, Atharva College Of Engineering, India)
[3](Computer Department, Atharva College Of Engineering, India)
[4](Computer Department, Atharva College Of Engineering, India)

Abstract: *The paper presents the overview of proposed recommender system which helps to maintain people healthful eating routine which in turn would raise their energy and efficiency of work. The nutrition consists of protein, carbohydrate, and fat. People having the habit of eating junk food with high carbohydrate and fat which increases the possibility of suffering from lots of chronic diseases so there is a need of the system that provides the suggestion for balanced nutrition based on diet and daily routine. This work proposed sequential hybrid algorithms to optimize the decisions based on existing knowledge and gives the suggestion of diet and exercise.*

Keywords -*ABC, MAB, BMI, BMR, Recommender System.*

I. INTRODUCTION

Today's generation is facing many health-related problems like obesity, high blood pressure, skin problems etc. The busy life schedule brings out these issues of unhealthy life. Approximately 1.9 billion people worldwide are overweight and over 600 million of them are obese.[1] These conditions increase the risk of health problems, such as hypertension, type-2 diabetes, coronary heart disease and many more. Balanced nutrition mean fueling ourselves with right things, right amount at the right time, to achieve a healthier body and immune to the disease. [1]

A good diet not only protects you from health problems but will also give you more energy and happiness. A healthy life requires good diet as well as regular physical activity. Both are vital in the avoidance of disease and also help recover overall mental and physical health. Diets contain saturated fats, put you at risk of cancers and heart disease, whereas a diet rich in vegetables reduce the risk of these diseases and give other benefits also. Sugar, bad fats and processed foods also increase your risk for joint problems, such as arthritis, which is compounded by a lack of exercise, as regular workouts keep the body active. A healthful dietary should be rich in vegetables, fruits, chicken, fish and whole grains, while exercise should include cardio and strength-training workouts. Generally getting about 30 minutes of physical activity such as walking, biking, yoga or swimming for four or five days a week will help keeps you healthy.

Food recommendation is one of the solutions to obtain an optimal nutrition. A good recommendation can be achieved using an appropriate optimization method. For disease-free health appropriate amount of calories should be taken. Calories play an important role in people's diet as more calories in their food can make them gain weight. Also, consumption of high calories diet can have major bad effects on health. [2] In this paper, we majorly focus on two initial dimensions of food recommendations: calories intake per day consumed by the person and the calories which are left unused for that person. This analysis proposed food suggestion based on protein, carbohydrate and fat. Using ABC algorithm we provided food recommendation to obtain balanced nutrition diet.

To obtain ideal diet previous analyst were used Computational Intelligence (CI) method. Computational Intelligence is sub-branch of Artificial Intelligence. Usually, it is used to solve a complex real-world problem such as optimization problem [4]. The most popular optimization techniques are ABC (Artificial Bee Colony), MAB (Multi-Arm Bandit). MAB formulation is basically here used to show maximization of calorie loss while ensuring suggestions are easy to adopt. MAB algorithm is used in the state of food and activity to calculate user behaviour frequency and average calorie benefit multiplication. [4] Nature inspired (NI) algorithms are based on the nature intelligence met in the survival, feeding and perpetuation of specific strategies of life forms but also on otherartificial or natural phenomena [8]. NI algorithms were developed for both numerical and combinational optimization problems and are able to generate near-optimal solutions for computationally intensive optimization processes. [8]

II. LITERATURE REVIEW

There are many recommendation systems available and are discussed are as follows:

Fidelson Tanzil, Lili A.Wulandhari proposed the system which provides the user food options in accordance with the user's BMI, healthy immune system and calorie intake. The system filtered the food options on the basis of user's inputs. The optimal solution obtained from fitness function, which was the difference between nutrition needed and nutrition suggested must minimum as possible. In this paper, the result showed that ABC achieved 99.90% in giving a recommendation for portion and type of foods per day. [1]

Neha Gaur, Archana Singh proposed the system which explores and recommends a model for systematic diet and healthy food. The system would help youth to maintain their healthy food habits which would increase their energy and efficiency of work. The system takes various parameters as age, genetic disease, gender and recommends the right amount of calorie intake considering various situations. [2]

Anisio Lacerda, Adriano Veloso and Nivio Ziviani proposed the system which was focused on the important problem of adding value to the daily-deals recommendation. It introduces several criteria that can be used to sort customers based on aggregated statistics and past history of emails. The system showed that multi-armed bandit algorithm is extremely effective in sorting customers that are likely to click the e-mail. [3]

Daphney–Stavroula Zois, the proposed system based on MAB formulations can be used among others to model medical tests performed to individuals This paper focused on designing on recommender system which assists the daily routinely diet selections depend on some nutrition guidelines. It takes the user's profile, food taken by and nutrition database and some additional knowledge base. [4]

Xianneng Li, Huiyan Yang, Meihua Yang proposed the system which integrates variable neighbourhood search (VNS) into ABC (artificial bee colony) algorithm so that the search ability under variable neighbourhood structures and local search is accelerated. It gives an idea of neighbourhood change and adaptive local search to significantly accelerate the optimization performance of ABC. [5]

Sundus Ayyaz, Usman Qamar presented a neighbourhood selection approach using collaborative filtering method by comparing two neighbourhood methods, the k-nearest neighbours and the threshold-based neighbours to get the most favourable recommendations. The recommendations generated using collaborative filtering can be further improved by combining a flexible technique with collaborative filtering and implementing a hybrid approach. [6]

Colin Patch, Bruce Gooch proposed an exercise data logging system that collects data. Logging exercise data can help the individual to keep track of their fitness progress and to plan an exercise history allows users to visualize their accomplishment as well as inactivity thus provide feedback and motivation. [7]

Silviu-Ioan Bejinariu, Hariton Costin, proposed the system based on optimization problems, nature-inspired algorithms are able to generate near-optimal solutions faster than other optimization algorithms. ABC algorithm can be used for multimodal and multivariable optimization having the ability to avoid the local solutions and get the global one. [8]

Mikhail Kamalov Vladimir Dobrynin proposed the system which shows the problem of choosing an algorithm that solves the optimization problem for to online data processing. The high accuracy of PMBGD and MBGD ranking algorithms for the tasks of homepage finding, name page finding, and topic distillation. [10]

III. OBJECTIVE OF PROPOSED SYSTEM

The issues of improper nutrition and lack of exercise are endless, both result in major weight gain or loss which puts you at risk for multiple health problems it may be mental or physical. Inadequate nutrition habits can lead to behavioural health issues because of nutrition and diet influence how you feel, look, think and act. A bad diet has a lot of side effects such as reduced thinking capacity, muscle response time and a decrease in strength and laziness.

There are many health-related blogs and articles are available on the internet and it mainly focused on a particular type of nutrition only, so the users get confused and could not decide which method should follow. There are a lot of difficulties user has to face while searching for the suitable exercise according to parameters. If the user is not regular in physical activity and he/she wants to track their activity data then the user will be unable to do this. The data available related to nutrition and exercises over the internet are not so accurate. If the user wants to prefer any expert then it will have cost his/her money and time also.Hence, it is important to make such a system which will able to suggest you the food which will be in your calorie limit. The main objectives of the designing system are as follows:

1) Designing a hybrid system (ABC + MAB) which helps people in getting the good decision of daily diet according to their lifestyle.

2) The system will help the people to get the details of exercise/workout according to their daily routine and schedule.

IV. PROPOSED SYSTEM

A)   Methodology:

Figure 1. Represent the block diagram ofFitness Solution Recommendation System. The proposed system accepts inputs from the user like name, height, weight, age, BMI, gender, food type, exercise type etc. and gives the diet and exercise recommendations. For future recommendation, MAB algorithm is used. MAB algorithm uses the previous diet plan, exercise plan and recommend the user improved diet, exercise plan.
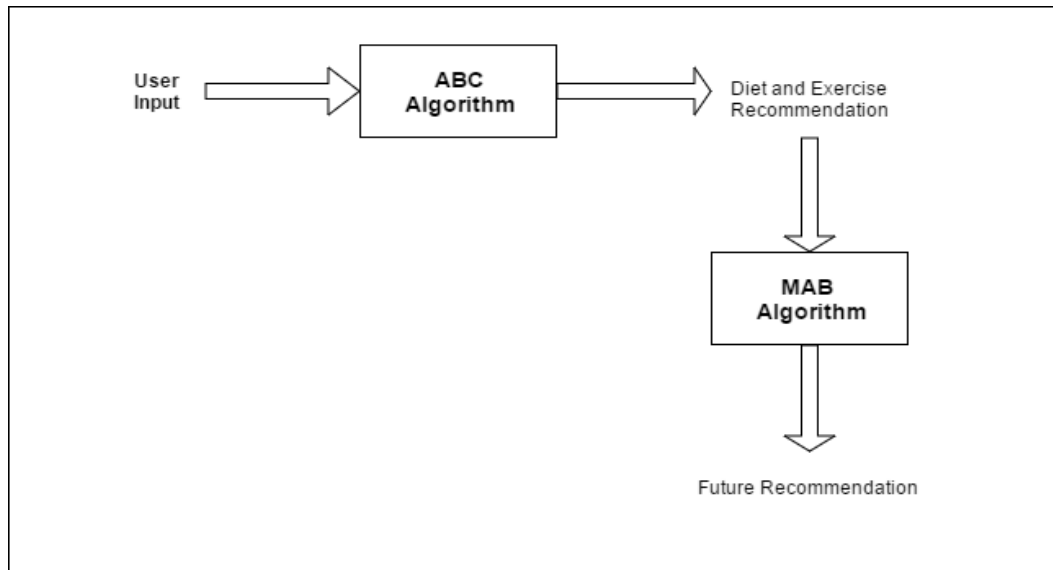

Figure 1. Fitness Solution Recommendation System

Steps of proposed system:

1) The initial task is decomposed into two subtasks. Accept users Body measurements such as body weight, height, age, and activity level. These inputs are used to calculate the users BMI and BMR using formulas.

2) After getting suitable inputs from user artificial bee colony algorithm it is used to suggest required data i.e. diet and exercise plan from our database to the user.

3) The output which is obtained from the processing of ABC algorithm is used as input by MAB algorithm. This algorithm is used to optimize the previous diet and exercise plans. Future diet recommendation can be done through this method.

B) Dataset:

Dataset consists of foods ID, foods name and food nutrients description, exercise ID, exercise name, exercise description is as shown in table 1. The data is collected by using Google forms of different age groups of 15 to 65 years. Total 750 records collected by continuous follow-up of six months. The selection of attributes has done by the expert advice.

Table 1: Dataset attributes of Fitness Solution Recommendation System

Sr.No	Attribute Name	Description
1	User ID	Assign unique identification number to the user.
2	Name	System accepts username
3	Age	System ask for the age of user
4	Height	System asks for user height which will be used while calculating BMI
5	Weight	System asks for user weight which will be used while calculating BMI
6	Gender	System accepts Male or Female values and later that will be used in calculating BMR
7	BMI	Calculated by the system automatically with the help of height and weight of the user.
8	BMR	Calculated by the system automatically by considering height, weight and gender of the user.
9	Food Type	Food type accepts the different values which Include carbohydrate, fat, protein.
10	Exercise Type	Exercise type considered as Low level, medium level, and high level.

V. CONCLUSION AND FUTURE SCOPE

This work proposed a solution which is based on the people lifestyle, food habits and way of living standards. The recommender system keeping various significant parameters as age, weight, height, genetic disease and gender recommended the proper food diet and exercise considering various situations in order to keep the people healthy. The appropriate metabolism is essential to be healthy and for that, it is necessary to know what is good and bad for our health. So we have proposed a solution which will recommend healthy food options available to an individual depending upon the food calorie needed for that body. In future, the proposed system will be implementedby using the sequential hybrid system which will use ABC algorithm followed by MAB algorithm. This work can add more value by adding the concept of mining the data to suggest the type of food and exercise based on the region.

REFERENCES

[1]   Fidelson Tanzil, Lili A.Wulandhari, "*Artificial Bee Colony – Based for Dietary Recommendation in Daily Nutrition Requirements*", IEEE 11th International Conference on Knowledge, Information and Creativity Support Systems (KICSS), Yogyakarta, Indonesia, 5090-5130, 2016.

[2]   Neha Gaur, Archana Singh, "*Recommender System - Making Lifestyle Healthy Using Information Retrieval*", 2nd International Conference on Next Generation Computing Technologies (NGCT), pp.479-484, 2016.

[3]   Anisio Lacerda, Adriano Veloso and Nivio Ziviani," *Adding Value to Daily-Deals Recommendation: Multi-Armed Bandits to Match Customers and Deals*", IEEE Brazilian Conference on Intelligent Systems, pp 216-221, 2015.

[4]   Daphney–Stavroula Zois, "*Sequential Decision–Making in Healthcare IoT: Real-Time Health Monitoring, Treatments and Interventions*", IEEE 3rd World Forum on Internet of Things (WF-IoT), pp.24-29, 2016.

[5]   Xining Li, Huiyan Yang, Meihua Yang, Xian Yang, Guangfei Yang, "*Accelerating Artificial Bee Colony Algorithm with Neighborhood Search*", IEEE Congress on Evolutionary Computation (CEC) pp.1549-1556, 2017.

[6]   Berina Ali, Lejla Gurbetal, Almir Badnjevi,"*Machine Learning Techniques for Classification of Diabetes and Cardiovascular Diseases*", IEEE 6th Mediterranean Conference On Embedded Computing, (Meco), 11-15 Bar, Montenegro, 2017.

[7]   Colin Patch, Bruce Gooch,"*An exercise Data Logging system for retrofitting gym equipment*", IEEE Eighth International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing, pp. 178-185, 2014.

[8]   Silviu-Ioan Bejinariu, Hariton Costin, Florin Rotaru, Ramona Luca, Cristina Diana Nita, "*Performance Analysis of Artificial Bee Colony Optimization Algorithm*",IEEE International Symposium on Signals, Circuits and Systems (ISSCS), 2017

[9]   http://scholarpedia.org/article/Artificial_bee_colony_algorithm [Dated accessed: 10 November 2017]

[10]   Mikhail Kamalov Vladimir Dobrynin," *Online Optimization Algorithms for Multi-Armed Bandit Problem*", IEEE Constructive Nonsmooth Analysis and Related Topics (dedicated to the memory of V.F. Demyanov) (CNSA), 2017.