Educational Career Recommendation System Using Machine Learning

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Abstract: In order to cope with the changing education system and the evolving new technologies, it is important for a student to identify his field of interest and select his best among the available wide range of courses. Many students opt the courses which are not of their interests as they will not be having much knowledge about the courses of their interests. Most of the students in our society decide their future based on what their elders say or they rely on their friends or their family and does the same course which they had done or doing. There will be no proper guidance for them on choosing their subjects or courses. This project is a part in progress of education towards better course recommendation. We use a machine learning program that asks the client questions, and recommends the better stream based on the skills and academic performance provided. The program also serves as a data collection platform to support the drive for more data on course recommendation.

Keywords: Career recommendation, Machine Learning, Recommendation system, Hybrid approach, Form based.

I. INTRODUCTION

We can see that in the day-to-day life we rely on recommendations of people, newspaper and internet, we make choices. The amount of information available on the internet keeps on growing on a daily basis, which becomes difficult in searching and making a firm decision. In case of a student searching for his/her next opportunities, gets exposed to many fields, where making decision based on their field of interest becomes difficult. So, the recommendation system helps the student to explore fields related to education and career opportunities that are available. It narrows down the information based on their interest and makes ease for them to select their next step. Individual's educational needs will differ on their career objectives and skills. The use of personalized course recommenders can help students select courses that are relevant to their career goals and skills. Courses recommended based on what the students have taken before, by trying to research strengths and weakness of previous approaches, we are trying to present a next degree course recommender machine which helps students to discover relevant abilities and courses primarily based on their specific courses which they have taken previously.

Our project is meant to be a part of the progress of Education towards better course recommendation. We use a machine learning program that asks the client questions, and recommends the better stream based on the skills and academic performance provided. The program also serves as a data collection platform to support the drive for more data on course recommendation. Machine learning provides a better ability to upscale, upgrade and obtain results than hard coded algorithms. A machine learning model is an entity that understands the problem – this is obviously better for non-deterministic, real world problems like recommender system, compared to a pre-programmed system that can do nothing but go by the book. Intuitively, ML is the right approach for this problem, and we have made use of the same.

A recommender machine or recommendation system is like a subclass of information filtering system which helps in predicting the user will give to any item. It is used in many different areas, some examples of this are taking the shape of playlist for video and song offerings, some recommendation of products to online store, and some recommendations of content for platforms like social media and open net recommendations of content. These structures can operate the use of a single input, like music, or more than one inputs within and throughout systems like news, books, and search queries. There are also famous recommender structures for specific topics like ingesting places and on-line relationship. Recommender systems have also been advanced to discover studies articles and specialists, collaborators, and economic services.
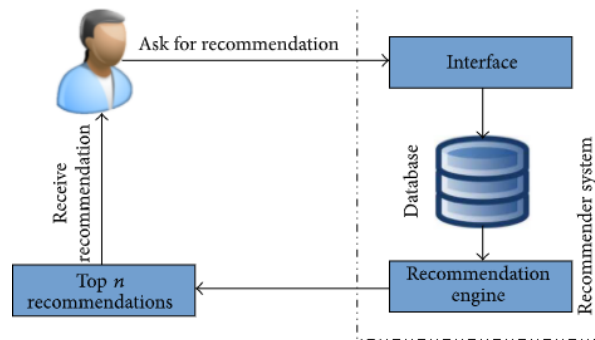
Figure 1: Simple Recommender System

Recommender machine will employ one or both collaborative and content-based filtering (additionally referred to as the persona-primarily based method), and also different structures along with know-how-based totally structures. Collaborative filtering tactics construct a model from a person's beyond conduct (objects formerly purchased or decided on and/or numerical rankings given to those objects) in addition to comparable choices done by using different users. This version is later used to expect objects (or some ratings/views for gadgets) that a person might also have some kind of interest in. Content-based filtering strategies make use of a sequence of different, pre-tagged traits of an object with the intention to advocate extra gadgets with comparable homes. Current recommender machine usually tries to combine one or extra strategies into hybrid machine.

II. RELATED WORK

To build a recommender system using content-based recommender system and when the cosine similarity is applied on the user's data to check the closeness and recommend the courses.[2] The Data Mining techniques applied to data to enhance the features. Building a recommendation system considering cold start problem. Building a hybrid recommendation system considering different algorithms and their accuracy. [1]

Several recommendation systems have been anticipated are based on collaborative filtering and so far most of them have been able to resolve the problems while providing improved recommendations. Most of them have been able to resolve the problems while providing improved recommendations.[3] Different types of recommender systems that could be implemented and the different types of algorithms that could be used for better accuracy.[14]

III.METHODOLOGY

A. Data Visualization

The data set is been created by us on collecting different courses on different levels of education the basic criteria which is been considered during the collection of data were

• courses after 10th

• courses after 12th

• courses after under graduation

Again these data are split based on the area of study and again it split based on the field of study. After the data collection, it is been pre-processed in a machine learning format. With this course data, the user data is also combined to overcome the cold start problem, once the data is filtered to provide an accurate recommendation, the data is displayed in two formats that are a list of courses and visualized format of the pie chart to show the percentage of an interesting area of study.

B. Proposed Methodology

A web-based application to guide an interested career, based on his interested area. The Proposed application consists of set of questions with list of answers as a MCQ's where these questions extract his skills or interested domain of studies. The options or answers selected by the user is been further processed and analyzed using specific hybrid-based model and recommended using a web page as a text based or graph based or voice-based recommendation on the course.

A hybrid approach, is a study to overcome the problem of over specialization i.e., characteristic of content-based recommendation systems. Similarly, it overcomes the cold-start problem characteristic of collaborative filtering-based systems by falling back on learners' preferences, if no similar neighbours were found. In this case, both approaches were handled in memory and therefore susceptible to scalability issues as the item and user databases grew in size.
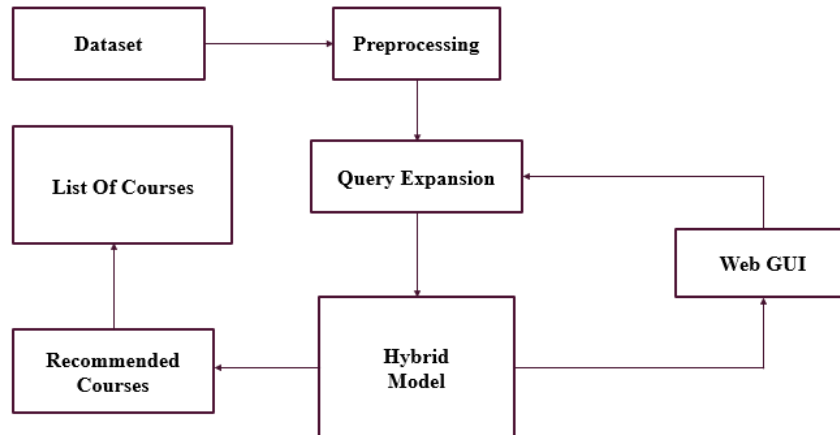
C. Implementation

Figure 2: Implementation Details

The dataset which we have used is the list of courses, i.e., categorised. Then we apply the pre-processing techniques. Query expansion is used for re-formulating data which helps in better information retrieval. These data are then used to classify the input data using filtering techniques that is the collaborative filtering and the content-based filtering which forms a hybrid model. Then the model is connected to web interface where input data of user is further processed into the model and recommended courses are displayed based on interested area.

D. Collaborative Filtering Recommendation

Collaborative Filtering uses similarity between users and items simultaneously to provide recommendation and multiple ways to calculate rating based on ratings of similar users. It Actually depends based on the user response on the same items and references from other users but not features of it, the similarity between user survey needs to be done. a table with data of user's rated items will be used for similarity comparison based on the similarity results the prediction will be made the result will be further filtered for a better recommendation.
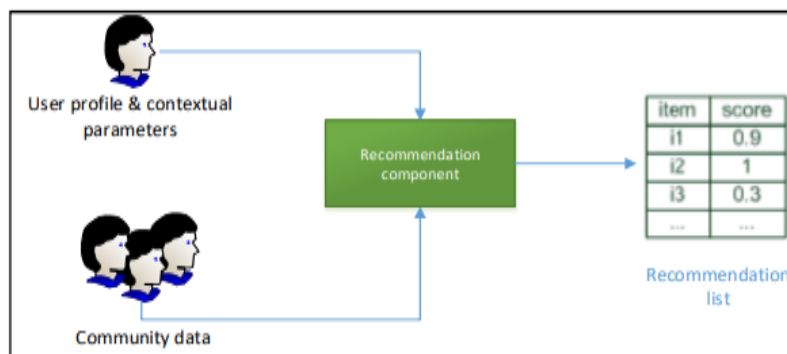

Figure 3: Collaborative Filtering Recommendation System

As we know recommendations completely rely on the filtering method on huge data . the highest similarity score will be given as a result of the recommendation. so finally the code will be created based on the content of recommendation that is given by a user X1 and recommend an item that X1 may like.

User-Based: The system finds out the users who have rated various items in the same way. Suppose User A likes 1,2,3 and B likes 1,2 then the system will recommend movie 3 to B.

Item Based: Here, the system tries to find users who bought similar items. For example, A and B like movie 1 and 3 and C likes 3 then, the system will recommend movie 1 to user C.

E. Content Filtering Recommendation

Content based filtering works on the basis of similarity of the content. If a user is watching a movie of one genre and rates it high, then the system will try to find movies of the same genre with good ratings and recommend it to the user.
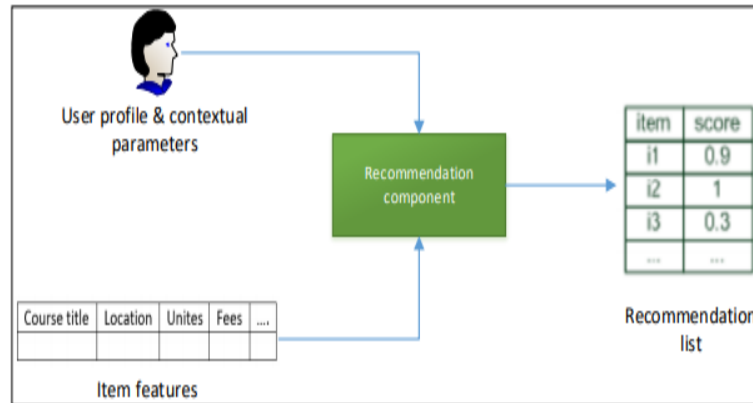
Figure 4: Content Based Filtering Recommendation System

It depends on the similarity between parameters of the items. The recommendation of items to a customer is based on previous data of highest rated items by the same customer. List of parameters/features about these items needs to be generated. Each item will have an item data. A table structure will list the properties of these items. Comparing these features, the scores are assigned. The highest scored properties will be recommended. This process depends on item features or parameters only, and not the user parameters.

F. Hybrid Recommendation

The hybrid approach is a union of content-based and collaborative based filtering and some other strategies. There isn't any cause on why many special techniques of equal type couldn't be hybridized. It can also be applied in different ways: by doing collaborative and content- based assumptions one by one and later combining them, by including advantages of content-based into a collaborative based technique (and the other way); or via merging the techniques into single/one version.
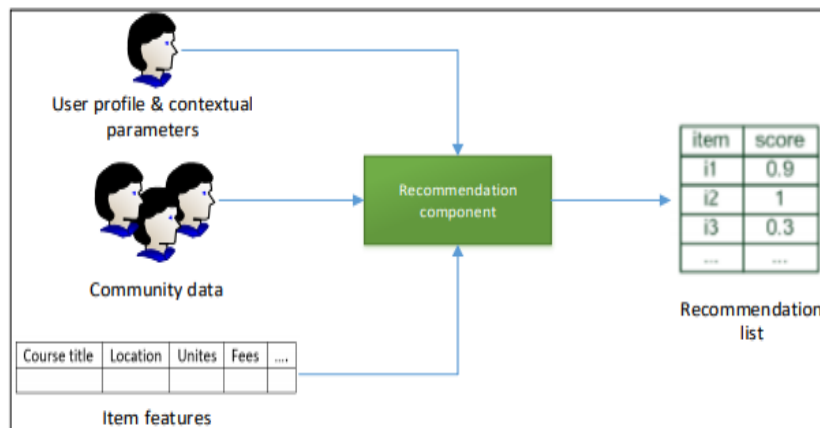
Figure 5: Hybrid Recommendation System

Some hybridization strategies consist of: Weighted: It merges the rating of multiple recommendation additionally. Switching: Here it is done by choosing a recommendation additive and making use of the one which is selected. Mixed: Recommendations are given from exceptional recommenders and are provided together to present the advice. Feature Combination: Here the features are derived from exceptional information resources and all are mixed together and given to a single recommender set of rules. Feature Augmentation: Here the computation of a feature or set of functions, that's then some part of the input is given to the subsequent approach. Cascade: Recommenders provide a strict precedence, with least precedence ones then breaking the ties in the scoring of the greater ones. Meta-degree: One recommendation technique is implemented and produces some type of version, this is then the input used by the following approach.

IV. RESULT DISCUSSION

Process of how courses being recommended; When the URL is entered, the http request is raised, then the GUI is loaded. The user can enter the input based on his preferences. This user preference is taken as input, the course dataset is then read from the backend server. Then data filtration is done in two types. Firstly, based on current education level and then based on the age group. Based on these two factors, the user data and the course data file are filtered into education level and age separately.
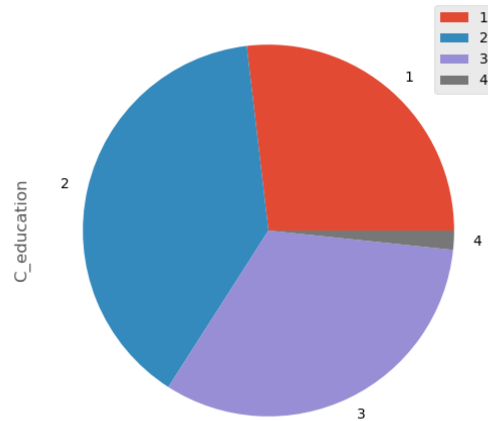
Figure 6: Result Analysis Based on Area of Interest

User data is fed to the csv file to enhance cold start problem, all user data are taken as content. The data read from GUI is assigned with variables and then made as a csv file. This csv file is then converted into data frames. Then we apply collaborative filtering technique. Item based data filtration is done. i.e., based on user data and course data, we create a group based on similarity by merging both the data frames. Then we check for similarity in education level. Then the similarities are fed into the array. This resultant array is converted into data frame and then it is sent as output to frontend for displaying.
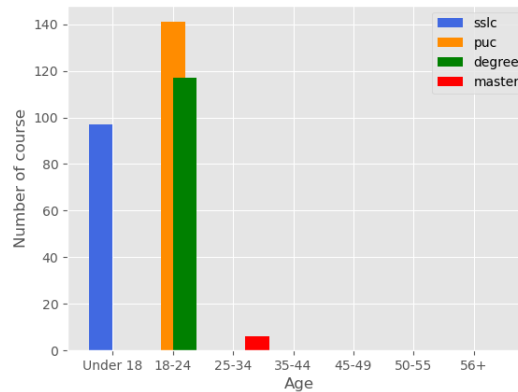

Figure 7: Data Visuality of Existing Data

V. CONCLUSION AND FUTURE SCOPE

A. Conclusion

In this proposed approach, the problems of cold start, trust and privacy is solved in this approach and a recommendation system is built in Python because it is easy and efficient to put into effect algorithms on exclusive operating systems. Python additionally has different libraries and functions that allow us to perform actions with variations in code. The intention is to apply numerous python libraries to use Machine Learning techniques. The dataset used for training the model is the most crucial part of the project.

B. Future Scope

The course collection for the dataset can be enhanced with addition of college recommendation with the list of courses available.

REFERENCES

[1]   Tanya V Yadalam, Vaishnavi M Gowda, Vanditha Shiva Kumar, Disha Girish, Namratha M; "Career Recommendation Systems using Content based Filtering", IEEE, 2020.
[2]   E K Subramanian, Ramachandran, "Student Career Guidance System for Recommendation of Relevant Course Selection", IJRTE, 2019.
[3]   Bharat Patel, Varun Kakuste, Magdalini Eirinaki; "CaPaR: A Career Path Recommendation Framework", IEEE Third International

Conference on Big Data Computing Service and Applications, 2017.

[4]   Dr. D. Haritha and Lakshmi Prasanna, "Smart Career Guidance and Recommendation System", IJEDR, 2019.

[5]   Hong-Quan Do, Tuan-Hiep Le, and Byeongnam Yoon, "Dynamic Weighted Hybrid Recommender Systems", ICACT, 2020.

[6]   Maddala Lakshmi Bai, Rajendra Pamula, Praphul Kumar Jain, "Tourist Recommender System using Hybrid Filtering", ISCON, 2019.

[7]   E K Subramanian, Ramachandran, "Student Career Guidance System for Recommendation of Relevant Course Selection", International Journal of Recent Technology and Engineering (IJRTE), April 2019.

[8]   Shebha Shahab, "Next Level: A Course Recommender System based on Career Interests", San Jose State University Scholar Works, 2019.

[9]   Rimpal Unadkat, Mehul Barot, "Survey Paper on Fuzzy Logic Based Recommender System", IJARIIE – ISSN, 2017.

[10]   Zameer Gulzar, A. Anny Leema, Gerard Deepak, "Personalized Course Recommender System Based on Hybrid Approach", ICSCC, 2017.

[11]   Priyanka, "A Survey Paper on Various Algorithms based Recommender System", IOSR – Journal of Computer Engineering (IOSR – JCE), May – June 2017.

[12]   Seema K Yadav, Sujit J Singh, Akshay M Bora, Shashankit N Thakur, "Educational Recommendation and Tracking System", International Journal of Scientific & Engineering Research, November 2016.

[13]   Paulo Alencar, Donald D Cowan, "The Use of Machine Learning Algorithms in Recommender Systems: A Systematic Review", Research Gate, November 2015.

[14]   Bhumika Bhatt, Prof. Premal J Patel, Prof. Hetal Gaudani; "A Review Paper on Machine Learning Based Recommendation System", IJEDR, 2014.

[15]   Claudia Crisan, Oana Ghimbulut, Anisara Pavelea, "A Need Assessment on Students' Career Guidance", The 6th International Conference Edu World 2014 Education Facing Contemporary World Issues, 7th, 9th November 2014.

[16]   Mukta Kohar and Chhavi Rana, "Survey Paper on Recommendation System" International Journal of Computer Science and Information Technologies, 2012.

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