Applications for Food Recipe based on Filtering Algorithms

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*Abstract*— To put it another way, everybody likes to serve, but no one has the least knowledge about how to cook. and they would also like to know specific recipes which meet their particular tastes. But most culinary blogs do not provide cooking ideas tailored to individual food tastes. To some extent, recent studies have used collective knowledge, demographic statistics, and food additives in developing new recipes. With regard to the previous issue, this paper suggests and tests a content-driven web application in this paper. What the program is really trying to do is to present a user's chosen algorithm. CBFA is used to classify recipes that might be liked by the customer. Knapsack will be used for deciding the portions, while BFS will be used for close site locations for the ingredients. This algorithm can be dependent on users' behaviors in recommending recipes. The recipe algorithm can weigh several factors in order to figure out which recipes the browser has already seen. The advantage of using this algorithm is that it has no startup latency and only needs user input to adjust to expectations. In order to validate this algorithm, it was developed as a web-based program.

Keywords—Recipe Application; Software Architecture; Filtering Algorithms; Model Analysis; Responsive Website

# Introduction

People generally like to eat according to a taste of their certain mood and thus leads to cooking or going to a certain restaurant. Although many online food applications have rightly served us in the recent times, we cannot completely eradicate the idea that the companies which also provide us food needs a recipe at first. People now face a small range of food and are frequently forced to search for recipes after having a tiring and stressful day. Preparing meals can necessitate searching, contemplating, preparing and even studying new foods, but also places the family members, wives or themselves at risk of being threatened. This dilemma stems from the latest recipe that can differ and does not match ordinary preferences from the preferred selection of meals. Furthermore, certain people would like various food recipes that offer differences but also suit their tastes. In addition, for any human, the sense of taste is distinctive. Not all people prefer to eat the same kind of food. Furthermore, as the coronavirus pandemic presses on, customers have been more prone to home-cooking rituals and surveys show that after the pandemic, this practice will persist. This move also leads to a shopping list update. Food sellers and suppliers can deal with customer demands by delivering choices that ease, easily and healthily prepare at home — and adding a range of items to the menu. More than half of shoppers (55%) said they are eating home more often since the pandemic began, according to an [Acosta Report](https://www.acosta.com/news/new-acosta-report-details-how-covid-19-is-reinventing-how-america-eats) released on 20th September, 2020. The survey showed that many customers plan to dine less than before right though the pandemic is over. In a previous research by [Bloomberg News and Morning Consult](https://www.bloomberg.com/news/articles/2020-07-07/newly-minted-home-chefs-mark-another-blow-to-u-s-restaurants), identical findings have been obtained, with approximately a third of the surveyed claiming they expect to cook even more when home orders are lifted. Just 7% said that after the whole economy reopened, they plan less to cook. The 2,200 US consumers survey showed that younger demographics have particularly high intention of keeping up with home cooking. A full 43 percent of Gen Z respondents were asked whether they wished to cook more in their homes after the pandemic had finished. On [Food Navigator-Usa](https://www.foodnavigator-usa.com/Article/2020/04/15/Survey-Cooking-at-home-will-become-the-new-normal-post-pandemic), of the American adults surveyed who report that they are cooking more while sheltering-in-place. 75% said that they have become more confident in the kitchen, 50% are learning more about cooking, and 73% are enjoying it more than they did before. So, we can say that this recipe application would help the people to have a dynamic effect on their lifestyle as it publishes a variety if features to their needs.

# Literature Survey And Related Works

Web pages like Netflix, Facebook, Twitter and Newegg.ca are commonly used as a feedback mechanism on e-commerce, social networking and movies. Recommendation programs propose goods, services and knowledge that will better draw people [1]. There had been some applications on food recipe in the past. One of such projects built a mobile application that has a feature to search for recipes based on the material owned by the user. In that app, the user was asked to load the ingredients owned and the program would then scan for recipes that have the content that was most similar to the user's material. In these inquiries, the user's actions were also read by logging in. A study on the basis of most widely used materials was made from the data stored. [2]. Another application [3] gave users the option to search recipes from cloud. Searching may be conducted according to grade, pattern, type, ingredient and title. In addition to that, the user can select, save and share recipes. One more paper [4] gave the users some features about an offline availability of recipes, structured UI, smart search filters, ingredients checklist and a nearest store locator.

While all the papers or projects presented a similar approach as mine, they lacked a definite algorithm as well as a dynamic solution to the application. The first paper lacked a definitive search, which could have been solved by demographic filtering algorithm and content-based filtering algorithm. Data like age, ethnicity, education and income are used in demographic filter algorithms to categorize user groups. For example, high-quality cooking instruction, under the age of 18 and high-wage individuals can be categorized into categories. The customer has a good relationship to a commodity with these factors. For instance, the age groups like teens tend to like stylish clothes, whereas old people like high-paid and high-quality products tend to like branded products [5]. Another algorithm, CBFA (Content-Based Filtering Algorithm) works on the base of contents. It detects similarities between the characteristics of an item the customer likes and then suggests an item with typical features of the item [6]. The second and third project shows a use-case but doesn’t give us a clear idea about the content search. It just retrieves data from a cloud server. The third one gives us an idea about the local food usage and the location but doesn’t show a proper method of doing this. With regard to the above-mentioned issues, this application proposes and tests a content-based responsive web recipe application. Furthermore, it provides users with recipes and their preparation time, number of portions and ingredients needed to be added to the shopping list/controller to buy afterwards. In addition to the ingredients, users can also add and upload their own recipe. The system proposed is a good way of finding the food they want to make from any form of cook to a start-up or a specialist. This application will be implemented using various algorithms such as a content-based filtering algorithm, demographic filter algorithm along with common algorithms such BFS [7]. The number of portions needed to create a food will use a Multi-Dimensional Knapsack Algorithm [8]. Lastly, the location will be solved using geolocation, mixing with object-oriented programming.

# METHODOLOGY & MATERIALS

This project starts with designing and building a responsive web application. The website interface was built using JavaScript, HTML and CSS. All information pertaining to this program was stored in Web API. JSON was used as the client-server data exchange. In addition to the suggestion functionality, this application also contains several other features not included in this article, as the emphasis is solely on the CBFA suggestion function.

The website recipe framework proposed is essentially made up of three elements, namely the user interface, databases and the recommending module. The UI converts the information contained in the database into a humanly legible language for the users and receives user inputs. The database consists of three sections, the repository for receipt records, the user profile repository and the log repository of the user. The archive of recipe information and user profile primarily stored information relating to the recipes and the users.

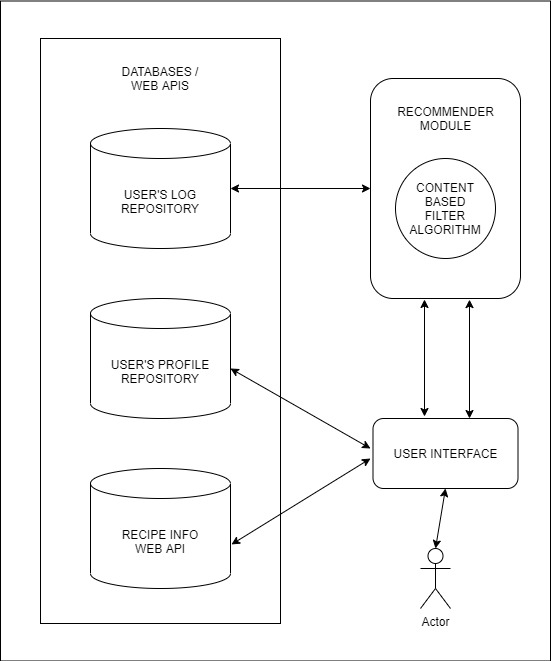


Fig. 1. The framework of the proposed application

The CBFA is based on the recipe’s material and the choice of the customer. The functions of an item that the user likes or that is close to what the user enjoyed in the past will be found and another item with a similar function to the item the user liked would be suggested. Therefore, information about the feedback of the user to the app can be monitored in order to capture and classify the user's interests. Each user search is saved and registered in the user log repository. The key condition that the customer must first see at least one recipe is considered as a candidate to be recommended. For users who never have seen a recipe, but wish to ask for ideas, users should instead pick a recommendation depending on their requirements. For data estimation and recognition of your interests, the user search history contained in the log repository. Since an unintentional search or search with an unwelcome recipe is unusual for a customer.

Basically, the recipe recommendation application using CBFA consists of three main steps: data selection, weight estimation of each featured material, and the recommendation for the recipe. The system would eventually prescribe recipes that weight the highest common characteristic.

Diagram

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Fig. 2. Flow chart of CBFA for suggesting user preference recipe

Assume that the largest view category has ten views to illustrate the use of the proposed CBFA computation. Cake, pie, and pudding are the featured content in the dessert segment, with 2, 5, and 3 views, respectively. As a result, there are three functions in the top tier. As a result, the cake's weight is (2 \* 10)/3 = 6.67. The weight of all the features within the category with the most views is calculated by the application. The next move is to measure the weights of each feature and then choose the one with the most weight. Following that, the program retrieves recipes for common functionality and suggests the feature with the maximum weight that has not been viewed to the consumer. According to the example provided, the featured material with the highest weight is 'pie,' implying that the consumer enjoys sweets, and that pie is his or her favorite. As a result, the program will suggest other similar recipes to the consumer depending on his or her tastes [9].

To have an overview of the overall web-based software, an architecture was created which gives us a thorough explanation.

Diagram

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Fig. 3. Architecture of the application

Besides the architecture, a flowchart was also created to see all the functions, calls and actions.

Diagram

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Fig. 4. Flowchart of the application

And for the software methodology Agile will be used. Agile approaches are one of the few in the development of applications. Agile approach is a kind of short-term system creation that has to change quickly and engineers in every direction. Agile product development requires more contacts and workers than procedures and resources, software of greater importance than full documents, cooperation with customers than contract agreements, and a more critical role in adapting to transition than following the strategy.

# RESULTS AND DISCUSSIONS

To demonstrate how the content-based filtering algorithm works, data on recipes and user logs was gathered and stored in the form of web API. User A evaluated the proposed CBFA through the web-based recipe application interface. To keep track of each user's preferences, the program requires the user to login. This generated a customized profile for that user and allowed the user to log in each time the user desired to search for a recipe inside the application. After the user signed in, the program saved the user's search history to the user's log repository. The user can conduct a search by category or by name of the recipe. The user's log repository stores the number of searches, the recipe, and the user's identity. Table I contains a selection of five categories, each with several featured pieces of content, along with the user search history.

TABLE I. A SAMPLE OF CATEGORIES, FEATURED CONTENT, AND USER'S

SEARCH HISTORY

|  |  |  |  |
| --- | --- | --- | --- |
| Categories | Featured | No. of View for User A | Total No. of views |
| Side Dishes | Mashed Potatoes | 34 | 87 |
| Wedges | 45 |
| Coleslaw | 8 |
| Breakfast | Canadian | 42 | 100 |
| Indian | 58 |
| Chicken | Biryani | 23 | 138 |
| Masala | 46 |
| Spaghetti | 69 |
| Desserts | Cake | 39 | 88 |
| Pie | 38 |
| Pudding | 11 |
| Main Dish | Rice and Curry | 15 | 34 |
| Chowmein | 19 |

After the user clicks the search button, the program compares the number of views in each category to determine which category has the most views. According to Table I, the group with the most views for each user is chicken. The application then determines the weight assigned to each featured item within that category. The category with the most views and the weight assigned to each feature are listed in Table II. The application will determine that the individual consumer preferred chicken recipes based on the weight of the features collected. As such, the application will suggest additional chicken recipes to the consumer. Fig. 5 illustrates the suggested performance for user A.

TABLE II. EXAMPLES OF WEIGHT FOR EACH FEATURE WITH HIGHEST NUMBER OF VIEWED CATEGORY

|  |  |  |  |
| --- | --- | --- | --- |
| Category | Featured | No. of views for User A | Weight |
| Chicken | Biryani | 23 | 674.59 |
| Masala | 46 | 1349.18 |
| Spaghetti | 69 | 2023.77 |

To conduct additional analysis, the CBFA, Wi, and Ci; values for each featured content in the preceding example are calculated and visually outlined in Fig. 5. The observed trend indicates that if a featured content (for example, spaghetti) is viewed more often (increasing Ci), the weight of that specific featured content Wi increases considerably, implying that the featured content in that type of recipe is strongly favored by the consumer. Additionally, a user's favorite featured content can be categorized and aggregated depending on the recipe's type. As shown in Table II, simply comparing the views of featured content is inadequate, as a comparable amount of featured content views can be viewed as the user's favorite feature. However, even with a comparable number of views, the featured content can be distinguished as desired or otherwise by the respective user using the CBFA computation. As such, this demonstrates that the proposed CBFA is capable of recommending recipe(s) that are compatible with the user's preferences (s).

Graphical user interface, website

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Fig. 5. The login page with the suggestions and the serving differences for persons

This is the critical move towards making an appropriate recommendation. If the group chicken, I has the most views Cj, but it contains a variety of quality features j in a particular category I the application must determine the weight Wi of each featured content view Ci; included within that category. The following equation is derived from [1].

A picture containing text, clock

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Besides the recommendation, another algorithm was used to update the portion of ingredients according to the number of persons showed in Fig. 5. It calculates according to the number of persons.

# CONCLUSION

In conclusion, this article suggests a content-based web recipe that, through the use of CBFA, will recommend a user-preferred recipe. With a single click of a mouse, the suggested answer assists those who have no idea what to cook. The customer does not need to waste a lot of time with this program to obtain his or her favorite formula. The primary goal of this paper is to give the user a full recommendation system which eases the pressure of and saves time efficiently by introducing the user to bookmarks, portions, make their own recipe and upload it, suggestions using CBFA, location finding using BFS. This program remembers the user's preference(s) based on their encounters with the pages they visited or the recipes they have seen. To accurately recommend a user favorite recipe, the weight assigned to each attribute in the recipes displayed by the user is determined. Only recipes that share the same characteristics as the recipe with the highest weight and have been viewed by the customer would be recommended to him. Additional analysis may be conducted by using learning or prediction algorithms (such as neural networks) and taking into account additional user preferences from other forms of user interaction in order to improve the accuracy of the recommendation.

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##### APPENDIX

Text

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Fig. 1. Controller.js. Async function running in the background

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Fig. 2. View.js