CONCEPTUAL MODEL OF A SPECIALIZATION RECOMMENDER SYSTEM FOR MANAGEMENT STUDIES

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Abstract

The MBA has almost become a prerequisite for the organization's top management positions. In today's global corporate market, it has become one of the most important credentials. It has become one of the most significant qualifications in today's world corporate section. The right selection of a B-School is crucial, but the choice of proper specialization in MBA is the most important. It focuses on various elements of educational objects, such as students, teachers, teaching materials, class organization and many others in order to provide better and effective solutions. Although selection of business management institute might be critical, however, selection of appropriate specialization has become essential. Specialization selection, sometimes, becomes the real challenge for the students to opt.

In recent years, data mining applications through Artificial Intelligence and Machine learning are emerging almost in every walk of life. Educational Data Mining (EDM) is one of them. It is an evolving area that aims to discover information using information from learning environments.

National Education Policy 2020 under the head "Technology Use and Integration" talks about Digital India Campaign that assists the entire nation to transform into a digitally empowered society and knowledge economy. It also highlights the use and integration of technology to improve multiple aspects of education. New technologies that include artificial intelligence, machine learning, block chains and many more for should be used for student development.

The present article proposes a conceptual model for developing a "*Recommender system*" which will assist students to opt for most effective specialization during their Business Management course.

Keywords: *Machine Learning, Collaborative Filtering, Personality Test, Subjects' Marks, Cell Activity Performance score*

Introduction:

Education is fundamental for achieving full human potential, developing an equitable and just society, and promoting national development. Providing universal access to quality education is the key to India's continued ascent, and leadership on the global stage in terms of economic growth, social justice and equality, scientific advancement, national integration, and cultural preservation. The world is undergoing rapid changes in the knowledge landscape. With various dramatic scientific and technological advances, such as the rise of big data, machine learning, and artificial intelligence, many unskilled jobs worldwide may be taken over by machines, while the need for a skilled workforce, particularly involving mathematics, computer science, and data science, in conjunction with multidisciplinary abilities across the sciences, social sciences, and humanities, will be increasingly in greater demand.

National Education Policy 2020:

The NEP, 2020 emphasized the usage of technology in education. Many educational institutions, including CBSE, have realised the importance of introducing artificial intelligence into the curriculum. It recently partnered with IBM to integrate AI curriculum in around 200 Indian Schools. With the NEP 2020, it addresses the need to inculcate new-age technologies such as AI and analytics, which are built on the premise of logical thinking, critical thinking and problem-solving skills.

New technologies that include artificial intelligence, machine learning, block chains and many more for should be used for student development. Overall development of a student does not include only providing best of the courses to learn but also to appropriately gauge his/her strengths and skills in order to help him select right course/skill set.

Literature Review:

The research community has done a great deal of work to boost the applicability and efficiency of RSs in recent years. (Lu et al., 2015). In the education sector, AI has been widely adopted and used. Initially, AI in education took the form of computers and management, teaching and learning. AI learning, in its early stage, is currently seen as an education assistant, while AI-enable education will play a more significant role as learning requirements shift (Chen L. et al, 2020).

Andriessen J. et al (1999) presented arguments supported by research examples for a fundamental shift of emphasis in education and its relation to technology, in particular AI-technology. They discussed three pedagogic scenarios that reflect different educational stands: what knowledge is taken to be, what learning is taken to be, what would be the goal of education, and how the learning process should be mediated by instructional intervention. They also discussed about different options for the use and investigation of AI- principles and techniques in AI and Education research. Recent technological developments and the growing pace of introducing new technology in higher education are being examined to foresee the future nature of higher education. Teaching in higher education needs a revision of the role and pedagogy of teachers. Many sets of tasks currently at the heart of higher education teaching practice will be replaced by AI applications based on sophisticated programming algorithms that can express their own biases or agendas in operating systems (Popenici Stefan et al, 2017).

India's National Education Policy (NEP) 2020, unconfined in July 2020, provides that all universities offer doctorate and masters programmes in core areas such as machine learning and in multidisciplinary fields ("AI" + "X"). The NEP also contains provisions for setting up a National Educational Alliance for Technology "to enhance learning, assessment, planning, [and] administration" at schools and higher education institutions (Jain R, 2020).

Research Gap and Objective:

More than 15 research articles have been reviewed. Most of the articles argued about utility of AI and ML applications in education/ higher education system. Many of them discussed about recommender system and its scope in education across various functions in general terms. This article, particularly, focuses on specialization selection in Management studies and proposes a conceptual framework of a collaborative recommender system.

The objectives of the research paper are:

1. To determine utility of AI and ML application in Higher Education.

2. To propose a conceptual framework using technology to assist management students select the specialization.

Recommender system:

There are plenty of questions in almost every walk of our life where we seek suggestions or recommendations, usually with our family members, friends and close acquaintances. These suggestions might often be biased due to various biases and not be as effective as we expect.

An RS is an intelligent computer-based technique that predicts on the basis of users' adoption and usage and helps them to pick items from a vast pool of online stuffs. (Int. J., 2021)

The main goal of RSs is to assist users in their decision-making processes in order to choose an online item by promoting high precision in-hand recommendations (Jannach et al., 2011).

The capacity of RS in various domains have attracted researchers to exhaustively investigate the possibilities. People from different fields such as data mining, data retrieval, knowledge discovery, artificial intelligence (AI), approximation theory, forecasting theory, information security and privacy, and business and marketing have made substantial contributions to various research approaches(Jannach et al., 2011).

In practice, recommendation systems provide a number of methods and algorithms that can recommend "relevant" items to users. The suggested items are as meaningful as possible to the user, so that the user can engage with those items. Recommender systems are generally divided into two main categories: collaborative filtering and content-based systems.

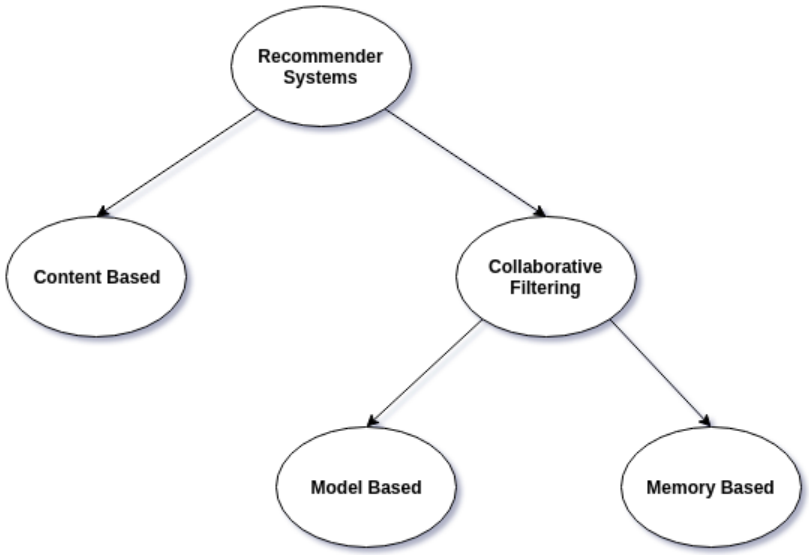

Figure 1: Recommender System types (source: https://www.kdnuggets.com)

Collaborative filtering approaches for recommender system are techniques focused solely on previous consumer engagement with target items. Therefore, the input to a collaborative filtering system will be all historical data of user interactions/engagement with target items. This data is typically stored in a matrix where the rows are the users, and the columns are the items. The article proposes "Collaborative Filtering Approach".

Recommender system in Higher Education:

The discussion about using Artificial Intelligence and Machine Learning application were not unrelated to higher education institutions. This could be done by collecting as much information as possible about university students, professors and administrative staff and allowing deep analysis, thereby constructive action in student attention, course planning and resource management can be taken.(del Casino, 2018)(Fendley, B, 2018)(Blackwood, J, 2018).

Educational Data Mining (EDM) is a new emerging field that discovers knowledge from data originating from educational environments (Vukicevic, M et al, 2013).

A vast amount of data is available in the modern world and can be used efficiently to generate vital information. In the fields of medical science, business industry, agriculture, education and so on, this data are being used and analysed. But to evaluate this enormous amount of data, conventional data storage and analysis methods are no longer adequate. Modern methods like Data mining can be an effective solution (Kumar V. et al, 2011).

There are several uses of RS in education, the most reported is helping on academic choices, assisting in suggesting courses, or simply e-courses, research documents' management, course complementary materials, resources and academic activities. Another area of education enhanced by RS is the e-learning education through web platforms. (Tapia-Leon M et al, 2018).

Management Studies and selection of specialization:

Although, the correct choice of a B-School is important. The most important thing is to select the best specialization for the MBA. Much like a decision to buy a new property like home, car or invest capital in the right company to maximize profits, the decision about specialization is very critical. The choice of specialization determines by the academic discipline, environmental factors and interest of the student in the field. (S. Murali et al, 2019). Wrong selection of specialization may not assist in taking out 100% of the student's capacity and potential. Therefore, specialization selection is not only important bust also critical. Educational Data Mining (EDM) is a new emerging field that discovers knowledge from data originating from educational environments (Vukicevic, M et al, 2013). These modern data analysis techniques viz. datamining, machine learning and artificial intelligence can provide a revolutionary solution in this domain.

How Recommender system can be used: A proposed Model:

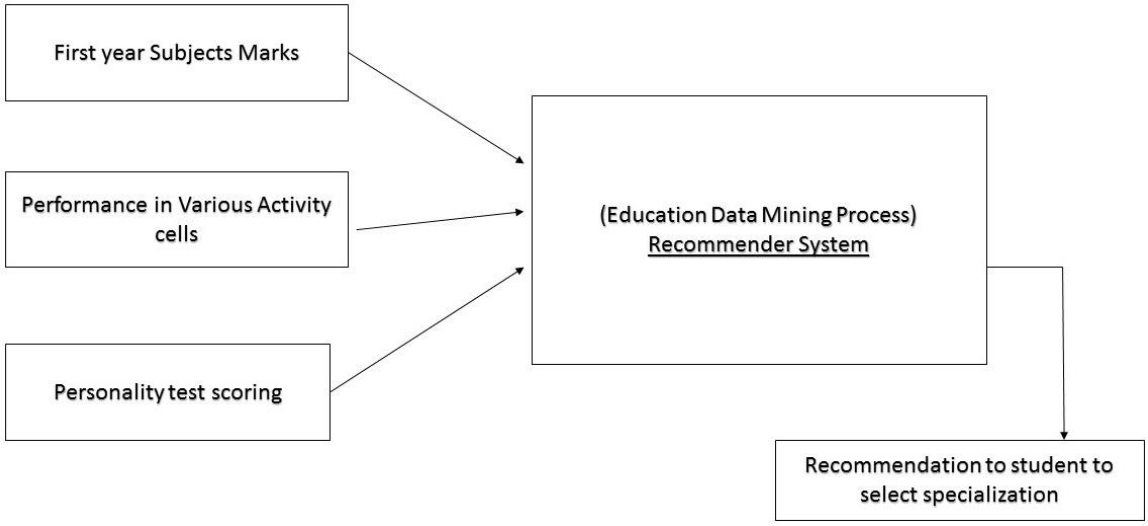

Figure 2: Proposed Model of recommender system to assist in selecting specialization

Specialization in MBA/PGDM course are usually opted in the second year first semester or fourth trimester. The proposed model of the recommender system will help student to guide or recommend the most appropriate specialization he can opt for.

The entire process would be based on the recommender system developed using machine learning approach. The proposed model would use collaborative filtering technique. This technique is would use historical data comprising previous subjects marks of each domain viz. marketing, business analytics, human resource ,finance and operations , scores given by various cells/committees heads where he was involved, score retrieved from personality test. All of these inputs in matrix format will be used to develop a model of the recommender system. Based on the users' historical data involving subject knowledge performance, performance in various cells and personality test score, the system will try to predict the specialization the student should go for.

Conclusion:

The present research article discusses about the various applications of AI & ML in education in order to understand its utility in higher education. It also proposes the conceptual model of a collaborative recommendation system using collaborative filtering approach. It also discussed about the historical data in term of different scores from subjects, activity cells and personality test to be used to create a recommendation model. Various Recommender Systems in education are being used in other countries despite many difficulties in implementation, the most reported is helping on academic choices, assisting in suggesting courses, or simply e-courses. But such systems in Indian higher education systems are still awaited. These systems will not only recommend students to select most appropriate specialization on a smaller scale but also help to build intellectual and institutional capacities in educational technology on the larger scale. (National Education Policy 2020).

Webliography

1. Accessed from https://digitallearning.eletsonline.com/2020/07/national-education-policy-advocates-use-of-technology-in-education/#:~:text=The%20NEP%2C%202020%20emphasized%20the,(NETF)%20is%20being%20created.&text=The%20new%20policy%20is%20eyeing,equipping%20schools%2C%20teachers%20and%20students
2. Accessed from https://analyticsindiamag.com/how-will-the-new-education-policy-make-india-ai-ready/#:~:text=With%20the%20NEP%202020%2C%20it,needs%20of%20the%20future%20workplace.
3. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
4. https://er.educause.edu/articles/2019/8/artificial-intelligence-in-higher-education-applications-promise-and-perils-and-ethical-questions
5. https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-019-0171-0

References

1. Blackwood, J. How one Artificial Intelligence is Changing Higher Education Curriculum. Tech Decisions, 23 January 2018
2. del Casino, V. Machine Learning, Big Data and the future of higher ed. Inside Higher Ed, 21 March 2018.

3. Fendley, B. Artificial Intelligence in Higher Education. Medium, 8 March 2018.
4. Int. J. Recommender Systems: An Overview, Research Trends, and Future Directions. Business and Systems Research. Vol. 15, No. 1, 2021
5. Jannach, D., Zanker, M., Felfernig, A. and Friedrich, G. (2011) Recommender Systems: An Introduction, Cambridge University Press, New York.
6. Jerry Andriessen, Jacobijn Sandberg. Where is Education Heading and How About AI?. International Journal of Artificial Intelligence in Education, (1999), 10, 130-150
7. Lijia Chen, Pingping Chen, Zhijian Lin. Artificial Intelligence in Education: A Review. IEEE Access, Received April 5, 2020, accepted April 14, 2020, date of publication April 17, 2020, date of current version May 5, 2020.
8. Lu, J., Wu, D., Mao, M., Wang, W. and Zhang, G. (2015) 'Recommender system application developments: a survey', Decision Support Systems, Vol. 74, pp.12–32.
9. Mariela Tapia-Leon, Sergio Luján-Mora. Recommendation Systems in Education: A Systematic Mapping Study.
10. Murali. S, Saravana Kumar S, Dhanalakshmi. Factors Influencing Selection of Major Specialization with Special Reference to Mba Students at Ramaiah Institute of Management Studies, Bangalore. International Journal of Recent Technology and Engineering (IJRTE), Volume-8 Issue-3S3, November 2019
11. Romi Jain, "Crossroads of Artificial Intelligence: Higher Education and Research in India and China," ORF Occasional Paper No. 281, November 2020, Observer Research Foundation.
12. Stefan A. D. Popenici, Sharon Kerr. Exploring the impact of artificial intelligence on teaching and learning in higher education. Popenici and Kerr Research and Practice in Technology Enhanced Learning (2017) 12:22
13. Varun Kumar, Anupama Chadha. An Empirical Study of the Applications of
    Data Mining Techniques in Higher Education. (IJACSA) International Journal of Advanced Computer Science and Applications,Vol. 2, No.3, March 2011
14. Vukicevic, M.; Jovanovic, M.Z.; Delibasic, B.; Suknovic, M. Recommender system for selection of the rightstudy program for Higher Education students. InRapidMiner: Data Mining Use Cases and Business AnalyticsApplications; Hofmann, M., Klinkenberg, R., Eds.; Chapman & Hall: London, UK, October, 2013.