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Development of A New E-Learning Platform That Provides A Learning Path Recommendation

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***Abstract*: E-learning Platform has gain traction in the recent times. As now it has become an ultimate alternative to physical learning. These situations have boosted the rise of education technology companies. Online Learning has become the norm of our academic learning. It is known for its flexibility, economical costs, and removes location barrier. E-Learning in India has been mostly popular for Higher Secondary and Competitive Exams tutoring. It is has grown so much that now become a major branch industry in education business. We are proposing an online learning infrastructure that will concentrate on collaborating mentors and mentee for providing a suitable learning path. To create a solution for this issue, we have developed a e-learning platform that uses collaborative filtering and neural network for course recommendation as well as learning path recommendation**.

***Keywords*: *Learning path recommendation, neural network, collaborative filtering, e-learning platform, online learning*.**

I. INTRODUCTION

E-learning platform is the new trend in the education industry. Learners who want independence from time and location choose online learning platform to learn at their own pace. Now as this technology is getting more acquainted with the people. Novel innovations in the e-learning field are emerging.

But there are also hindrances for learner that makes it difficult for the person to complete the course and gain practical knowledge.

E-Learning is not a simple system were the student follows a straight trajectory of learning. It needs more humanistic approach in teaching the learners. In many cases, learning a course has an enthusiastic start, but when the learner arrives at the middle of the course, either the course is dropped or remains at a halt. Thus, creating a vacuum of understanding concepts.

Even though online learning is cost effective, it might not guarantee if learner has gained knowledge to solve real-world problems, which is the goal of various e-learning platforms, to make the learner industry-ready.

And in most of the cases, online courses are treated as side-learning interests or the auxiliary learning but never becomes the main part of the learner's curriculum.

As the learner is introduced to the learning program, the person is not able to decide to choose a course that matches its field of interest and capability. Hence, it also becomes another reason why courses are left in the middle.

Given these issues are being well analysed by the researchers, to tackle these hindrances we have designed a platform that only recommends courses but also recommend a learning path for the student. By using collaborative filtering and neural networks, our system is not only able to recommend courses but suggest learning path to suit the learner's style for learning. With help of neural networks and collaborative filtering we can predict student's learning ability. Our proposed system is designed to be easily acquired by the academia and supplant the archaic model of learning to enter in the new realm of education and technology.

II. LITREATURE SURVEY

The proposed works is related to online learning ergonomics and course recommendation analysis. The related work and method of how the proposed system is placed in the literature is shown.

1) Title: Making Sense of MOOCs: Musings in a Maze of Myth, Paradox and Possibility

Authors: John Daniels

Advantages:

Provides full history of MOOCs to understand the evolution of the structure.

Methodology:

Understanding MOOCs is a demanding for four reasons. Firstly, this is a relatively new phenomenon, that started in 2008 under the course name as MOOC. On a second note,

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this tutelage way of the early courses, which can be termed as cMOOCs, is founded on the canon of Connective Knowledge and Networking. This is dissimilar from the xMOOCs that is now being designed by American Ivy Leagues Schools. They are developing a more behaviorist approach for pedagogy. Thirdly, there were scantily done research on academic studies of MOOCs are about the earlier offerings because a systemic study couldn't be organized in such less amount of time after the 2012 xMOOCs. Analysis of the latter has to be based on a large volume of press articles and blogs. Fourth, commentary on MOOCs includes thinly disguised promotional material by commercial interests (e.g. Koller, 2012) and articles by practitioners whose perspective is their own MOOC courses

Description:

The paper describes the short history of MOOCs and sets them in the wider context of the evolution of educational technology and open/distance learning.

2)Title: How video production affects student engagement: An empirical study of MOOC videos

Authors: Philip J. Guo, Juho Kim, Rob Rubin

Advantages:

Provides full history of MOOCs to understand the evolution of the structure correctly classified by our approach.

Methodology:

The authors took a unique method wherein they scrutinize data from four Edx online learning courses and complemented their findings with the insights gained by discussing it with six Edx employees who were involved in the process of designing these courses.

Description:

Videos are a widely used kind of resource for online learning. This paper presents an empirical study of how video production decisions affect student engagement in online educational videos.

3) Title: A personalized recommendation system with combinational algorithm for online learning

Authors: Jun Xiao · Minjuan Wang · Bingqian Jiang · Junli Li

Advantages:

It gives us the basic knowledge for making online course recommendation system.

Methodology and Description:

The authors have developed a system where it recommends learning materials such as similar courses to learners who have registered the in formal online courses, by applying a combination methods such as the collaborative filtering, and association rules, content filtering.

Disadvantages:

Sparsity problem, Cold start problem, Scalability problem.

4) Title: Learning path combination recommendation based on the learning networks

Authors: Hong Liu • Xiaojun Li

Advantages:

A good understanding to constructs the course–course network and the learner–learner network, which describes the relationships between any two arbitrary courses or learners, respectively.

Methodology and Description:

In LPCRLN, it introduces complex network technology. Based on the characteristics of courses and learners, the course network and learner network, respectively, are constructed, and then learners are divided into three types. Finally, the recommendation is made in different scenarios according to the learner's learning records.

Disadvantages:

The data is experimental and not real data.

III. PROPOSED METHODOLOGY

Nowadays, world is rapidly upgrading in all fields. Along with it, learning platform are also rapidly upgrading. But nowadays in education platforms, sources or courses are recommended by a student's interest just like YouTube is recommending videos by user's interest. An IQ test is an assessment that measures a range of logical abilities and potential. It contains many tests like psychological, logical and many more that you have to use our brain. It is essential to look at exactly how these tests are conducted. It's very difficult to choose a right course to develop a career. This system is useful to overcome from this drawback.

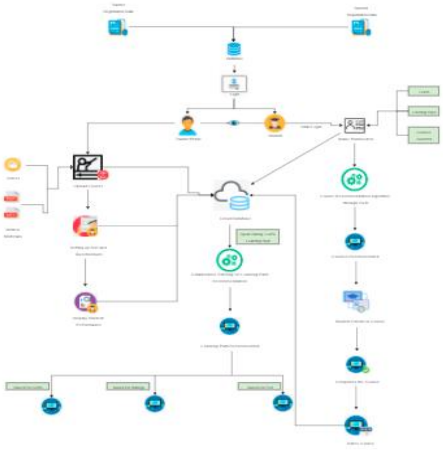

Fig 1. System Architecture

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This system is fully cloud based so it could be used from any remote location with mobile devices. This system is developed to check cloud performance in the education system and measure the student's ability in study. In this system, registration and login activities for each and student, teacher or parent also. After the successful login, each student has an IQ test for selecting the right course according to the report of the test. In this system, various courses are recommended according to the report of this IQ test. Teachers are also logged in to check test results. This system is very useful in future perspectives.

The methodology proposed for this system is developed using python and web technology, and machine learning classification.

Modules:

1) Registration Module
2) Course Upload Module
3) Course Recommendation Module
4) Learning Path Recommendation Module

A. *Registration/Sign-Up Module*
The first module will be built to handle new registrations and sign up of the users. The users will be the teacher and student profiles. Two databases will be set-up. A form on the UI Level will be created to get basic details of the users (different for student and teachers). Sub-modules for Change Password and Forgot Password will be created. Security like 2AF and OTP login could be enabled.

B. *Course Upload Module*
This module will be built for the tutor to upload the material of the course. The platform will support Video and Document-like materials.
This is for the demo class. Ratings system is supported for the courses. Metrics such as Time Taken to complete the course and test marks will be tracked, in this module. All materials must be non-plagiarized proof and completely original.

C. *Course Recommendation Module*
This module will be built for recommending the students to choose courses from their interests.
Collaborative filtering Algorithm will be used.
Initial selections made by the student and their IQ test will be fed in as input. For example: If students score 45 on the IQ test and has interest for computer graphics, courses like programming languages such as HTML, JAVA will be recommended for a basic start. This module will help in understanding the potential and intelligence of the student to complete the course.
Also, it will be help in turn give input for learning path recommendation module. It will also note the affinity of the courses the student chooses through comparison.

D. *Learning Path Recommendation Module*
This module will be built for recommending the learning path to the student. Learning path will decide what sought of attention or way of learning the student requires. Does live classes will help or static learning will be fine - such decisions will be made by the module. Collaborative filtering Algorithm and Neural Network Algorithm will be used. Input nodes will be the IQ Test, Course completion duration, marks acquired on each application test module and the output from Course recommendation module. This module will help the tutor and student to create a bridge the gap in the student learning.

IV. IMPLEMENTATION

Following algorithms is applied on features obtained above:

1) Decision tree:
Decision trees build classification or regression models within the style of a tree structure. It breaks down a dataset into smaller and smaller subsets while at an equivalent time associate degree associated call tree is incrementally developed. the ultimate result's a tree with call nodes and leaf nodes. A decision node (e.g., Outlook) has 2 or a lot of branches (e.g., Sunny, Overcast and Rainy). Leaf node (e.g., Play) represents a classification or decision. The top call node during a tree which corresponds to the most effective predictor referred to as root node. Call trees will handle each categorical and numerical knowledge.

2) SVM (support vector machine) :
A support vector machine (SVM) may be a supervised machine learning model that uses classification algorithms for two-group classification issues. After giving associate degree SVM model sets of labeled training knowledge for every class, they're able to categorize new text..

4) Naive Bayes:
A classification algorithmic rule beneath supervised learning cluster supported probabilistic logic. This is one in all the only machine learning algorithms of all times. Generative algorithms from GANs also are used as classifiers, interestingly they'll do rather more than categorization although.

5) Random forest:

Random forest, like its name implies, consists of many individual call trees that operate as associate degree ensemble. every individual tree within the random forest spits out category|a category} prediction and also the class with the foremost votes can become our model's prediction.

i) precision
ii)recall
iii)f1 score
iv)Accuracy will be calculated.

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IMPLEMENTATION RESULTS

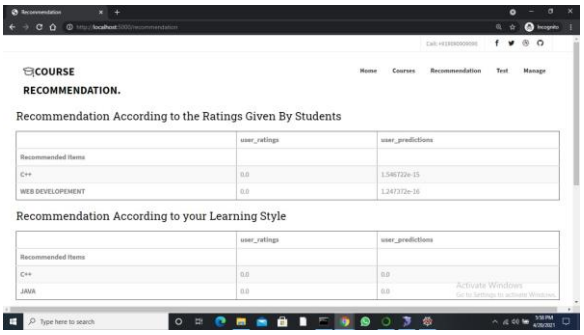

Fig. 2 Course Recommendation

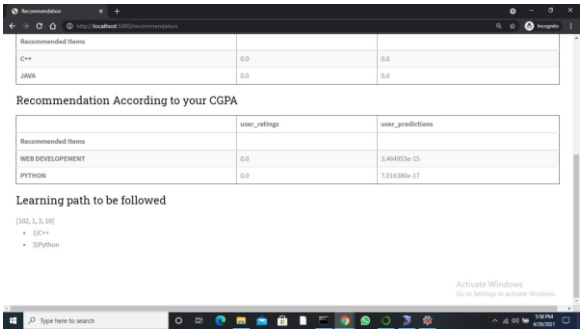

Fig.3 Learning Path Recommendation

V. CONCLUSION

In this paper, we presented an empirical study of course recommendation and proposed a new system we use collaborative filtering, natural language process for prediction and course recommendation based on student grade. Final result of this project is very hopeful. Collaborative filtering approach provides student an accuracy prediction of the courses. Which will be very helpful when they decide on selecting elective course as a grade is important parameter for a student while deciding on courses.

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