EduNexus: A Personalized Course Recommendation System Based on Skills and Career Interests

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Abstract- ***With the growth of online learning platforms, students now have access to a wide choice of courses on a wide range of topics. For students, the sheer quantity of possibilities can be daunting, and selecting the correct course can be difficult. Learners spend endless hours exploring each of the online course platforms in order to find the course that best fits their interests. Finding courses that are a suitable fit for their interests and learning goals can thus be made easier for students by employing customised course recommendations. The proposed system is intended to provide users with tailored course recommendations based on their interests, skill sets, and personal preferences. Our approach in this study uses machine learning methods to provide meaningful cross-platform course recommendations.***

Indexed Terms- ***Recommendation system, Machine learning, Feature extraction, Data Mining, Cosine similarity***

I. INTRODUCTION

In response to the worldwide digital transformation, the education sector has made significant progress in adopting e-learning or online learning in recent years. Adoption has become more common since the Covid-19 epidemic. As a result, the market for online education has exploded. People are looking for alternatives to traditional educational institutions and are beginning to recognise the benefits of online learning. There are numerous online learning sites that provide programmes in a variety of areas and languages these days. They encourage people to learn anything, at any time, and from any location as long as they have internet access.

However, because there are so many alternatives and learning settings to choose from, option fatigue is a prevalent issue for keen learners looking for online courses. Finding the right course to start learning from frequently requires more time and effort as a result. To remedy this inefficiency, we intend to create a Personalised Course Recommender System that would serve as a one-stop shop. Our system may recommend cross-platform courses based on a learner's preferences, skills, and career interests. Learners would no longer have to spend countless hours scouring each online course platform in quest of the appropriate course for their needs.

II. LITERATURE REVIEW

Y. Ren, Z. He and T. Han; The research improves the design of an online education course recommendation system, including data collection, pre-processing, feature extraction, and the recommendation process. The proposed design aims to improve the quality of the recommendation system as well as the user experience. They propose a hybrid recommendation algorithm for online course recommendation systems. The proposed algorithm combines collaborative filtering and content-based filtering strategies to overcome the limitations of each strategy and improve the accuracy of the recommendations.[1]

N. N. Y. Vo, N. H. Vu, T. A. Vu, Q. T. Vu and B. D. Mach, they presented a system that would combine content-based filtering and collaborative filtering techniques to generate individualised course recommendations for software engineering students. The authors gathered data on students' academic achievement, course enrollments, and course content assessments in order to develop a knowledge graph that displays the connections between courses and skills. Based on this knowledge tree and a hybrid recommendation algorithm that matches students' talents and interests, the CRS recommends courses. The CRS can assist students in making better informed

course enrollment decisions and improving their learning outcomes.[2]

Jiang, Pardos, and Wei offer a Goal-based course recommendation system (GCRS) that recommends courses based on learners' goals and preferences. The effort required taking data from a large online learning platform and using it to build a recommendation engine. The authors used a combination of collaborative and content-based filtering to locate courses that were relevant to the learner's preferences and goals. They also incorporated a goal model, which allowed students to identify their educational goals and receive personalised course recommendations based on these goals. The authors discovered that their algorithm was particularly effective at recommending courses to students with specific learning preferences and goals. The study also stressed the importance of giving students the option to select their learning preferences and goals in order to maximise the utility of the GCRS suggestions. [3]

Gulzar, Deepak, and A provides a personalised course recommender system (PCRS) that uses a combination of collaborative filtering and content-based filtering to make course recommendations to students. According to the authors, this method can improve the precision and applicability of guidance offered to pupils. The authors used a content-based filtering algorithm to recommend courses based on the learner's interests and skill levels, as well as a collaborative filtering method to locate courses that were popular among users who shared similar interests and skill levels. The authors also utilised a rating normalisation technique to improve the accuracy of the PCRS's recommendations. The authors discovered that their algorithm was particularly effective at recommending courses to students with diverse backgrounds and interests. The study also highlighted the need of incorporating both collaborative and content-based filtering when developing customised course recommendation systems.[4]

Zhao and Pan propose a collaborative filtering algorithm-based system for recommending online courses. The authors used an updated collaborative filtering algorithm that took into account a user's implicit input, such as click behaviour and time spent on a particular course, to locate courses that were relevant to the learner's interests and preferences. They also inserted a diversity constraint to ensure that the suggested courses were diverse and not unduly similar to one another. The authors discovered that their strategy was extremely effective in recommending courses to students with a wide range of interests and preferences. The study also stressed the importance of incorporating implicit user feedback and diversity constraints while developing course selection models.[5]

Jiang, Feng, Niu, and Dai Suggest developing an intelligent recommendation system for online video courses. According to the authors, this method can improve user interaction and engagement with online learning platforms. The task included obtaining user information from a large online learning platform and using it to build a recommendation engine. The authors employed collaborative filtering and content-based filtering to locate courses that were relevant to the learner's interests and choices. They also integrated a deep learning system to analyse the video material and create more accurate recommendations. The authors discovered that their strategy was particularly useful for recommending courses to students with diverse backgrounds and interests. The study also highlighted the importance of incorporating deep learning models for developing knowledgeable recommendation systems for online video courses.[6]

III. DIFFERENT TECHNIQUES USED IN RECOMMENDATION SYSTEM

There are several techniques used in recommendation systems, including:

Collaborative Filtering:
Collaborative filtering is a technique used in recommendation systems that makes recommendations based on the preferences and behaviours of similar users. This method is based on how users behave or rate items. It uses similar 'users' to recommend items. The benefit of employing these filters is that they don't require topic knowledge and offer serendipity, allowing users to find new interests through recommendations. These systems can identify learners with similar preferences using learner profiles and can then propose learning resources/materials in line with those choices.

Content-Based Filtering

Recommendations made using content-based filtering are those that are based on an item's traits or characteristics. This technique is employed in recommendation systems. These systems attempt to recommend items by comparing the contents or preferences in a user profile with the attributes of the product. These algorithms don't rely on data from other users because recommendations are tailored to a target user and can take into account their personal interests. It entails examining an item's attributes or metadata, such as its genre, author, or keywords, and then recommending to the user other products with related attributes. The technique demands some domain knowledge because the features/contents of things are hand-engineered. Since content-based filtering is reliant on the user's current interests, its expansion potential is constrained.

Knowledge Based filtering:

The recommendations made by knowledge-based recommendation systems depend on the domain's knowledge or on explicit rules. To generate recommendations, these systems rely on expert knowledge or information particular to a given domain. This method keeps information about the user and item in a knowledge base. A dialogue-based interface is used to solicit explicit feedback from the user, and the knowledge base is then updated as necessary. This method generates recommendations using a knowledge graph. A database of information and relationships between things makes up the knowledge graph.

Hybrid Filtering:

Each recommender system has advantages and disadvantages. With this in mind, hybrid filtering combines several different recommendation systems to take advantage of their combined strengths. They attempt to increase the recommendations coverage and accuracy.

IV. METHODOLOGY

The proposed methodology consists of following main steps: data collection, data pre-processing, and recommendation model development and Evaluation.

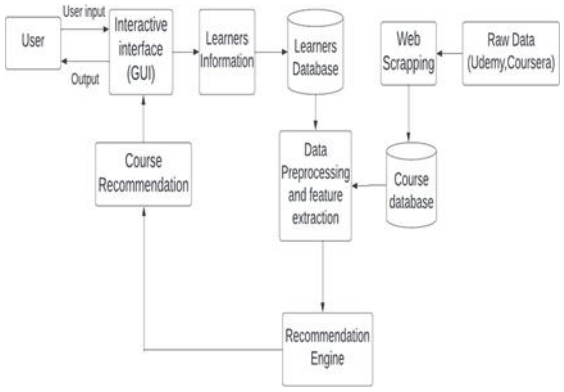

Figure: Architecture Diagram

Data Collection: The initial stage is data collection. Web scraping is a data mining technique used to acquire course information from various e-learning sites. Data regarding the learner's preferences, career interests, and other relevant information that can help with the suggestion process are included.

Data Pre-processing: Pre-processing is required to assure the quality and utility of the received data. In this step, data cleaning, normalisation, feature extraction, and other methods are performed to prepare the data for analysis and modelling.

Recommendation Model: The subsequent step is to develop a recommendation algorithm capable of matching learners preferences and interests with the most suited courses. Different machine learning and data mining techniques, such as content-based filtering, collaborative filtering, or hybrid models that include both, can be utilised to develop such a model. The model should take into account the user input and course data to deliver the most relevant recommendations.

Evaluation: The final stage is to evaluate the recommendation model's performance. This can be accomplished by assessing the model's ability to generate accurate and relevant recommendations. The evaluation outcomes can be utilised to fine-tune the model and increase its accuracy and efficiency.

CONCLUSION

We suggested a personalised course recommendation system in this work that employs machine learning techniques to deliver course recommendations based

on the learner's skills, preferences, and career interests. The proposed system collects data on the student's skills and interests, creates learner and course profiles, and generates personalised course suggestions using a content-based recommendation model. By providing personalised course recommendations that match their talents and interests, the proposed method has the potential to improve learners' learning outcomes and engagement.

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