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Recommendation of Indian Cuisine Recipes Based on Ingredients

Aarti Nagarkar¹, Chaitali Rangam², Tejashri Suryawanshi³

U.G. Student, Department of Computer Engineering, Sinhgad Academy of Engineering, Kondhwa BK, Pune
Maharashtra, India^{1,2,3}

ABSTRACT: Recipe Recommendation System for Indian cuisines is a system that learns from the past preferences of a user's preferred dishes to recommend him/her new, untested cuisines. The basis of recommendation is the ingredients in the recipes already liked by the user. The conventional food of India has been broadly refreshing for its remarkable utilization of herbs and flavors. Indian food is known for its substantial arrangement of dishes. The Cooking style shifts from locale to the district and is generally separated into South Indian and North Indian food. India is very acclaimed for its differing multi-food accessible in countless and inn resorts, which is reminiscent of solidarity in assorted variety. The staple nourishment in India incorporates wheat, rice, and heartbeats with chana (Bengal Gram) being the most vital one. In current occasions, the Indian sense of taste has experienced a great deal of progress. Bengali cooking is refreshing for its astounding utilization of panch phoron, a term used to allude to the five basic flavors, to be specific mustard, fenugreek seed, cumin seed, aniseed, and dark cumin seed. Similarly, the other cuisines from all around the country are a blend of flavor's nourishing the taste buds.

KEYWORDS: Recipe; Food; Cook Book; Recipe Retrieval; Android; Recipe Generator; The Meal chart.

I. INTRODUCTION

There are lots of varieties of Indian cuisine available with same ingredients. In India, Traditional cuisines consist of wide varieties due to locally available spices, herbs, vegetables, and fruits. In this paper, we purposed a method that Recommends recipes of Indian cuisine on the basis of available ingredients and liked cuisine. For this work, we did web scraping to make a collection of recipes' varieties and after that apply the content-based approach of machine learning to recommend the recipes. This system gives the recommendation of Indian Cuisines based on ingredients.

The conventional food of India has been broadly refreshing for its remarkable utilization of herbs and flavors. Indian food is known for its substantial arrangement of dishes. In this paper, we presented a method for Indian cuisine recommendation using ingredients matching of cuisine and liked food. For this, we did web scraping to make the database of Indian cuisine and collect information all about the all cuisine recipes and used ingredients. The above issues such as cold start need to be addressed. One of the ways in which we can do this is by linking each user to their social network profiles and suggests recipes liked by their friends. Heterogeneity can be addressed by building better, more dynamic crawlers. So, it will be possible in future that enhance the food recommendation by using hybrid approach [12] and web crawling methods where the extracted meta-data is more. [13] Future improvements could include making suggestions based on the geographical location where the cuisine originated, or based on the particular chef whose dishes the user likes. The system could also leverage the user's location to suggest specialty dishes found in nearby restaurants.

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II. LITERATURE SURVEY

Thakkar, Priyank introduced This paper explores different ways of combining predictions from UbCF and IbCF with an aim of minimizing overall prediction error. In this paper, we propose an approach for combining predictions from UbCF and IbCF through multiple linear regression (MLR) and support vector regression (SVR).[1]

Qian, Yongfeng, et al. "EARS: this paper proposes an emotion-aware recommender system based on hybrid information fusion in which three representative types of information are fused to comprehensively analyze the user's features [2]

Pereira, Nymphia says In the hybrid approach, the techniques of collaborative filtering, i.e., user-user and item-item similarity along with demographic filtering, are combined. [3]

Wang introduces This paper builds a dichotomy model of shareholder-stock relationship based on the distributed graph computing framework Spark GraphX, and using a certain financial theory, transforms the investment behavior of users (shareholders) into the ratings and trust of the invested stock[4]

Zhao says we propose a new document representation method named fuzzy Bag-of-Words (FBoW) in this paper [5].

III. PROPOSED WORK

The recommender system carries out the process of suggesting new cuisines to the user.

The system has been provided with an extensive dataset of Indian dishes collected from the web, with exhaustive data about the ingredients and steps of each of the recipes.

For each user, the system stores the dishes liked by him/her, and tries to match their ingredients with the ones in its database and finally the system suggests the top results to the user.

It is a combination of more than one recommendation techniques to predict item for the users, of which the recommendation technique used are collaborative and content-based.

Basically, it overcomes the drawback of limited user-item rating problem of collaborative filtering techniques and cold start problem in content-based techniques.

Foodie will require minimal user input, yet still provide substantial information regarding the desired output. A database will be used to keep track of all the foods owned. From this database, ingredients will be searched when the user decides what kind of dish he wishes to create. The app will feature direct integration with the user's input ingredients, so it will know what ingredients you have so you can cook great meals. The system will show all kinds of food vegetarian as well as non-vegetarian cuisines. Recipe information will include details about a recipe, instructions for preparing a dish, ingredients, preparation time along with pictures as guides to great food.

In the Fig1 below, for each user, the system stores the dishes liked by him/her, and then tries to match their ingredients with the ones in its database. After the search ends, the system suggests the top results to the user.

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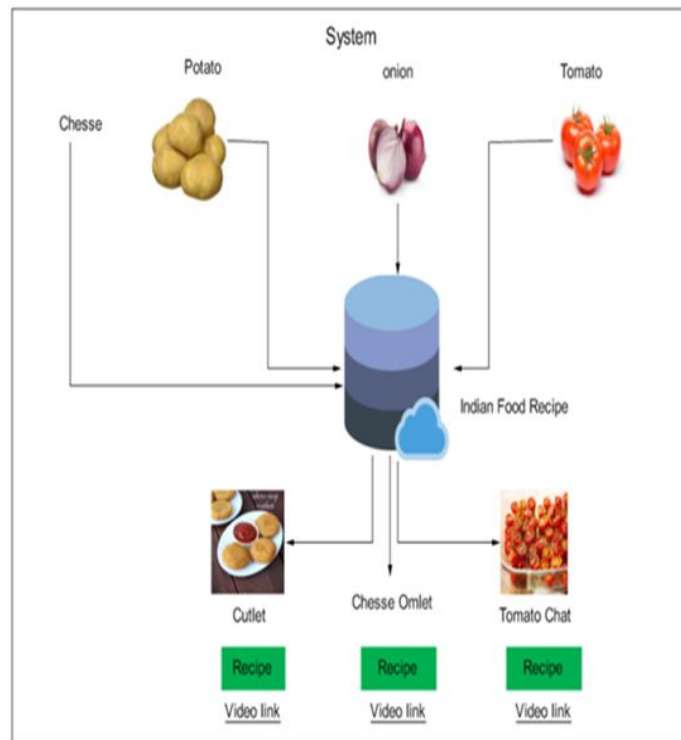
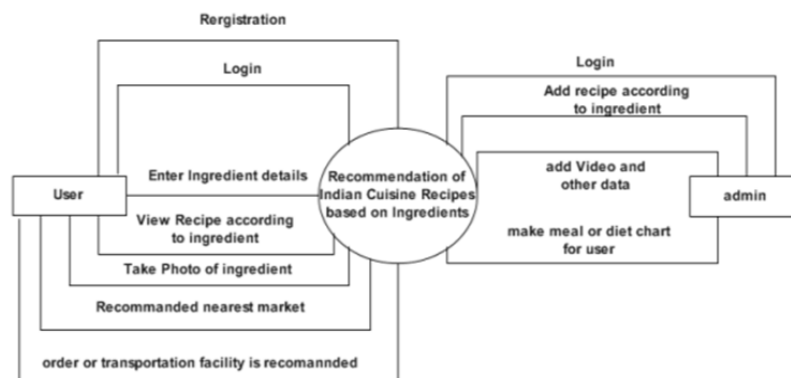


Fig1: Architecture Diagram

In Fig2, The system performs various operations, such as Registration, Login, Enter Ingredient name, image, video, make diet chart, recommend nearest market, order online or transportation facility.



Data Flow Diagram : Level-0

Fig2: Data Flow Diagram

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IV. ALGORITHM

A. OCR

OCR consists of many phases such as Scanning of image, Pre-processing, Segmentation, Feature Extraction, Classifications and Recognition, Post Processing. The task of preprocessing relates to the removal of noise and variation in the image [3]. In scanning step the image is acquired. The quality of image depends highly on the scanner being used. In practical applications, the scanned images are not perfect there may be some noise due to some unnecessary details in the image which can cause a disruption in the detection of the characters in the image. Preprocessing involves removal of noise (applying filters like Gaussian filter, Gabor filter etc.) and proper conversion of image like a colored image can be converted into gray scale or binary image for further processing of image. Feature extraction involves recognizing the feature required. Classifications and Recognition phase is the extraction phase of the process. After finishing the OCR process several post processing steps are necessary depending on the application, e.g. tagging the documents with meta-data (author, year, etc.) or proof-reading the documents for correcting OCR errors and spelling mistakes [4]. OCR is still in research and much advancement need to be made in this technology. The future scope of this is OCR in mobile devices, handwriting recognition, recognition of various languages except English (like Arabic, Devanagari, Telugu text), extraction and processing of images from video, processing and restoration of old documents and many more. In the Fig3, the image is preprocessed by removing noise and unwanted data, performed feature extraction, classification, recognition.

Scanning the

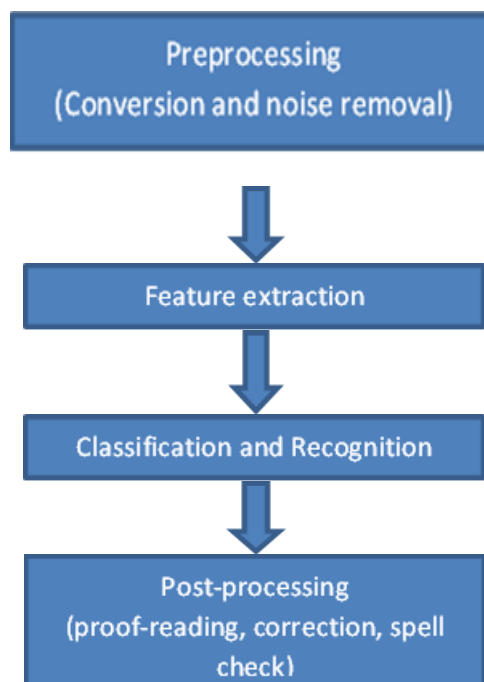


Fig3: OCR Algorithm Diagram

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V. COLLABORATIVE FILTERING

Collaborative filtering is used to tailor recommendations based on the behavior of persons with similar interests. It can be based on an item bought by the user.

Item based collaborative filtering is used as it works better with large sets of data. The algorithm is as follows:

List all the items with the given ratings to them by different users.

Calculate similarity between the items using Pearson correlation coefficient:

Where,

$$r(X,Y) = \frac{\sum_k (X_k - \bar{X})(Y_k - \bar{Y})}{\sqrt{\sum_k (X_k - \bar{X})^2 \sum_k (Y_k - \bar{Y})^2}}$$

X_k : Rating of person X for item k

\bar{X} : Mean Value of person X ratings

Y_k : Rating of person Y for item k

\bar{Y} : Mean Value of person Y ratings

Similarly compute the similarity between all the N number of pairs of ratings for particular item. Sort the similarity between the items such that the items are in descending order. Produce weighted table for scores that rank the items by multiplying the ratings by different users similarity score. Find the average of the weighted scores by dividing the weighted score by sum of the similarity ratings. List out N items for user by sorting the average weighted scores.

VI. CONTENT-BASED FILTERING

Content-based recommendation methods basically consist in matching up the attributes of an object with a user profile, finally recommending the objects with the highest match.

Each keyword or term is considered to be an attribute and their weights relate to the relevance associated between them and the document.

There are various term weighting schemes like Term Frequency- Inverse Document Frequency measure.

TF: It measures the frequency of a term in the document. Since the size of a document may vary, It will be futile to use simple count. Hence this count is normalized.

TF(w) = (Number of times term w appears in a document) / (Total number of terms in the document).

IDF(t) = $\log_e(\text{Total number of documents} / \text{Number of documents with term t in it})$.

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Combining the TF and IDF measures, we can define the TF-IDF weight of a keyword in a document :
Weight = TF X IDF

VII. CONCLUSION

The Recommendation system helps user in decision making while searching for most relevant recipe using ingredients they already have. The system facilitates the user to search appropriate recipe as per the interest. Provides diet chart based on individual's physique. The application saves times and hassle to search the recipe with minimum requirements. Ultimately, this brings users personalized experience and is useful to all.

VIII. FUTURE SCOPE

The system then lets you either to find a recipe by giving its name or by providing input of ingredients into the search field to make a custom search. If text is chosen as input, you will have to enter as much as ingredients you want in the search box query. It cranks out a list of potential recipes you can make using just what you have or with the addition of another item. Similarly if voice is chosen as input user can easily search for recipes just by saying ingredients by voice and discover great dishes. Lastly when image is chosen user can click pictures of ingredients and post it in search box. Accordingly results will be provided. The App also allows saving your favourite recipes for further referral.

IX. ACKNOWLEDGEMENT

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