International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 04 | Apr-2018 www.irjet.net p-ISSN: 2395-0072

Content Aware Recipe Recommendation System Based on Co-occurrence Relation

Pallavi Barguje[1], Pradnya Bhalerao[2], Surabhi Bhongale[3], Sharyu Ranmale[4]

[1,2,3,4] *B.E. Student, Department of Computer Engineering, SKNCOE, Vadgaon BK, Pune, India*

Abstract - *In this paper, we propose a recipe recommendation system that utilizes information about nutrition on the Internet. With the predominance of web, entirety world is associated and distinctive clients of various nations are sharing a large number of new recipe on the web, world generally. Thus, subsequently clients don't know about the every one of the recipe on the web. Recipe contains diverse ingredients, cooking procedure, categories and so on. Along these lines, we think the recipe is conglomeration of the unique heterogeneous elements. The greater part of the suggestion framework depends on the substance or community oriented sifting to foresee the new formula of enthusiasm for a client. Joining with the both the sifting methods, we exhibit a successful and exquisite structure for consolidating the two strategies in Recipe suggestion framework. A large portion of the formula proposal framework utilizes content data as fixings or cooking techniques of Recipe. We proposed novel approach to recommend new recipes.*

Key Words: Co-occurrence relation, Content based filtering, Ingredient combinations, Image Recognition, Recipe.

1.INTRODUCTION

Recommendation System is known as an effective solution for information overload and there are many recommendation research achievements have been made from academia and industry. By diming a binary relation between user item, recommendation system can help user find what they are interested in, and build personalized recommendation to meet their needs. Recent years, the term kitchen economics has been risen up, and mobile apps for providing recipe information has gradually become the focus in our life. However, the growing mobile Internet services and Content will gradually exceed the acceptable range of people. In this paper, a scalable recommendation system are designed and implemented for personalized recipe recommendation for web apps and mobile application. We are using JAVA and MySQL to design the whole system interface (UI). Through the UI we can understand the user's preferences and his/her daily amount of nutrients that can be ingested. Based on the user preference the system can extract from the knowledge base in line with a number of sample recipes for recommendation.

In this paper proposes a new method based on machine learning. The recipes are generated based on existing ones using linear combinations. If the generated recipe cannot pass the evaluation of it is not recommended. On the other hand, if a recipe can pass the evaluation, we do recommend it to users.

2. RELATED WORK

In paper [1] proposes the system that calculates occurrence frequency of a single ingredient, calculates co-occurrence frequency of a combination of two ingredients, verifies whether the category of the focused ingredient is same to the one of the exchange-ingredient or not and filters by co-occurred seasoning.

In paper [2] suggests the recipes to the user depending on its history and profile, also the system gathers the user's requirements and consulting its knowledge base to and the items that best meet the user's requirement. The recipes that satisfy the constraints will be the good recommendations and it will give the details preference feedback. All results for diabetes disease are achieved using proposed system having improved precision and recall than existing system.

In paper [3] proposes a hybrid recommendation system for personalized recipe mobile application. A hybrid recommendation algorithm, combining content-based and collaborative filtering, is designed to improve the recipe recommended effectiveness. Based on the Spark clusters, the recommendation system is scalable to process the massive data from mobile apps. One of the widely used recommended algorithms is item based collaborative filtering algorithm .Using user's scoring record for item, the collaborative filtering (CF) system computes the similarity of users or goods, and the Top N items with highest score will be recommended to active user. Our experiments reveal that the recommendation system has scalable computational capability to process massive recipe information.

In paper [6] the main idea of a Content-aware fridge based on RFID is to integrate food item information and user's health condition with content-information processor mechanism. In the future, we will focus on integrating services provided by content-aware fridge with smart supermarket. Then the users will not only know what they need to replenish but also gain a lot of insights into the construction prior to building a smart guide shopping that knows where to buy those products.

3. PROPOSED SYSTEM

Specific recommendation systems have different target users in different areas and the hybrid recommender system. In this paper is designed for recipes personalized recommendations and provides users with recipes browsing service.

The current approaches mostly focus on recognition of food category based on global dish appearance without explicit analysis of ingredient composition. Such approaches are incapable for retrieval of recipes with unknown food categories. On the other hand, content-based retrieval without knowledge of food categories is also difficult to attain satisfactory performance due to large visual variations in food appearance and ingredient composition. So with reference to these problems, we propose our system to overcome limitations occurred in previous systems.

We propose a system that allows searching recipes based on the ingredients available in your home. Furthermore, we propose a method for automatically generating probable recipes, which we plan to add to our system. Most of the existing services for searching recipes allow ingredient names or recipe names as search input.

A. CloudSight API

For object detection we have used the CloudSight API . It is a platform available online for image processing. Basically we are using this platform for feature extraction of ingredients. The CloudSight API is a simple rest API for understanding images.

B. Modules

In this system we need to collect the data from different resources like recipes, ingredients, nutrition values for different recipes so that we are divide the system in two subsections

1. User

User needs to authenticate with system and upload different images from application. The uploaded image will be displayed on webpage and system identifies the ingredients from the Image and suggest recipe according to ingredients

2. Admin

Admin part manages all data related to recipe like add recipe delete recipe, manage ingredients Admin need to perform the verification of recipes posted by the user with some basic user management functions.

4. System Architecture

In our system User interact with system and Admin handle all data comes from user and also perform some administrative task like verify recipe, add new recipe, manage recipes and Ingredients. All data is communicated with Database system so that it can suggest a recipes based on ingredients posted by user. The user image contents the ingredients related to recipes so our system performs analysis on image and extract ingredients from image and make a set of ingredients allows system to suggest recipes based on co-occurrence relation between ingredients and recipes.

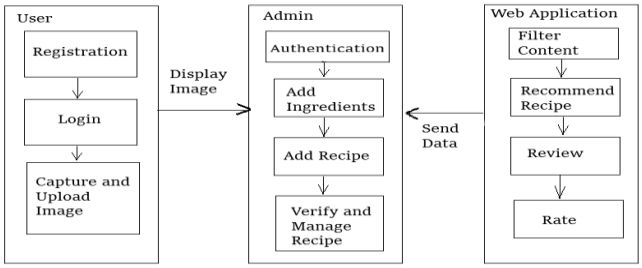

Fig 1. Architecture Diagram

1. Collecting Dataset analysis and preprocessing

For suggestions for recipe a huge dataset of recipes and its ingredients are needed so we are first collecting the different types of recipes and their available ingredients in that recipe ingredient for a dish based on analysis of recipe database. This system recommends additional part as a nutrition value of particular recipe considering the nutrition values of an ingredients present in that recipe. Most of data uploaded in the database, which are in the form of plain text, and cannot be analyzed and preprocessed, including but not limiting to fill in the missing options, duplicate the redundant data. Another important part of task during preprocessing is to map text data to numeric data for distributed platform data processing. All of processed data mentioned above will be stored in distributed file system.

We divided the data into a training set (80%) and a testing set (20%).The fact that these categories are not mutually exclusive should not be a problem since what we expect from the network is that it should capture not only links of specific words to specific categories but also the information inherent in order of words. We are also providing the facility to user to add some recipes and that recipes are approved by user to increase the size of datasets

2. Identifying ingredients and retrieval

Ingredients have several characteristics: taste, texture, flavor, nutrition, and color. Therefore it is difficult to find out ingredients similar to a given ingredient. Iwatani et al. propose a method for food texture evaluation using an

accelerometer sensor. But, this method is not considered sensibility of the individual of users. We are using five ingredient categories in an ontology vegetable, fishes, seasoning, and the others. And, this paper defines ingredients in same category as similar ingredients with each other. The definition is based on the idea that texture and nutrition of ingredients in same category are more similar than the ones of the ingredients in other categories.

3. List of Recipes

Proposed recipe application consists of four components as Database, Recommended Module, Recommendation and User. User profile history, recipe information and disease information basically stores information related to user, recipe and disease. User profile history, recipe information and disease information basically stores information related to user, recipe and disease. The proposed system suggests recipe for diabetes disease which provides improved precision and recall [2]. In this paper only recommend the recipes based on flavor. These is useful for restaurant to plan a launching dishes [5]. This study is based on an ontology-based dietary management system established by our group earlier [7].

In our proposed recipe recommendation we can add all type of recipes. It can be useful for all user. We can add the recipes the admin have the authority to active or deactivate recipes. Admin can active the recipes which uploaded by user.

4. Comment or Review

Recipe recommendation system we can write your won comment also we can see the reviews related to that recipes. In this system we also give the suggestion to improve our system. We can solve the problem regarding recipes through replay comment. By reading review we can improve our recipes. Review and comment are most important part of the system.

5. Experimental Setup

We have created dataset of recipe and its respective ingredients. Various recipes are stored in dataset. Ingredients will fetch from dataset while recommending recipe. MySQL database is used for storing data. User can enter his/her data from android application. Project is having four tables. It consists of user table, admin table, ingredients table and recipe table etc. Query can be used to fetch or store data in database. Application will used Java language to develop project.

Android platform is used along with sdk tool. We used MySQL in backend. MySQL is customizable. We are using J2EE platform for implementing project. On web application, JSP servlet, HTML, CSS is used in front end. Operating system can be window 7, 8, 10 can be used. Java Version is J2SDK 1.7 / 1.8 is used. Tomcat server is used. In android part, Wamp server is used. Java language is used for development.

6.RESULT

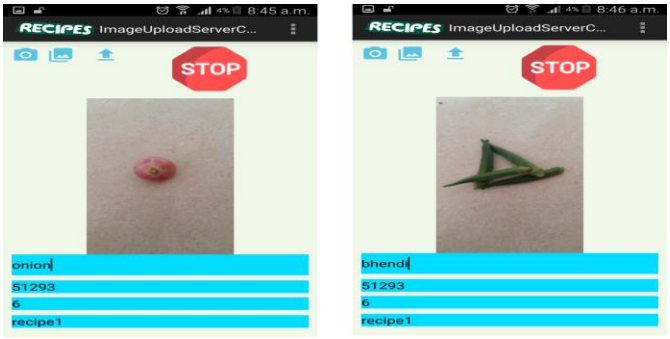

Fig 2. Ingredient Image Upload Page

For uploading the image user has to click on the camera icon on the upper left corner of the app-screen. User has to name the images as a reference to be stored in the database. The images of ingredients entered by the user which will be detected by the system using CloudSight API.

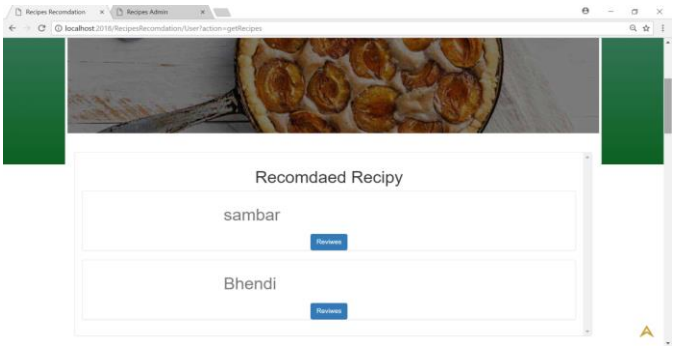

Fig 4. Recommended Recipe

In the website after logging into our account the data entered through the android application will be available. On the basis of the batch of images created by the user under one remark, the recipe will be recommended by the system. In this case the dataset contains 2 recipes whose ingredients match with the input given by the user.

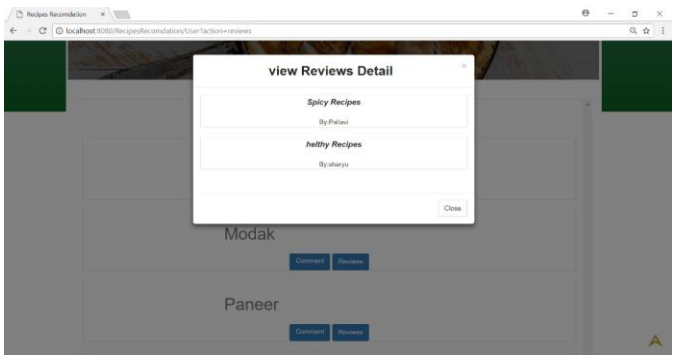

Fig 4. User Review Page

The system features also include giving a review for the viewed recipes. User can also decide to cook the respective recommended recipe by considering reviews given by other users.

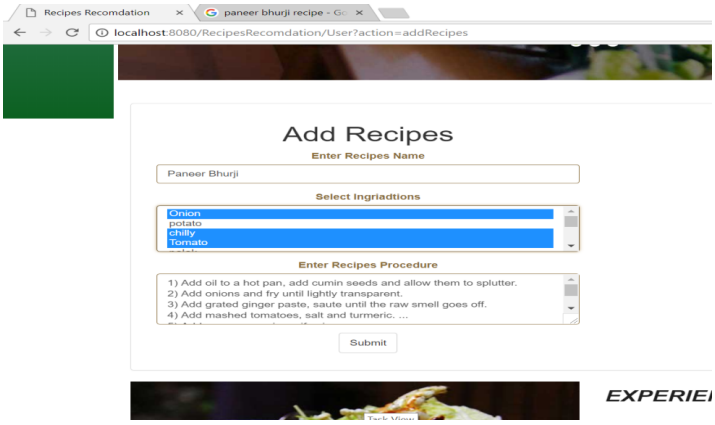

Fig 5. Add Recipe Page

Our System not only recommends recipes but also allows the user to publish their own customized recipes on the website. The user has to give unique name and a systematic procedure of the respective recipe so as it is easy to understand by others. The admin maintains the consistency of the database by verifying the recipes submitted to the system.

7.MATHEMATICAL MODEL

Let S be the universal set

This will include user, resources, system.

S =

Identify the inputs as I

I = I

F = I1, I2, I3, I4 | I image by user

Identify the outputs as O

O = R

R= Recipe | R given recommended recipe

the functions as F

F = F1 (), F2(), F3(), F4(), F5(), F6()

F1 (I) = login

F2 (V) = upload image

F3(V) = alter content

F4 (V) = identify ingredients

F5 (V) = recommend recipe

F6 (V) = rate

Relevant mathematics associated

Mapping

I1: image provided by the user. E.g. twits by users

I2: image provided by the user. E.g. twits by users

T3: image provided by the user. E.g. twits by users

T4: image provided by the user. E.g. twits by users

IN1: identified ingredients

IN2: identified ingredients

IN3: identified ingredients

IN4: identified ingredients

IN5: identified ingredients

R1: By applying algorithm, recipe recommended

R2: By applying algorithm, recipe recommended

R3: By applying algorithm, recipe recommended

R4: By applying algorithm, recipe recommended

R5: By applying algorithm, recipe recommended

B Set Theory let us consider S as a system for recipe recommended system.

INPUT: Identify the inputs

F= f1, f2, f3 ...., fn | F as set of functions to execute commands.

I= i1, i2, i3|I sets of inputs to the function set

O = o1, o2, o3|O Set of outputs from the function sets

S = I, F, O

I = Query submitted by the user,

O = Output of desired query,

F = Functions implemented to get the output.

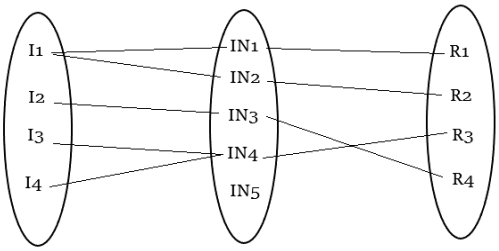

Fig 6. Mathematical Model 1

8.CONCLUSION

Recommendation system is the progressive field in the last decade. In our work, we choose the culinary domain here. Both the content as well as collaborative altering has their advantages as well as disadvantages. So to overcome each other's problems, here we proposed different approaches to make culinary experience user-friendly. With reference to this system, in future the system can be made advanced like it can give you recipe recommendation at any remote location, through server hosting. It can be made advanced like it can also suggest you the continental dishes

on the basis of available resources (ingredients) in your house.

9.FUTURE SCOPE

With reference to this system, in future the system can be made advanced like it can give you recipe recommendation at any remote location, through server hosting. It can be made advanced like it can also suggest you the continental dishes on the basis of available resources (ingredients) in your house.

REFERENCES

[1] Naoki SHINO, Ryosuke YAMANISHI, JunichiFUKUMOTO " "Recommendation System for Alternative-ingredients Based on Co-occurrence Relation on Recipe Database and the Ingredient Category" 978-1-4673 8985-3/16 $31.00 © 2016 IEEE DOI 10.1109/IIAI- AAI.2016.187.

[2] Kirti R. Pawar, Tushar Ghorpade, Rajashree Shedge "Constraint Based Recipe Recommendation using Forward Checking Algorithm" 2016 Intl. Conference on Advances in Computing, Communications and Informatics (ICACCI), Sept. 21 24, 2016, Jaipur, India.

[3] Hanshen Gu, Dong Wang "A Content-aware Fridge Based on RFID in Smart Home for Home-Healthcare" ISBN 978-89- 5519-139- 4-987 Feb. 15-18,2009 ICACT 2009.

[4] Yu-Wen Lo, Qiangfu Zhao, Yu-Hsien Ting, and RungChing Chen "Automatic Generation and Recommendation of Recipes Based on Outlier Analysis".

[5] Xuehui Mao, Shizhong Yaun, Weimin Xu, Daming Wei "Recipe recommendation considering the flavour of regional cuisine of Regional Cuisines" 978-1- 5090-3484-0/16/$31.00 ©2016 IEEE.

[6] ZhengXian Li, Jinlong Hu*, Jiazhao Shen, Yong Xu "A scalable recipe recommendation system for mobile application" 2016 3rd International Conference on Information Science and Control Engineering 978-1-5090-2534- 3 /16 $31.00 © 2016 IEEE DOI10.1109/ICISCE.2016.30.

[7] Yuguan Xing, Sosuke Amano, Toshihiko Yamasaki, Kiyoharu Aizawa " Distributed Representation of Dish Names in Food Related Web Services for Associative Search and Nutrition Estimation" 2017 IEEE Third International Conference on Multimedia Big Data 978-1-5090-6549- 3/17 $31.00 © 2017 IEEE DOI 10.1109/BigMM.2017.47

[8] Teh Lee Cheng, Umi Kalsom Yusof, Mohd Nor Akmal Khalid "Content-Based Filtering Algorithm for Mobile Recipe Application" 2014 8th Malaysian Software Engineering Conference (MySEC)

[9] Asami YAJIMA Kobe University, Ichiro KOBAYASHI Ochanomizu University "Easy Cooking Recipe Recommendation Considering User's Condition" 2009 IEEE/WIC/ACM International Conference on Web Intelligence and Intelligent Agent Technology - Workshops