

Virtual Nutritionist using AI

Siddarthan Chitra Suseendran, Nanda Kishore B, Josephus Andrew, M.S.Rajyashree

Abstract: *Good food is a standout amongst the most basic angles for the family, particularly for their dynamic individuals as solid eating regimen for them results in better life including the expansion of their capacity to learn, work out, and notwithstanding carrying on. In this way, a requirement for a full help for furnishing them with solid nourishment is a fundamental focus to reach. In this paper, we propose a model for a sustenance master framework which point is to give its clients the nourishment skill. It creates solid dinners for people in various ages as indicated by various criteria including their development stage, sexual orientation, and their wellbeing status. An application is created and a few contextual investigations are connected to show how the proposed model can be connected for deciding one's nourishment utilizing Artificial Intelligence (Machine and deep learning).*

Keywords: *Artificial Intelligence, Machine learning, supervised machine learning, unsupervised machine learning, macronutrients, micronutrients, TDEE, BMR*

I. INTRODUCTION

Nutrition, nourishment, or aliment, is that which provides materials - food - needed by organisms and cells to remain alive. In science and human medicinal drugs, nutrition is that the science or observe of overwhelming and utilizing foods. As biology, organic chemistry, and biological science advance, nutrition has become a lot oftargeted on metabolism and metabolic pathways - organic chemistry steps through that substances within U.S. are remodeled from one type to a different. Nourishment additionally centers around how infections, nounditions, and issues can be forestalled or diminished with a solid eating regimen. Also, sustenance includes recognizing how certain ailments and conditions might be brought about by dietary variables, for example, less than stellar eating routine (unhealthiness), nourishment sensitivities, and nourishment bigotries. We as a whole realize The human body requires a few noteworthy sorts of supplements, not all supplements give vitality but rather are as yet critical, for example, water and fiber, Micronutrients are vital however required in littler sums, Vitamins are fundamental natural intensifies that the human body can't blend. A nutritionist is an individual who informs others on issues with respect to sustenance and nourishment and their effects on wellbeing.

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A few people have practical experience specifically territories, for example, sports sustenance, general wellbeing, or creature nourishment, among different controls. A nutritionist advice an individual to take a particular kind of eating regimen relying upon their way of life and a few different elements that choose their full scale and small-scale supplement esteems on standard premise. An AI nutritionist is a mechanized nutritionist who prescribes a kind of sustenance to pursue without setting off to a genuine nutritionist. This is finished by essentially signing into the application and giving the required contributions for the client which is later used to produce the sort of eating regimen he/she should pursue with the definite small scale and full-scale supplement proportion dependent on the data sources given by the client.

II. RELATED WORK

Detailing of healthfully adjusted dinners is an unpredictable assignment, which requires extensive exertion, time, and scholarly ability for assessment of menu things and examination of a scope of supplement esteems. As a stage towards robotizing this undertaking, this interdisciplinary investigation introduces a fluffy advancement demonstrate applying Fuzzy Multi-objective Linear Programming (FMOLP) to make a day by day diet comprising of healthfully adjusted Meals which limit supplements, for example, cholesterol, sugar, soaked fat, and sodium. A viable calculation is created to make a pare to ideal arrangement set of streamlined every day diet decisions. The model is taken a stab at using one hundred Menu things, for showing the real nature of the model in framing an invigoratingly balanced eating schedule.[1] Manual self-checking strategies for eating regimen experience the ill effects of downsides, for example, low adherence, underreporting, and review mistake. Camera based applications that naturally extricate type and amount of nourishment from a picture of the sustenance plate can possibly improve adherence and precision. Be that as it may, best in class frameworks [8] have genuinely low exactness for distinguishing prepared sustenance (just 63%) and are not completely programmed. To beat these downsides, for example, low adherence, underreporting, review blunder, low exactness, and semi-automatedness, MT-Diet, a completely robotized diet appraisal framework was presented.[2][13]

III. EXISTING SYSTEM

The current framework is a completely mechanized eating regimen appraisal framework which can recognize the prepared nourishment with a precision of 88.93%. It is a cell phone based framework that interfaces a warm sensor with a cell phone.

Utilizing this framework a client can take both warm and visual pictures of her nourishment plate with only a single tick. We utilized a database of 80 solidified dinners which contain a few distinct kinds of sustenance with the goal that the genuine all out number of our nourishment database 244 and the database has 33 unique sorts of sustenance. By utilizing the database, we exhibit two center parts: a) sustenance division, isolating nourishment things from the plate and perceiving different nourishment things as a solitary sustenance thing, and b) nourishment recognizable proof, deciding the sort of sustenance. [3]

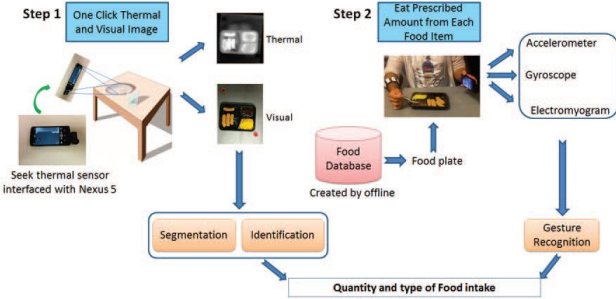


Fig 3.1 Existing System Architecture

IV. PROPOSED SYSTEM

The designed system is a AI based system that allows the user to follow a specific diet with the appropriate macro and micro nutrient necessary for their specific lifestyle and medical conditions with the flexibility of choosing any food that falls within your macronutrient range with recommendations of additional supplements if the micro nutrient ranges aren't met depending upon your goals.[6] This is done by creating an application that as already recoded and stored several researches in its server based on:-

- Diets
- Food profile
- Medical conditions
- Lifestyles
- Body Type

The application learns everything based on the above criteria and integrates all the leaned information into one and provides the type of diet which would bring the best results for a particular individual. For example:- Let's say two individuals A and B share the same type of lifestyle and also have exactly the same type of body and both wants to gain weight but then individual A has 'diabetes' as his pre medical condition then the type of diet that is prescribed to both the individuals will be different and would offer a diet that has foods with a low glycemic index and to consume any low glycemic index foods to hit the macronutrient ratio of carbs in order to bring down the sugar levels and to put on quality weight in individual A and on the other hand individual B would get a diet that he could potentially eat anything provided he hits his macronutrient ratios.[7]

V. SYSTEM ARCHITECTURE

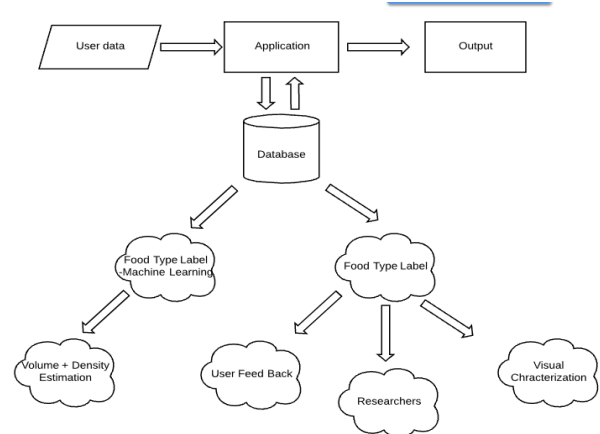


Fig 5.1 Proposed System Architecture

VI. WORKING

Once the user is logged into the application he/she must answer the following inputs that are:-

- The users name.
- User's Gender
- The users age.
- The users height and weight.
- The users body type(i.e. ectomorph etc..)
- The users lifestyle(sedentary , active etc..)
- Extra activities(i.e. Plays sports ,Gym etc..)
- The users goal with time line(weight gain or weight loss)
- Premedical conditions(diabetic, thyroid)
- Preferred type of diet(keto , none, etc..)

Once the user has completed entering the following inputs, these inputs are validated and the necessary information's regarding these inputs are retrieved from the server and is calculated accordingly with the help of supervised and unsupervised machine learning algorithms that helps the user to get a proper desired diet with macronutrient ratio split and additional micronutrient supplements that are helpful for his/her desired goal and premedical conditions.[5] Let's take a real user named 'X' as an example, Let's say 'X' is a male, 22 his is age ,his height is 175cm and his weight is 70 kilos. He is an mesomorph with an active lifestyle and hits the gym regularly with no premedical conditions and his goal is to gain 2 kilos of weight through a diet named 'intermittent fasting' within 2 months. [9][10] The application would first measure the Basil metabolic rate(BMR) by the formula:-

$$\text{Women BMR} = 655 + (9.6 \times \text{weight in kg}) + (1.8 \times \text{height in cm}) - (4.7 \times \text{age in years}) \quad (1)$$

$$\text{Men BMR} = 66 + (13.7 \times \text{weight in kg}) + (5 \times \text{height in cm}) - (6.8 \times \text{age in years}) \quad (2)$$

Once his BMR is figured out the TDEE(Total Daily Energy Expenditure) is figured out by,

$$\text{TDEE} = \text{BMR} \times \text{Activity Factor} \quad (3)$$

Activity Factor Table

Amount of Exercise/Activity	Description	TDEE/Maintenance
Sedentary	Little or no exercise/desk job	TDEE = 1.2 x BMR
Lightly Active	Light exercise/sports 1-3 days/week	TDEE = 1.375 x BMR
Moderately Active	Moderate exercise/sports 3-5 days/week	TDEE = 1.55 x BMR
Very Active	Heavy exercise/sports 6-7 days/week	TDEE = 1.725 x BMR
Extremely active	Very heavy exercise/physical job/training 2x/day	TDEE = 1.9 x BMR

Fig.6.1 Activity Factor Table

Let's say the TDEE for 'X' is 2500 calories and since he wants to gain weight of 2 kilos in 2 months a surplus amount of calorie must be added to his TDEE for him to gain quality weight.[11]

Surplus/Deficit calorie per day = $(3500 \times \text{weight to gain or lose}) / \text{No. of days}$. (4)

Total calories for weight gain = TDEE + Surplus Calories (5)

Total calories for weight loss = TDEE - Deficit Calories (6)

If the total calories required for 'X' per day is 2800, now the macronutrients are split amongst the calories depending on the diet that was chosen by the 'X'.

1g of protein = 4 calories

1g of fat = 9 calories

1g of carb = 4 calories

Once the macro nutrients are split, the foods which are to be taken are listed out by AI depending on 'X's medical condition. Since 'X' has no premedical condition he can pretty much have a lot of foods including few cheat meals at times by the App through its AI technology and also suggests few micronutrient supplementations if their values aren't hit.[14][15]

VII. FUTURE WORK

This health improving AI based nutritionist will be improved in the future by several following ways:-

- The nutritionist can be made smarter by making suggest foods that are based upon a certain cuisine (i.e. Italian, Indian etc..)
- The data that has been recorded will be analyzed based on one's medical or pre medical conditions and pop out suggestions on few things not to do in order to improve one's health.
- A user can track his/her progress towards his/her goal from the day he'd started using the application.
- Reminders for every meal.
- Inbuilt personalized customization of meals depending upon one's preferred foods.

VIII. CONCLUSION

This paper presented is based on a virtual nutritionist using artificial intelligence which is used to support a human's body type goals customized for his/her specific lifestyle by taking everything relevant for a diet into account from just few clicks at home rather than meeting a real nutritionist.

Few key advantages are: Customized diet for any lifestyle and age along with various types of diets to choose from which acknowledges your pre medical conditions with appropriate macronutrient ratio split that ensures micronutrient supplement suggestions based on the foods you consume.

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