

Online Food Calorie Prediction Using Django Frame Work

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Abstract:

The daily food intake and calorie intake consumed should be monitored so that they are taken in a healthy manner. Nevertheless, not all people can give attention to their nutrition because of the lack of time and desire to know the number of calories a piece of food has. The paper outlines a Web-based project about calories prediction in food relative to Django and Python programming language. The specified system will allow a user to identify the food items and learn the approximate caloric value with the help of the interaction with the interactive web interface. The system also holds the information on food and external nutrition API, which will be utilized to derive and determine the calorie information of the different varieties of food. Through the application, the user will be in a position to key in certain food items and view the value of calories and other nutritional contents. The system is also capable of giving the graphical view of the calories intake by the users. The specified solution will provide an effective and convenient platform of tracking the dietary intake, with the help of web technologies and data-driven solutions. It will help the population make the right choice regarding food and follow the balanced nutrition and, thus, increase the regulation of health and lifestyle awareness.

Keywords: Food Recognition, Calorie Prediction, Django Framework, Nutrition Analysis, Machine Learning.

I.INTRODUCTION

The role of healthy lifestyle gains more and more significance nowadays as the modern way of life and the eating patterns are rapidly evolving. People are also likely to stick to hectic schedules, eat processed or fast foods without knowing their nutritional contents. Such a lifestyle shift has added to the etiology of some of the ailments like obese, diabetes and heart diseases. Research carried out in the health sector has indicated that the inappropriate dietary intake and ignorance in relation to the intake of calories is one of the basic factors that have led to the growing incidence of obesity in the global society [1]. Thus, self-management health has also assumed a form of keeping check of the number of calories taken every day. The progress in the computer science and artificial intelligence has made it possible to create intelligent systems that are able to process and analyze a large amount of data. Artificial Intelligence (AI) can be defined as a type of ability of machines to carry out some tasks, traditionally associated with the human intelligence in the process of learning, reasoning, and decision-making. Machine learning as a branch of artificial intelligence enables computers to make inferences and anticipate the future occurrences without

being told in writing [14]. These technologies were actively used in any sphere of life such as healthcare, image recognition, and recommendations systems.

One of the most popular alternatives in the recent past that have been used in dietary monitoring is food recognition and calorie estimation systems. The machine learning algorithms and image processing decide on the choice of the systems to determine and estimate the number of calories in food objects. Research has found that automated food recognition system can be employed in helping a person to keep track of their nutrition. intake more effectively [4]. The picture-based food analysis techniques have also been found to be used to determine the portion size and calories content of food accordingly to the methodology of computation [2].

The food recognition systems have also improved using deep learning methods. The CNNs have been applied in the food image recognition and identifying the food images under the various categories with a high degree of accuracy [9]. Besides that, huge food image databases like Food-101 have been created to facilitate machine learning research projects within the food classification and recognition issues field [12]. These datasets can enable researchers to develop models that are capable of identifying different food objects in the actual world setting.

Online technologies are significant to provide such smart solutions to the user along with machine learning. The Django is a high level python web framework that is based on quick development and clean applications development. It is based on a framework that is known as Model-View-Template (MVT) and it is ready with authentication, database management and URL routing functionalities. Django has also been attracted to the project due to the security features and scaling of the project, making it attractive and appealing.

The modern study is created according to the online system of the food calorie prediction building based on the references of the Django and Python programming language. The proposed system allows the individuals to view the food products and calorie contents on a Web-based interface. The system is linked to a food dataset and outside application programming interfaces (APIs) in order to retrieve the nutritional information. The input food item will be fed into the machine which will then de-compose the dataset and provide approximate calorie content and graphical representation.

The key objective of the project is to develop the convenient platform that would enable individuals to monitor the quantity of calories in their diets and make rational decisions when it comes to their diets. The system proposed would be an easy and feasible method of nutritional awareness and calorie counting, which is an outcome of machine learning concepts, food information, and web apps. Such systems can be deployed to ensure that the users record improved health management and healthier dieting.

II.LITRETURE REVIEW

The present technological breakthroughs in artificial intelligence and machine learning have enacted the creation of robotic vehicles of food identification and calorie determination. The researchers have suggested some processes on how the nutritional content of food items can be determined by applying image processing and machine learning techniques on how to identify the food items.

Livingstone et al. [1] have described the issues of gauging the dietary intake and the need to maintain the food intake within the limits that a person is well nourished. In their investigation, great stress was laid on the need to exercise proper calorie counting in enhancing dietary awareness particularly to the adolescents and children.

In relation to the computation of the size of food portions and prediction of nutritional information, Mingui et al. [2] offered a method of image processing in their work. The research determined that food analysis in the form of pictures can find some use in educating individuals on the amount of food and amount of calories, which can be applied in tracking of food intake.

Burke et al. [3] studied the effectiveness of self monitoring systems in the management of the dietary intake and enhancement of the nutrition behavior. Their inquiry revealed that one of the technological interventions that can be used to empower users is digital food monitoring that helps them to monitor the consumed calories and stick to a healthier diet.

On the principle of image processing and convolutional neural networks (CNN), Reddy et al. [4] created a food recognition system. In their research, an input was a food picture and the number of calories contained in foods was forecasted. The experimental data revealed that the deep learning algorithms are far much better in classifying food than the normal machine learning algorithms.

In a study on estimating calories by a food image of food, Zhou et al [5] presented an article where the determination of calories was done using a food image of food by the process of crowdsourcing. They conducted their analysis dedicated to the study of the precision of the methods of the calorie calculation and the aspects that cause the errors of the predictions. This research was able to conclude that it is possible to use automated systems to simplify the process of diets analysis and help the healthcare use.

A model of predicting calories in food was proposed by Srivastava and Tiwari [6] and it is based on MobileNet. They found out that with deep learning models, the type of food can be classified cheaply and that the amount of calories present in a food item can be predicted with greater accuracy. The paper has indicated the significance of the large size of data in training accurate food recognition model.

The deep-learning-based food intake tracking is the semantic segmentation that Pfisterer et al. [7] proposed. They conducted their work with reference to the analysis of food portions with the help of the RGB-D cameras and deep neural networks. The suggested system could give high-quality conclusions about the estimation of the consumed food and calorie intake in comparison with the traditional strategies. Although these research studies have achieved some level of improvement, most of the current systems use elaborate image processing or specific hardware. Thus, there exists the necessity of a simple and conveniently accessible solution, which will enable users to gain easy access to the calorie content of various food stuffs by the help of the Web-based solution. The given system will solve this weakness as it will provide a web application based on the Django framework that will allow the user to enter the name of the food item in the search engine and render the amount of calories in the food item.

III.EXISTING SYSTEM

In the last several years, several systems have been developed predicting the quantity of calories in food and analyzing the composed dietary intake depending on the machine learning and image processing approaches. Most of the existing systems are keen on identifying food products with the aid of pictures and projecting their calories based on already acquired collections. Identifying the food item is mainly done by the use of machine learning algorithms, which are the Random Forest, the K-Nearest Neighbors (KNN), and the Convolutional Neural Networks (CNN) to classify food items and approximately estimate their nutritional content.

The traditional food calorie forecast technologies primarily use the past data to establish forecasting models. The trained models are then used in the classification of the food categories and calculating the

approximate calorie values. Image processing is used in other systems to recognize food items and the image of a portion of a food, approximating the volume of the portion of the food. Although these methods have been useful in their interpretation of food recognition and calculation of calories, they are laborious when it comes to data processing, as well as requires a lot of training data.

Most of the approaches available in the society are mainly research-oriented and might not offer an easy interface to common users. These systems in a number of instances rely largely on image-based recognition technique, which can give erroneous outcomes in case of poor quality of image or when the food item is obscured in part. Moreover, certain applications need a dedicated hardware like depth cameras or other extended image processing software to estimate the quantity of food and the number of calories. The other weakness of the current systems is that in most cases they are not made available in real-time via the web platforms. Such systems may be hard to engage with since a user needs either specialist software environments or technical expertise. Consequently, the systems might not be friendly to the ordinary consumers who only wish to know the amount of calories contained in the food items within a short and easy time.

Hence, there is necessity of a convenient and efficient system where people can access the information of calories of food items on a convenient web-based system. The suggested system helps overcome these disadvantages by creating a web application in Python based on Django and combining the data on food and API services to help users receive more accurate calculating calories and enhance access.

IV. PROPOSED SYSTEM

The proposed system presents a web-based application that will be deployed to predict the quantity of calories of different food products according to the Django system, and Python programming language. The main objective of the system is to assist in assisting the users in monitoring daily calorie intake and increase diet awareness. Given that the consumption of unhealthy eating habits, and lifestyle diseases such as obesity and diabetes continue to increase, there is tremendous need of systems that can help individuals make the right decisions when consuming food. Unlike the traditional food monitoring systems where the historical data sets are used or a user is expected to perform complex processing procedures on the given images, the proposed system is set out to provide a simple and easy to use web-based application where a user can easily access information about the calorie content of different food items. The system links structured food database and third party nutrition APIs to retrieve nutritional information like the calorie content. The system provides a viable atmosphere of forecasting of calorie and nutrition analysis through a mixture of web technologies and data processing techniques.

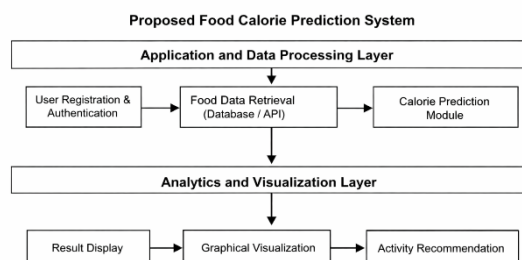


Fig.1.1 Food Calorie Prediction System Proposed Flowchart

The architecture of the proposed system is the following:

- A. Application and Data Processing Layer.
- B. Analytics and Visualization Layer.

The layers are collaborative to deliver the efficient data processing of food information, calories forecasting, and illustration of the findings with the assistance of the Web-based interface.

A. *Application and Data Processing Layer.*

Application/Data Processing Layer is interested in user interaction and food data processing and can retrieve nutritional information in the database or API services. It is the basic functional part of the system.

1) Authentication and User Registration Module.

The system will offer safe authentication system where the user will be able to enroll and access the web application. Registration requires the user to give minimal information like the username and the password. These are credentials which are securely stored in the database.

Upon an attempt by the user to log in; the system will match the credentials typed to the data stored in the database to validate it.

Under successful authentication process, the user is permitted access to the dashboard of the system. In case, the user will be redirected to the log in page. This module will make sure that the access of the system is not compromised and misused.

2) Food API and Integration.

External nutrition APIs and food dataset are also connected to the system to access the appropriate nutritional content of different food items. The information contained in the data set includes the description of various types of food and the calorie content of the food.

A query is done to the dataset or API when one is searching a particular food item to find the relevant nutritional information. There is also such information in the API as the amount of calories, the quantity of energy and other measures which refer to the food product.

APIs interface enables the system to obtain the latest information on nutrition and enhance the quality of calories calculation. The module is also mandated to recall the data together with ensuring that the data is in the right format before it is handled by prediction module.

3) Food search and data processing program.

The food search module allows one to search the individual food items using a basic text-based input interface. Having received a name of a food item, the system converts the query and tries to find food categories that will be matched in the database or API.

After locating the concerned food item, the system eliminates the corresponding nutritional information and prepares it during the subsequent processing. This is the module that also provides access to the backend database.

4) Calorie Prediction Module

The role of the calorie prediction module has been allocated to predict the amount of calories of a specific food item that has been selected. Once a suitable data is obtained in the dataset or API, then, the system will go ahead to determine the amount of calories that are availed by a food item that is selected. This will result in the estimated calculation of the calories content that will be entered and ready to be presented to

the customer. The module will also help the users to know the amount of calories in their food without necessarily calculating it.

B. *Analytics and Visualization Layer.*

The Analytics and Visualization Layer will presumably deal with the processed results and will display the findings in a handy and easy to access form.

1) Results Processing and Results Generation:

This work activity entails the processing of the results and result generation. After executing the calculation of the food item that has been selected, the system then runs the result which is then read on the web interface. Calories are denoted and further nutritional data of energy content or other dietary guidelines is denoted too. This module makes sure that the information that is displayed to the user is well comprehended, accuracy and specificity.

2) Module of Graphical Visualization.

The system provides graphical representation results to a user to enhance the amount of information that they have on the calories intake. The rough value of calories is indicated in graphs or charts and this assists the user in analyzing the nutritional content of the food items chosen. The graphical presentation will help the user to understand the content of calories and the differences in foods. The visualization can also assist the user to trace his/her food behaviour and make better decisions with respect to nutritious food.

3) Module of Recommendation of Activities.

It also has the activity recommendation program where the system provides physical exercises that are necessary to utilize the consumed calories. The exercises will be recommended in the program to be undertaken as walking, running or cycling depending on estimated calories contained in the food item taken.

This aspect helps the users to be informed about how the calorie consumption can be equated to the sporting activity and promotes the healthier lifestyle habits. Summary The system suggested is a web-based media of analyzing the quantity of calories of the various varieties of food stuffs and communicating the nutritional information to the customers.

V.METHODOLOGY

The given methodology is a systematic process of the creation of a web-based food calories calculating system on the basis of Django and Python programming language. The methodology will be aimed at combining a food database, user engagement modules, and calories calculator mechanisms to make the right nutritional information.

The workflow starts with the initiation of the system and setting up of the environment, and the interaction with the user and entry of the data occurs. The system is fed with the necessary data on the food in the dataset or external APIs and subsequently the data undergoes processing resulting in the generation of an approximate data of calories. The findings are then anticipated and tabled out to the user in the form of graphs in order to understand them better.

It would be beneficial to the proposed methodology since food data in structured data and external nutritional APIs would be automatically estimated (a task which is conventionally a manual task of a user). The system takes as its input the user and it determines the food item that the individual has ordered and makes an approximation of the calorie value of the food item.

There are six significant steps in the methodology:

1. System Installation and Start-up.
2. Interaction with Data entry and User.
3. Food Dataset Retrieval
4. Processing and Caloric Prejudice.
5. Result Visualization and Analysis.
6. System Evaluation and Acceptance.

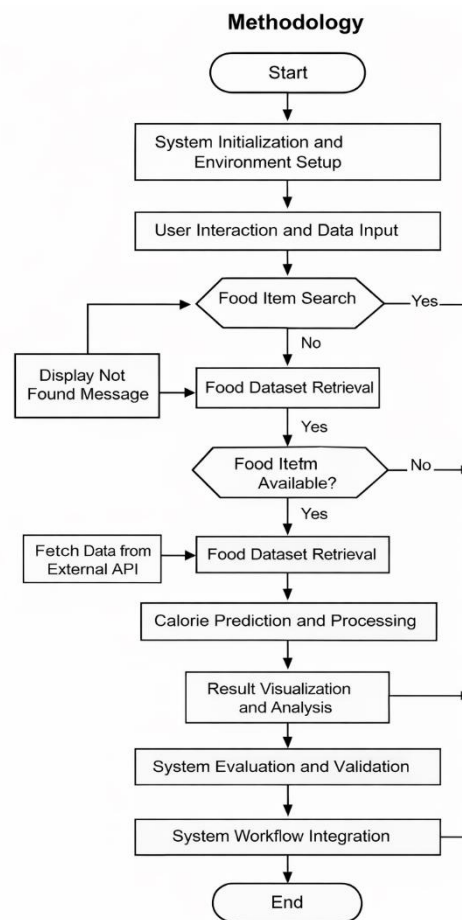


Fig. 1.2. General methodological procedure of the planned food calorie prediction system.

Fig. 1.2 is flow of methodology of the proposed food calorie prediction system, the sequences that will be followed in order of sequence to run the system.

A. *Installing the systems and the Islam environment.*

The first one will entail establishment of development environment on which calorie prediction system implementation will be developed. It is hosted on a web application platform called Django that is based on the Model View Template (MVT) framework of an efficient web application development.

The configuration of the system is as follows:

- Set up of python and Django framework.

- Database environment This holds the food database and user details.
- APIs combination with outside nutrition.

Development of project modules of user management and calorie prediction.

The nutritional database is loaded with nutritional information of the food on the various nutritional value including calories, carbohydrates, protein and fat during the first part of the process. It is the largest contributor of calorie prediction.

B. User Interaction, Data Entry.

This level has a system that has interactive user interface where the users can access the application. The customer will have to open an account and log in with valid credentials in the system.

When one is successfully authenticated, they can search or select a food item on the list that are availed. The input of the user is forwarded to the system that forwards it to the backend server that processes it.

The end user inputs are usually recorded in the following format:

- Food item name
- Quantity or serving size
- Food category (if applicable)

This information is applied to explain the input factors that are applied in estimating calories.

C. Food Dataset Retrieval

Once the user input has been received, the system extracts nutritional information concerning the user input in the food dataset or the external nutritional APIs.

The data include broad facts concerning some of the food items including the number of calories in each item taken.

The retrieval process involves;

- Viewing the database of the chosen food item.
- Matching of the food item and the respective nutritional records.
- Elimination of caloric characteristics of the data set.

The system can also demand external nutrition APIs to provide the required information in case the required food is not found in the local dataset. This will make sure that the system will be able to hold a variety of food products.

D. Forecasting and Energy Conversion of Calories.

The system then performs calculations on the approximate calories value based on the information that is set in the dataset that is accessed at this stage. It is the calorie prediction module which approximates the amount of calorie by calculating the amount of calorie based on the amount of chosen food item and the size of portion picked.

The process of prediction includes the following:

- The estimation of nutrition of the food item. either quantity or service of calories.
- Other nutritional property processing, where necessary.

What one is given is the estimated amount of calories which is the approximate amount of energy that the chosen food item has.

E. Result Visualization and Analysis.

This system then calculates the value of calorie which is then followed by giving the ultimate result of the system which is then displayed by the system to the user through web interface. The system enables the graphical presentation of the nutritional data e.g. histograms and bar graphs in order to facilitate the

comprehension of the customer. With such visual images, the users will easily know the amount of the calories and other nutrition value of the food item of choice.

The visualization module can contain:

- Charts of calories distribution.
- compositional nutrition graphs. -Comparison of various food stuffs.

Such visual cues allow customers to make healthy food choices.

F. System Evaluation and validation.

The last process will be the assessment of the effectiveness and reliability of the suggested system. Various foodstuffs are used to test the system to determine the level of accuracy of the prediction of the calories.

These parameters of evaluation are:

- Emphasis of the calories details on the dataset or API.
- Response time of the system
- Authenticity of processing the input of the user.
- Web interface usability.

The testing makes sure that the system is operating correctly and it gives same calorie forecast of the system.

G. System Workflow Integration.

The entire methodology is a continuous process that connects the interaction with users, the data and the prediction retrieval and the visualisation.

Workflow may be explained as follows: User input food dataset Retrieval Calorie Prediction Result Display Visualization. This type of systematic approach would be adopted in a manner that would result in a proper estimation of calories in a system proposed besides providing a user-friendly and scaled web-based space.

VI. RESULTS AND DISCUSSION

The food prediction calorie system would be suggested and developed based on the Django web framework and Python programming language. The system includes incorporated food database and third-party nutritional APIs, which will give a nutritional value of various food products in the form of calories. The fact that the developed application was able to generate the information regarding food demonstrates that the system could access food information and estimate the number of calories and pin it in a convenient web interface.

The system was tested with the help of different foodstuffs and the accuracy of the calculated calorie value of the set of data was proved. The input can be effectively handled within the application, the relevant nutritional details could be accessed and the approximate calories estimates could be displayed with very low response time.

The outcomes prove the given system is effective and can be relied on to calculate the quantity of calories and assist individuals to be more aware of their diets.

A. System Results of Implementation.

The various modules that will be incorporated into the designed system will entail the user authentication, food data retrieving, predicting of calories and providing a result. Application interface provides an opportunity to a user to register, log-in, and search the food items.

Once a user chooses a particular food item, the system will fetch the nutritional value of the food item and calculate the number of calories that would be consumed based on the portion. The calculated calories will be translated to the end-user through the web interface.

The outcomes prove that the system is effective in the following functions:

- Registration and user identification to the user.
- Foodstuffs picking and locating.
- Retrieval of nutritional information of the nutritional information in the dataset.

Caloric calculation of values.

- Slurring of results in graphic representation.

These characteristics are a test of functional validity of the given system.

B. Performance Evaluation

The system had been subjected on different parameters such as the response time, calorie and application usefulness. Testing was done with different food products including fruits, vegetables and ready-made meals. The retrieved values of the calories were compared and crossed against the nutritional values that existed in the database. Their results indicated that the system has the right amount of calories of the foodstuffs of choice.

In addition, the system was responsive to the request of the users. It includes the database management system which is combined with Django framework which enables access and processing data and within a short period of time.

C. Visualization and User Interaction.

The system will present the calorie information graphically to enable the users have more information on the nutritional intake. They are in either chart or graph format so that they can demonstrate the calorie composition and nutritional value of various foodstuffs.

These pictorial representations make the system more functional as well as simplify the task of consuming the calorie information by the system users.

The application interface was streamlined and user friendly whereby the user could just search the food items and obtain predictable calorie without being technical.

D. Discussion

The given system can be deemed to be efficient in predicting the calorie content and offering nutritional information using the web-based platform as the evidence of the experiment proves. The system is able to search and process nutritional information effectively as it relates to Django with the help of a food data. The proposed system is a more convenient and quicker way of getting information on calories as opposed to the old fashioned ways of computing calories. The users of the office will be able to gain access to nutritional information and make healthy eating choices.

There are, however, some constraints on the system as well. The type of prediction of the calories is dependent on the quality of data and the data available in the dataset. People might have missed all the food items in the dataset hence it might need additional integration with API.

Other functions that may be added in the future would involve introduction of image based food recognition, personalized meal list and the support of mobile applications, which would further develop the system.

VII.FUTURE WORK

Even though the recommended system provides a feasible way of predicting calories, it is possible to improve the future study to introduce additional functionality into the systems and make them user-friendly.

One of the potential improvements could be suggested as the possibility of the introduction of the image-based food recognition methods, which were founded on the deep learning models. This would allow the users to put pictures of food stuffs and the computer would automatically identify the food and will provide an estimate of calories in the food.

The other possible enhancement is the personalized systems of dietary recommendations. It was also possible to use the system to provide customized nutrition information and meal planning services by analyzing the preferences and nutritional status and the amount of calories expended on a daily basis.

This is also subject to continuation in future through the development of the mobile version of the system which will be simpler and more convenient to use and check the calorie intake at any place they are.

It is also a possibility that the number of calories of more food stuffs can be more predictable since the data of food may be further expanded and various food nutritional data bases can also be combined which may increase the accuracy and

the magnitude of prediction. The system would also become more useful with the improvements, and would assist in the development of intelligent digital applications to ease the control of the diet and tracking of the health.

VIII. CONCLUSION

The paper has introduced a web-based project of calculating the caloric value of food built with the Django technology and Python. The most important objective of the system was to offer the users a feasible platform of calculating the calories content of various food items and enhance nutrition awareness.

The advanced database of food and third-party nutritional APIs will be incorporated into the proposed system to acquire access to the sufficient food information and calculate the amount of calories. The developed application allows individuals to find food products, provide calories projections and diet observation in the interactive web-based application. The fact that the graphical representation is used also facilitates interpretation of the user when the data on calories is given in an easy to understand format.

The experiments were effective and proved that the system can retrieve access to food data and approximate calories with low response time. One of the aspects of the integration is the Django framework, which provides effective management of data and performance scalability of the application. Overall, the suggested food caloric forecast system can also be offered as a potential alternative, which can be offered to people, who are interested in keeping track of their caloric consumption and make the correct nutritional decision. The system may attain its goal of simplifying by involving accessibility of an accessible readily available web-app.

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