

Food Recommendation System

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Abstract : K Nearest Neighbor algorithm falls under the Supervised Learning category and is used for classification (most commonly) and regression. It is a versatile algorithm also used for imputing missing values and resampling datasets. As the name (K Nearest Neighbor) suggests it considers K Nearest Neighbors (Data points) to predict the class or continuous value for the new Datapoint. Recommender Systems are an integral part of a system nowadays, people tend to listen, see and order stuff that the machine suggests them to. The recommender system deals with a large volume of information present by filtering the most important information based on the data provided by a user and other factors that take care of the user's preference and interest. It finds out the match between user and item and imputes the similarities between users and items for recommendation. While surfing on a fully-fledged Food ordering website it is very to find the things that you currently want to eat. This project simply puts forwards a system that works on the basics of machine learning and follows the principle of Knn algorithm, where the user would get the top-rated food from different states and different flavor profiles.

Keywords: K Nearest Neighbor (Knn Algorithm), machine learning, food recommender system.

I. INTRODUCTION

K-Nearest Neighbour is one of the simplest Machine Learning algorithms based on the Supervised Learning technique. NN algorithm assumes the similarity between the new case/data and available cases and put the new case into the category that is most similar to the available categories. NN algorithm stores all the available data and classifies a new data point based on the similarity. A food recommender system is basically a system that uses the Knn algorithm and a filtering system known as a content-based filtering system. This recommender system will allow the user to find the best five dishes of their favorite flavor profile and their preferred state.

II. LITERATURE SURVEY

K-Nearest Neighbour Algorithm also known as Knn Algorithm or lazy learner algorithm is a nonparametric algorithm that is probably the simplest algorithm that stores all the available data and classifies a new data point based on the similarity. This means when new data appears then it can be easily classified into a good suite category by using K- NN algorithm. In order to start with this algorithm, we first need to find the value of k because the success of the classification depends on this value k[1]. In a sense, the k method is based on k the best way to find the k is to run the algorithm many times with different and

consider the one which the best performance. In its basic form, the algorithm is pretty slow with a time complexity of $O(n^2)$, Knn has a high cost of classification new instances.

There are many existing algorithms such as decision trees or neural networks initially designed to build such a model. One of the evaluation standards for different algorithms is their performance. As KNN is a simple but effective method for classification and it is convincing as one of the most effective methods on Reuters corpus of newswire stories in text categorization, it motivates us to build a model for kNN to improve its efficiency whilst preserving its classification accuracy as well.

In the model construction process, each data point has its largest local neighbourhood which covers the maximal number of data points with the same class label. Based on these local neighborhoods, the largest local neighborhood (called the largest global neighborhood) can be obtained in each cycle. This largest global neighborhood can be seen as a representative representing all the data points covered by it.

Taking a very simple example by marking category A having an image of a cat and category B having an image of a Dog now after declaring both the categories we give an input, here the user knows that the input which is being given has the image depicting a cat but we want the system

to give the correct output. Here the program would do all the possible comparisons and give the output which is the nearest to the declared dataset and the correct output would be that the image is of a Cat.

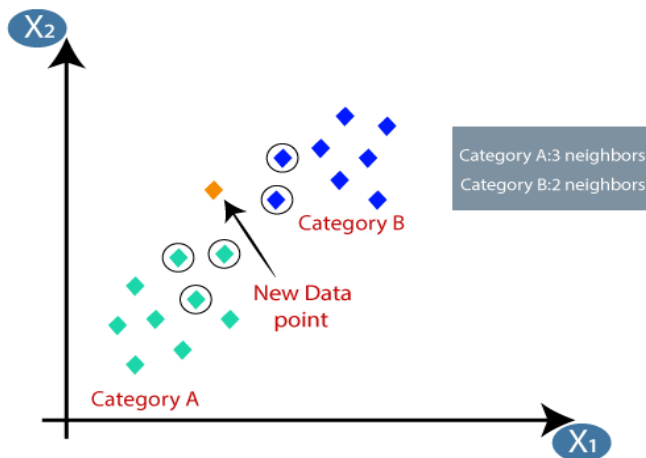


Fig 1.1 : KNN Algorithm

A recommender system is something that the user wants to get preference or predict from the given dataset

This system is used in recent days, especially for food recommendations where users can easily get a top 5 recommendations as per their needs for this known algorithm is used which comes under content-based filtering.

Content-based approaches have been used in recommendations to the user's taste. For example, if a user selects the state and flavor i.e west Bengal sweet/west Bengal spicy he/she will be recommended as per their preference.

Limitation of content-based: Does not work well with the large dataset: In large datasets, the cost of calculating the distance between the new point and each existing point is huge which degrades the performance of the algorithm. Does not work well with high dimensions: The KNN algorithm doesn't work well with high dimensional data because, with a large number of dimensions, it becomes difficult for the algorithm to calculate the distance in each dimension.

Advantages of KNN : Simple to implement and intuitive to understand

Can learn non-linear decision boundaries when used for classification and regression. Can come up with a highly flexible decision boundary adjusting the value of K.

No Training Time for classification/regression: The KNN algorithm has no explicit training step and all the work happens during the prediction

Constantly evolves with new data: Since there is no explicit training step, as we keep adding new data to the dataset, the prediction is adjusted without having to retrain a new model.

Single Hyperparameters: There is a single hyperparameter, the value of K. This makes hyperparameter tuning easy.

Choice of distance metric: There are many distance metrics to choose from. Some popular distance metrics used are Euclidean, Manhattan, Minkowski, hamming distance, and so on. Drive Traffic A recommendation engine can bring traffic to your site. It accomplishes this with customized e-mail messages and targeted blasts.

Provide Relevant Material By analyzing the customer's present site use and his previous browsing history, a recommendation engine can deliver appropriate product suggestions as he stores. The data is gathered in real-time so the software can respond as his shopping habits change.

Engage Customers Consumers to end up being more engaged in the website when individualized item recommendations are made. They are able to dive even more deeply into the product line without needing to carry out search after search.

Transform Shoppers to Clients Converting buyers into consumers takes a unique touch. Individualized communications from a recommendation engine reveal to your customer that he is valued as an individual. In turn, this engenders his loyalty.

Increase Average Order Value Average order values generally go up when a recommendation engine is used to show tailored alternatives. Advanced metrics and reporting can definitively reveal the efficiency of a project.

Boost Number of Items per Order In addition to the average order value rising, the number of products per order likewise typically increases when a recommendation engine is used. When the customer is revealed options that fulfill his interest, he is most likely to add choices to his purchase.

Control Retailing and Inventory Rules A recommendation engine can add your very own marketing and inventory control directives to the customer's profile to feature items that are promotional prices, on clearance, or overstocked. It offers you're the versatility to regulate exactly what items are highlighted by the recommendation system.

Lower Work and Overhead The volume of data required to create an individual shopping experience for each customer is typically far too huge to be handled manually. Utilizing an engine automates this process, reducing the workload of your IT staff and your spending plan. Provide Reports Providing guides is an integral part of a personalization

system. Providing the client with precise and up-to-the-minute reporting permits him to make solid choices about his website and the direction of a project.

Offer Recommendations and Direction An experienced carrier can provide suggestions on ways to utilize the data gathered and reported to the customer. Acting as a partner and a consultant, the supplier needs to have the expertise to assist direct the eCommerce site to a prosperous future.

A recommendation system is basically a type of system that gives content-based filtering preferences. The system uses different algorithms for huge data sets for the user to get their preferred choice. If you come to know what the user likes, we can easily recommend new content as per their choices. Recently looking to additionally studies by Epsilon 90% of the users find personalization appealing. Also, the majority of users claim that they are more feasible to do business with a company when they have offered the user their personalized experiences. In a research paper titled “Recipe Recommendation using ingredient network” which tells that the user’s preference of ingredients, cooking method, and food preferences greatly affect a person’s lifestyle. They tell how each ingredient works in many ways to make a person healthy or dull. . The network is constituted of two large communities, namely spicy and sweet. They found that foods do not have a large diversity of ingredients. When the main ingredient is taken, the method of preparation depends upon the person and the other ingredients used. (Chun-Yuen Teng, 2012). According to a paper, co-written by Jeremy Cohen, Robert Sami, Aaron Schild, and Spencer Tank titled “Recipe Recommendation”, they found that the ingredients used need to be well established for their nutritional value, i.e., if the person knows beforehand what ingredient contains then the person can prepare the food accordingly and select other ingredients as required. (Jeremy Cohen, 2014).

III. EXPERIMENTAL SETUP

A. Software Requirements

- Python: Programming language used for the project which includes different libraries. • Python libraries: Streamlit, pandas, etc.
- Pycharm: IDE to run the program and execute the project basically to make the webpage.
- Jupyter Notebook: a web-based platform to make the blueprint code and basic modifications with the data frame.

B. Hardware Requirements:

- CPU: 1.8 GHz or faster 64-bit processor; Quad-core or better recommended.

- RAM: Minimum of 4GB of ram.
- Storage: 4GB of free hard disk space.

IV. METHODS AND PROCESS

The method of food recommender system is to retrieve the top five dishes

Steps of the algorithm are given below:

Step1: There will be a dropdown list to select from. Step2:

Select the state and preferable flavor profile.

Step3: After selecting the preferred state and flavour.

Step4: The top five recommended dish will be displayed on the screen including their ingredients

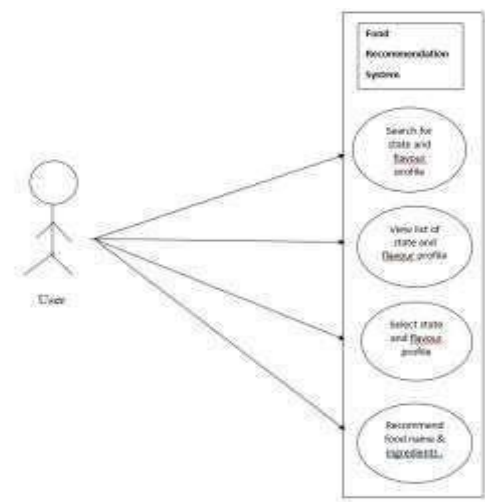


Fig.4.1 Use case Diagram.

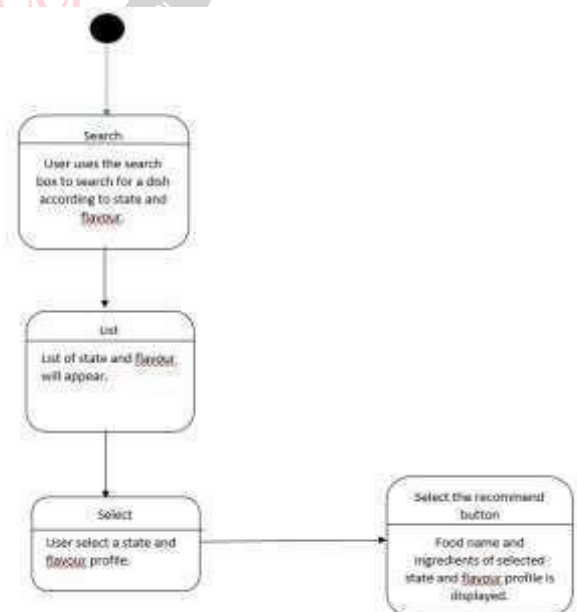


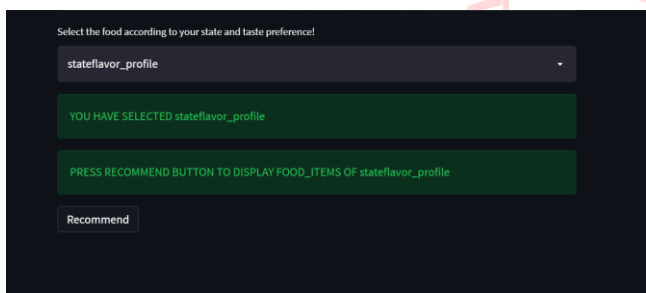
Fig. 4.2 State Diagram Of the Application

V. RESULT

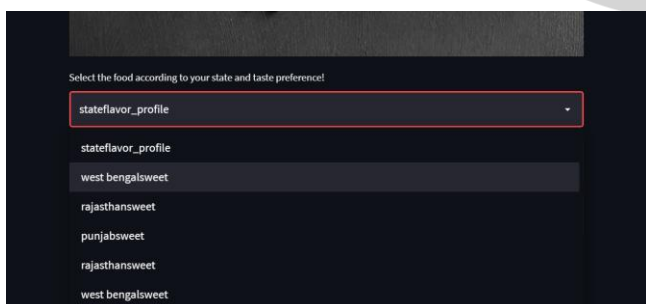
The overall motive of our group was to provide a recommender system. A recommender system that will provide the best five dishes that you choose according to the state and flavor profile which will be fetched from the given dataset. The algorithm used in this project was the k nearest neighbor algorithm the only problem is that the system will recommend the data that is preloaded in the dataset and as we have used the streamlit package in python there is a very limited scope of modification or styling. This problem is not an easy problem to be solved because in the first place whole data set needs to be changed in order to witness any alteration in the result.



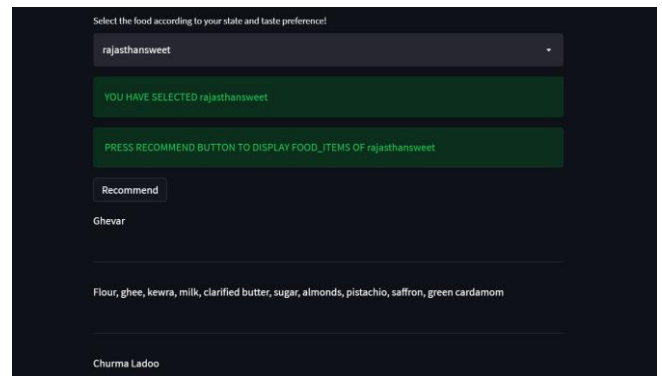
This is the front end of the project.



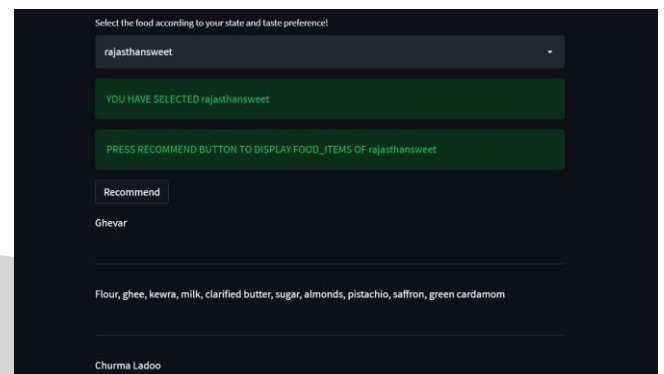
After Clicking on Stateflavour_profile the following list will appear :



Select one from the following list:



After clicking on recommend button the following item will display.



Here 1st indicates : dish name

2nd indicates : ingredients of dish.

VI. CONCLUSION

A recommendation system is an information service system that connects users and projects: on the one hand, it helps users discover potential projects of interest; on the other hand, it helps project providers to deliver projects to users who are interested in them. The recommendation system is a powerful system that can add value to the company or business. In the future, it will continue to be researched and developed to bring a better experience to users. Searching for a preferred dish has always been a hectic job, but this project has helped us overcome that task. We got to know briefly about the k nearest algorithm and also we got insights into the topic of content- based filtering. This project helps us to filter out the best food dishes from the data set. The KNN algorithm helps us to get the top five dishes from the provided data set and get the ingredients as well as the food name of the dishes.

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