

Menu Recommendation System Utilizing Content-Based Filtering Techniques

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Abstract: This project deals with a content-based recommender system for online food ordering applications using the expert system. The main goal of the recommender system is to propose and deliver suitable content to the user. We present an algorithm which adapts the content based on the user preference and the content viewed by the user. We propose a website that provides the user with the food item recommendation from the listed menu depending on the user past preference and the time of the day. Menu recommendation is a system in which we discover different data patterns in the data set by learning the client's choices and produces the outcomes that best fits and co-relates to their needs and interests. Recommendation systems are among the most popular applications of data science at the moment. There are different applications that are using this system such as amazon, Netflix and many other top applications as it enhances the ability of knowing the consumer's choices and their preference.

Keywords — Recommendation System, Content-Based Filtering, Menu Recommendation System, User preference.

I. INTRODUCTION

In today's hustling days, people have been swamped to the level that they have lost their taste of choice or just feels stressful to go through the availability of so many different options [5]. Our recommendation system is present in entertainment sector such as Netflix, prime video, and many as such. They are even present in e-commerce applications such as amazon, Flipkart, which is a common platform for buying different products. But coming to our online food applications sector the recommendation system still lags even though there are a lot of people who order food frequently. It is also difficult to choose a dish based on a specific recipe in mind unless there is a recommendation system in place that will assist in choosing what to order. A lot of customers spent more time searching the best item for the type of food they want to eat. It is true that most customers know cuisines for enjoying the type of food they want. Whenever they feel to try a new recipe or eat their favourite one from a new cuisine, there must be a recommender system in place which will assist them in deciding which cuisine to select and what to eat in that. In the back days when there were no technology people used to order food or visit to the place listening to the reviews of other people or recommended by the closed ones. But in today's time, people are so busy in their daily life that they choose whatever is available to them. The objective of this project is to help the customer by making a human-machine connection where the machine would recommend the customer its choice of food item according to their preference[16]. And for doing so we have sorted all items from the highest prediction of interest and recommend the

user. For achieving the above aim we would be using content-based filtering which is a type of recommender system that attempts to guess what a user may like based on the user's own activity[1][2][3][4][5][11][13][14][15]. To overcome the mentioned problem our recommender machine will efficiently help the customer to select its choice based on his/her previous preferences. Instead of rolling your eyes over the whole list, you will be provided with a recommendation list based on your proclivity. For a general application, one has to go through the whole process of searching -> choosing -> checkout at last, but with the recommender system one just has to select its choice from the previous recorded in the dataset for the next time. Along with the point mentioned earlier I would like to add that our project will benefit the people who suffer to choose their meal or not clear what they want to eat? For benefiting the society our project helps the customer to understand its choice, and make them meet their own interests of food item

II. LITERATURE SURVEY

The literature survey provides an overview of Menu Recommendation system and how content-based filtering could be used to improve user experience.

1. A Digital Menu and Food Item Recommendation

This paper highlights the number of contributing factors that make food decision making a difficult and time-consuming task. The survey carried out confirms the difficulties identified through literature and establishes that the use of digital menus is a preferred alternative to restaurant's

customers. A digital menu comprising of sufficient information regarding items will be introduced, which will allow customers to make well-informed food decisions.

2. Content and knowledge-based Food Recommending Intelligence Enabled System

Making the optimum choice has become a painstaking process or perusing and reviewing the plethora of available options. This conundrum extends to the choice of food from the ever increasing and byzantine menus of sumptuous restaurants. Ordering food from a litany of items in a menu may demand more time than the user is willing to expend, especially whilst ordering food online. Further the dearth of description regarding the ingredients and taste palette of a dish waxes the probability of the customer being discontent with his ordered dish.

3. Content-Based Recommendation System Based on Vague Sets

Focused on the trouble of the features representation of merchandise in content-Based recommendation system, in this paper, the theory of vague sets, Gaussian function and characteristics of uncertainty were used to represent features with vague value. On this basis, the general steps of content-Based recommendation with Vague Sets were given in the paper, in order to get a new idea and method to recommender systems designers.

4. Mood Based Food Recommendation System

Multiple options are provided to the user along with restaurant rating to give better experience. Total 9 restaurants are recommended to a customer out of which top-3 are the best recommendations and 6 are other recommendations. This model is developed using PyCharm, the restaurants are grouped by location using KNN algorithm. Flask is used to create website which is user friendly. This application can be used when a customer doesn't understand what to eat when they are in the moods.

5. Recommendation System Based on Item and User Similarity

The growing number of internet companies are demanding the company to innovate through technology. This is also applied to restaurant, they should give recommendation of restaurant which suit best on customer needs. This study aims to develop a system to provide recommendation for customer in restaurant selection. We merge the item similarity and user similarity features to generate recommendations. Evaluation shows that the recommendation system based on item similarity yields higher F1-measure value when comparing to user similarity.

6. Restaurant Recommendation System for User Preference and Services Based on Rating

Recommendation systems are being enforced to offer personalized set of services to the users. They are basically

built to produce recommendations or suggestions (like restaurants, places...) that comply with user's concern and that can be applied to multiple fields. To enhance the quality and service of Recommendation systems and to resolve any issues related to it, various effective techniques linked to data management can be made use of. The current paper proposes a Machine Learning Algorithms to resolve the issue of personalized Restaurant selection relying upon tripadvisor.com search data. The facilities provided by the hotel along with user's comments are being utilized. The NLP - Natural Language Processing is imbibed for examining and tagging all the previous user's comments (whether positive or negative) for every hotel, thereafter computing the overall % of the comments and storing the output.

III. EXISTING SYSTEM

The current option which is generally used to order a healthy dish in India is to make it at home or order it from Swiggy Health Hub. There are multiple issues that can take place during this process. You need to cook the food at home by your own to heat some healthy food items that can help to manage you to fulfil your daily calories intake at the same eating something tasty.

IV. ALGORITHMS

Step 1: Read your data and add it to your data frame.

Step 2: Make a new data frame that includes the data you want to run your ML model on.

Step 3: Convert your data into Sci-Fi-matrix and then convert it into arrays.

Step 4: Calculate cosine similarity between all vectors.

Step 5: Sort the distances in descending order according to the similarity values.

Step 6: Create an array and store it in a variable.

Step 7: Fetch the indexes of similar dishes.

Step 8: Find the distance of similarity matrix particularly index.

Step 9: Apply for loop and save the indexes of dishes in a variable.

Step 10: Print recommended dishes name using variable where index of dishes is saved.

V. EXPERIMENTAL SET-UP

Content based filtering is one of the top Recommendation Engine. Recommendation engines are a subclass of machine learning which generally deal with menu of the restaurant [1] [2] [3] [4] [5] [7] [8] [9] [10] [11] [12]. A recommender system is a system which provides recommendation of a dish based on dishes user has added to the cart from the

menu. These predictions will then be ranked and returned back to the user.

To establish the above, we have used the scikit toolkit to perform text vectorization or word embedding which is the process of converting text data to numerical vectors. Later those vectors are used to build various machine learning models and calculating the cosine similarity of two vectors. Cosine similarity ranges from 0 to 1 and it cannot be negative. Here we have denoted D as the Euclidean distance which is the shortest distance between two points.

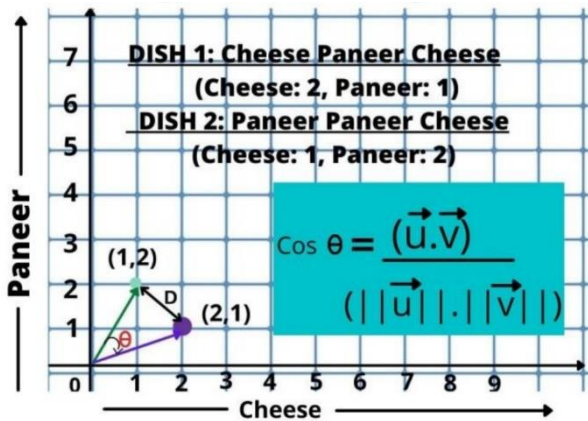


Fig. 1. Finding Cosine Similarity

From Fig. 1. Above, θ is the cosine angle or cosine similarity of two vectors is being calculated [6] [9][10][12][14]. For applying cosine similarity we take the text i.e. Dish 1 and Dish 2 and convert it two vectors. We would be taking these two vectors to find the similarity between them. The cosine similarity or $\cos\theta$ is calculated by the dot product of two vectors upon the magnitude of these two vectors.

VI. PROPOSED SYSTEM

A. Block Diagram

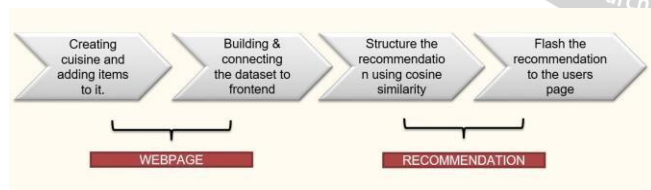


Fig. 2. Structure of the proposed system

B. Explanation of Proposed System

The structure of the proposed system is demonstrated in Fig. 2. For customer using the application will firstly interact to the webpage. It comprises of different components which would be useful in their own way.

The application also provides with a user login and a cuisine list from where one can select its type of cuisine. For establishing the backend, we use Model Routes-Controller (MRC) framework. The database will be created for the records of the user's orders, wish list. Each customer will

have its own data according to their choice and the orders they may have made.

Using the dataset established in mongo dB andcleansing dataset for the recommendation engine. Text Vectorization is the process of converting text into numerical representation. Later these vectors are used to find the similarity between the items. We would be incorporating cosine similarity as it measures the similarity between two vectors of an inner product space. It is measured by the cosine of the angle between two vectors and determines whether two vectors are pointing in roughly the same direction.

VII. CONCLUSION

As the World Wide Web is expanding in an exponential rate, the size and the complexity of the information are increasing along with it. The Web now contains a massive amount of information, most of it does not interest the user, either as unwanted information (advertisements, spam etc.) or as content irrelevant to his interests. The goal is to show the recommendation to the user according to their choice and preference. A content based filtering will improve the recommendation system by considering the user's preference and personalization problems. This paper implements the content based filtering using cosine similarity on the dataset provided from the webpage. This would be displayed on the cart page as a different column so that it would be easier for the user. The recommendation list is made according to the particular dish selected by the user in his/her cart which means one would be suggested only the dishes that are similar to the once they have added in cart. People with high stress levels and living away from home are susceptible to poor dietary routine which impacts both their health and daily life performance. To overcome the above lag the recommender system provides the customer with a healthy cuisine along with their preferences and depending on their calories intake.

ACKNOWLEDGEMENT

We got the inspiration for this idea when one of our team Member faced issues for eating tasty as well as healthy food even while working in offices or even while studying in college. Taking inspiration from applications like Swiggy, we decided upon this Website.

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