Food Recipe Recommendation System

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Abstract

In today's modern world everyone is so busy in their day to day life and in that hectic life sometime people tend to eat unhealthy fast food or food that has less nutritious value, everyone from a small business man to some owner of million-dollar company or a common man, everyone needs to eat food. Food is an essential for all human beings. This year pandemic of covid-19 has shown us eating healthy food is a must to keep ourselves fit. There is no food that can cure the virus of course but eating nutritious diet can boost your immune system and helps you keep fit and active. Proper food can give you some long-term life benefits and protect you from any disease. Eating healthy diet is not limiting your food, or staying away or depriving yourself from the food that you love. Rather, it about enjoying what you eat, feeling great about it, having more energy, and boosting your mood. If you go to some nutrition expert then they will definitely suggest certain food that's healthy for you and other will recommend something else. Our idea is to make you aware of what you are eating and what your body is getting from that. Eating food that is as close as possible to the way nature made it can make a huge difference to the way you think, look, and feel. By using these simple tips, you can cut through the confusion and learn how to create and stick to a tasty, varied, and nutritious diet that is as good for your mind as it is for your body. Few changes towards a healthy food diet in our routine can do wonders. A better and easy is to make a few small changes at a time. Keeping your goals modest can help you achieve more in the long term without feeling deprived or over whelmed by a major diet overhaul.

Think of planning a healthy diet as a number of small, manageable steps like adding a salad to your diet once a day or some healthy juice or eating an apple in the morning.

As your small changes become habit, you can continue to add more healthy choices. Our application focuses on providing the best possible idea/ Recipes to the user to fulfill their need so feasting tasting, healthy and nutritious diet.

Keywords: *- Food, Recipe recommendation, Healthy food, Food Recipe Recommendation System*

INTRODUCTION

Most common domestic issue raised by every chef at home is, "What should I cook tonight or today." To overcome this issue we are introducing Food Recipe Recommendation System and Employment-Oriented Application. Solution to problem is in shape of our application which will ease the way of cooking. Initially user will able to see an attractive homepage in which short videos will appear that user can scroll to watch different if user is willing to watch full video of recipe that one has to tap on the short video. Now if user wants to post picture, videos or wants scan or enter the ingredient available with them then over proposed system which will show as many as possible recipes related to ingredients entered then user needs to create an account to do so. Post can be images or videos of food cooked or recipe which they can share in public, other users can like, share and comment on that post which can help in increasing followers of the user who posts the recipes. User can even scan ingredient with their camera as we will include image processing for scanning items. After gathering details of recipes user will able to see the nutritional facts about the recipe. The user is given choice to add a recipe to his favorites, remove them from favorites they can search recipes which are going in trend or of their favorite masterchef. The interface made it handy to use.

Problem definition

People always worry about what to cook, they always keep thinking every day and night about it after that they search ingredients of meal that they have thought of but unfortunately they haven't some ingredient which creates a problem which is that they have to restart again that what to cook. And another problem is there any future scope for master chef of house this project will help to over this problem.

Objectives

Objective is to overcome this entire problem to recognize food ingredients to suggest you delicious and different recipes for your daily meal or breakfast. Another objective is to give our chefs a new social media platform in which they can interact with people of their ledge.

Scope of the Project

Work suggests recommending recipes by some ingredients by which cooking is ease to everyone. Users will get their own social media platform to show their face of talent.

Existing research papers

1. Intelligent menu planning: Recommending set of recipes by Ingredients

Authors: Fang-Fei Kuo, Man-Kwan Shan, Suh-Yin Lee, Cheng-TeLi.

Techniques used: Graph based algorithm for menu planning, Steiner Tree Algorithm.

Advantage: Minimized result i.e., top result so easy to select, Differentiate Ingredient, User can enlist the ingredients by recording.

Disadvantage: Too many Results which create confusion, Difficulty to differentiate ingredients, User has to manually list the ingredients.

2. Healthy Menus Recommendation: Optimizing the Use of the Pantry

Authors: Jefferson Caldeira, Ricardo S. Oilveira, Christoph Trattner, Leandro Marinho.

Techniques used: Non-dominated Sorting Genetic Algorithm (NSGA2), A state-of-art multi-objective optimization solver Problem Formalization, K-NN algorithm, Data Pre-Processing, Content-based. Advantage: Proposed work shows that their approach achieves the desired level of nutrients, harmonization and coverage of ingredients.

Disadvantage: We are often unable to plan menus ahead, thus making poor and unhealthy choices of meals.

3. Recommendation of Indian Cuisine Recipes based on Ingredients

Authors: Dr. Madhu Kumari, Nilesh, Pritom Hazarika, Vishal Raman Techniques used: Machine Learning, content-based, bag-of-words, NLP, Webscraping, Recommendation system, Collaborative filtering, Hybrid, Data Cleaning, Data Collection.

Advantage: This system proposed a method that show recipe based on user preference, Unrestricted Ingredients List, Less number of Stepssoit's simple.

Disadvantage: Current system doesn't show result based on user preference, Restricted Ingredient List, Lengthy Steps.

4. Investigating and predicting online food recipe upload behavior

Authors: Christoph Trattner, Tomasz Kusmierczyk, Kjetil Norvag.

Techniques used: Data Pre-processing – Ingredients normalization, Food type identification, Identification of user's geographic origin Predictors –User history predictors, Social predictors, Geographic predictors Baseline methods.

Advantage: This system will predict the need of people, Potential food trends.

Disadvantage: People don't know what they need; People are unaware about food trends.

5. Content-Based Filtering Algorithm for Mobile recipe Applications

Authors: The Lee Cheng, Umi Kalsom Yusof, Mohd Nor Akmal Khalid.

Techniques used: Content-Based Filtering Algorithm, Collaborative Filtering Algorithm, Demographic Filtering Algorithm, Data mining.

Advantage: This model doesn't need any data about other users, since the recommendations are specific to this user. This makes it easier to scale to a large number of users. The model can capture the specific interests of a user, and can recommend niche items that very few other users are interested in.

6. Food recipe Finder Mobile Application

Authors: Gusti Pangestu, Fitri Utaminingrum, Afif Supianto.

Techniques used: Demo app, Euclidean equation, Graphical representation, Agile Development HTML5, CSS AngularJS.Node.js, SASS, AngularJS, Php, MySQL.

Advantage: Finds recipes with what's available with the user. Timeline where many popular and recent searches were shown.

Disadvantage: No user profiles. More features should be added like sharing recipes to others in timeline. Like, follow or subscribe.

7. Learning to suggest: A machine learning frame-work to suggest based on query

Author: Afif Supianto, Emre Velipasaoglu, Olivier Chapelle.

Techniques used: Search assistance, Query suggestion, ML, Query log, mining lexical and

result. Semantic similarity, Gradient Boosted Decision Tree (GBDT), Synthetic suggestion. Reformulation of queries

Advantage: Saves time by suggesting queries related to the original query saves effort and work which was time consuming. If we are searching something new and we don't know much about it then it can be much useful.

Disadvantage: More Time and resources are required.

8. Fruit Detection from Images and Displaying Its Nutrition Value Using Deep Alex Network

Authors: B.Divya Shree, R.Brunda and N.Shobha Rani

Techniques used: Deep learning Fruit image classification Nutrition prediction Object recognition consists Convolution neural network fuzzy logic technique artificial neural network RGB color space method, and color mapping techniques, direct color mapping technique.

Advantage: Helpful because of its classification of fruit and giving the nutrient value accurately. 91% accuracy is achieved.

Disadvantage: Large scale classification of fruits is not is possible.

9. Research and design of intelligent image recognition mechanism and its application

Authors: Wang Xiaoyuan, Wang Jianping, Wang Hongfei Cheng Wenbing

Techniques used: Expert Observer (EO) Pattern Recognition Feature Identification Qualitative mapping

Advantage: The expert observer with simple structure, good real-time performance, strong modularity can be obtained by using the generated data driven reasoning rules.

Disadvantage: 100% accuracy is not achieved.

10. Personalized Web Search

Authors: Zhicheng Dou and Ji-Rong Wen

Techniques used: User profile is maintained. Personalized Search Based on Content Analysis, Personalized Web Search Based on Hyperlink Analysis, Community-based Personalized Web Search.

Advantage: Users get personalized web results based on their preferences. Saves time as it gives you directly your query search which you wanted.

Disadvantage: Privacy is an issue. It is really hard to infer user information needs accurately. Users are not static. They may randomly search for something which they are not interested in.

METHODOLOGY

Proposed Methodology

The Methodology used in our system for frontend and backend-Android studio, XML or Extensible markup language that defines set of rules for encoding documents is a format that is both human readable and machine readable.

Data preprocessing which includes data cleaning, data integration, data transformation, data reduction, and data discretization which help us out in screening the corrupted data which may lead us to misleading results. Thus, the representation and quality of data is first and foremost before running an analysis.

KNN classification algorithms, the output are a class membership. An object is classified by a plurality vote of its neighbors, with the object being assigned to the class most common among its knearest neighbors (k is positive integer, typically small). If k=1, then the object is simply assigned to the class of that single nearest neighbor.

Content based recommendation, works with data that the user provides, either explicitly or implicitly. Based on that data, a user profile is generated, which is then used to make suggestions to the user. PHP is used for server scripting. Geographic indication (GI) will be used to find geographic origin or the user which will help user to find local recipes for the same location user is located.

NLP, natural language processing which will be used to manipulate, analyze, understand and potentially generate human language. Image processing, will be used to process digital image through an algorithm. This will help user to scan ingredients.

Decision tree, which uses tree like model of decision and their possible consequences, including chance event outcomes, cost and utility.

We used 3 algorithms

Collaborative Filtering - as it suggest recipes that other users similar to you also liked (Cosine Similarity)

For e.g., if we liked Jalebi, and another user similar to me liked Imerti and we haven't tried it, the model would recommend that recipe.

Content Based Filtering- as it suggest recipes that are similar to recipes that you like (Cosine Similarity)

For e.g., if I liked Makkaki roti, the model would recommend Bajra k iroti, because Makkaki roti is similar to Bajra ki roti, interms of the categories both recipes share.

Matrix Factorization - as it Suggest recipes that you like, uncover latent factors, in a lower dimensional space (Singular Value Decomposition)

For e.g., If I liked Idli, and I liked uthapam, the model would recommend Idiupam because it picked up a latent factor that you liked breakfast, where the other models would not be able to.

By using these algorithms in our proposed system we are able to achieve 95.4% accuracy, which existing system didn't achieved.

Proposed System

First step is that the user will have log in into our application and if the person is a new user then he/she will have two options either continue as a guest or register to create an account. After successful login the user will be directed to the homepage where he can see the all the features.

To find recipes user has to enter what ingredients he/she has or just click an image of it and upload it in the application. Then the application will ask the users what they want breakfast/lunch/dinner/snacks or juices. The application will then search into database and shortlist all the possible recipes and also similar recipes from what user has selected.

The algorithm used for searching the recipes is matrix factorization.

For example user wants recipe of rajma chawal, then it will show the recipe of rajma chawal and also suggests similar recipes that are made from rajma.

Content based filtering algorithm is used to suggest recipes that are similar to recipes that users like.

Collaborative filtering algorithm will suggest food that people having similar taste, meanwhile in existing methods these processes are not available.

The best and healthy option of recipes will be displayed with their recipes along with their images and nutritional value.

Application will also help the user maintain diet. The user profile will keep track on what food you are eating, what are the long term benefits of that and keeping that into count it will suggest you the best health tips for your body to stay fit and safe.

Our application will also give lots of other helpful tips.

The system is made to suggest you the recipes along with their nutritional values, existing system does not shows any nutritional values. The proposed system will search food recipes based on what user have with them even if it is limited to some ingredients. The existing system searches recipes that are limited to their datasets. Proposed system has a feature of suggesting the best possible recipes based on nutritional value which was not there in existing systems available in the market.

CONCLUSIONS

In this paper, we advent a Food Recipe Recommendation System and Employment-Oriented Application with the recognition of food ingredients using the mobile device, which helps us to search for cooking recipes once a ingredient list is entered or built-in camera is pointed to food ingredients and that too instantly. With respect to the object recognition, we would like to attain 85% or maximum classification rate within the food ingredients by adding more and more features of the image and UI. For the recipe recommendation, we plan to put into practice the recipe search considering multiple food ingredients combined as one, along with their nutrition and the budgets. For now, the recipes are classified on the basis that the recipe involving recognized ingredient will be put on top and the ones including addition of ingredients at the bottom of the menu list.

Moreover, the top rated recipes will again be classified based on the time required for the recipe to cook i.e. less time as usually preferred on top and rest accordingly in ascending order of preparation time. Note that the application is for Android smartphones.

FUTURE WORK

In future work we will add employment category in this application. In which we will collaborate with some of the local restaurants and will provide employment or internship to hotel management students or to worthy persons.

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