Recommendation system for e-learning based on personality type and learning style

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Abstract- Current e-learning management systems contain a large collection of data collected from multiple sources but the biggest challenge these systems face is providing quality-related content to users and reducing the time users spend searching for this content. Also, with a difference in the reading ability, not many students can take the same learning track to understand a particular content. Personal Learning Environment (PLE) is an e-learning concept that allows users to manage their learning environment both in terms of content and process. However, the main problems with the use of PLE in grade reading are the excessive knowledge and difficulty in finding appropriate reading content for students.

As users of the e-commerce system, some students may feel overwhelmed by the choice of available content that is offered by the e-commerce program there, not always in line with their reading style. This is important as a psychologist suggests that students need to learn according to their style of reading. Therefore, we can recommend e-learning materials to the user depending on the user's style and learning style.

Keywords- (PLE) Personalized Learning Environment, recommendation system, e-learning, Myers-Briggs, Kolb's learning style, knowledge-based recommendation.

I. INTRODUCTION

The whole e-learning system is designed to help the student find his or her goals and help when needed. However, the learning style of the student is different, as a result, the continuity of learning and pattern varies between students. Learning style is an aspect of the user's mental and psychological functioning under the learning category. Therefore, a good e-learning program is one that not only recommends a knowledge-based concept but also recommends a type of reading material that will help the learner to learn or acquire a skill in the best possible way. E-Learning systems provide a wide variety of educational content and learning materials such as video tutorials, blogs, essays, e-books, etc. Finding and searching for adequate resources and site-related content is one of the key challenges for E-Systems.

Learning management systems provide users with an environment that allows them to manage and search small content units to learn more collaboratively. Each learning resource has its features and characteristics, when it comes to the way the data is presented, the data structure or the content format, etc. The biggest challenges in developing an e-learning site are improving the profile creation and continuing to update the profile to suit user changes in preferences, interests, and interests.

II. PROBLEM STATEMENT

With the advent of technology and the ever-increasing increase in student capacity and the number of departments in educational institutions, it is extremely difficult to change learning materials between students and faculty.

The main purpose of E-Learning is to help students move beyond the traditional way of learning and get used to the internet where their study notes are readily available.

E-Learning is an inexpensive, effective, and comfortable way for students to easily access notes and another easy way to study for tests. In our project, we try to give recommended e-learning materials to the user based on their personality type and their learning style so that they can save time in accessing resources.

E-learning has become a part of each student, especially after the Covid-19 pandemic. It has forced students to adapt to online studies and cope with online studies.

III. REVIEW OF LITERATURE

Nowadays, it is a quite common technology used in e-commerce systems to assist users in the retrieval of relevant items. Despite being very successful in the e-commerce area, the implementation of the recommended

system for education especially e-learning is still unexplored. The use of recommending systems for e-learning can be beneficial for both students and the instructors, as well as for the institutions.

There are four recommendation approaches – Collaborative filtering (CF) as explained in paper [4], Content-based recommendation (CB), Hybrid recommendation system as explained in paper [5], and Knowledge-based recommendation system as explained in papers [1, 2, 3].

Content-based (CB):- Content-Based recommendation is based on identifying characteristics that are like those a user has preferred in the past and making recommendations accordingly.

Collaborative filtering (CF):- Collaborative filtering recommendation is based on user behaviour or user ratings of recommended items. It recommends items liked by similar users and explores diverse possible content. By accessing a learner profile, RS can access information about age, country, previous learning activities, educational background, etc. With the help of this information, RS can find learners with similar learning preferences and suggest learning materials accordingly. The CF algorithm finds either prediction ratings or recommends a list of top-N items.

Hybrid recommendation:- Hybrid RS is the combination of CB and CF which combines characteristics of both approaches through mergers of individual predictions into one or by adding content information to a collaborative model or by a weighted average of content and collaborative recommendations or getting final recommendations based on the combined rankings.

IV. PROPOSED METHODOLOGY

To collect student data we have created a website and conducted a small personality test (MBTI Test). After submitting the test, the user will come to know about both its personality type and also users' learning style will be mentioned.
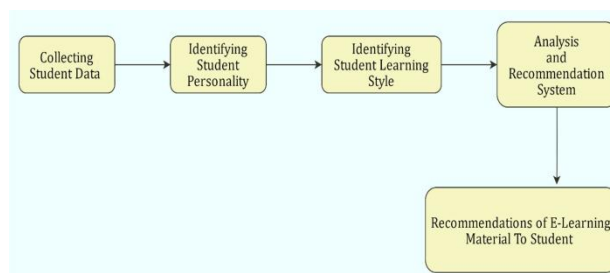

Fig 1. Activity Diagram

Identifying Student Personality

After the user submits the test, we analyze the data and identify the user's personality type. To Identify Student Personality, we are using the Myers-Briggs Type Indicator (MBTI). Myers-Briggs evaluates personality types and classifies the personalities into four types. They are as follows:

- Extroversion (E) or Introversion (I)
- Sensing (S) or Intuition (N)
- Thinking (T) or Feeling (F)
- Judging (J) or Perceiving (P)

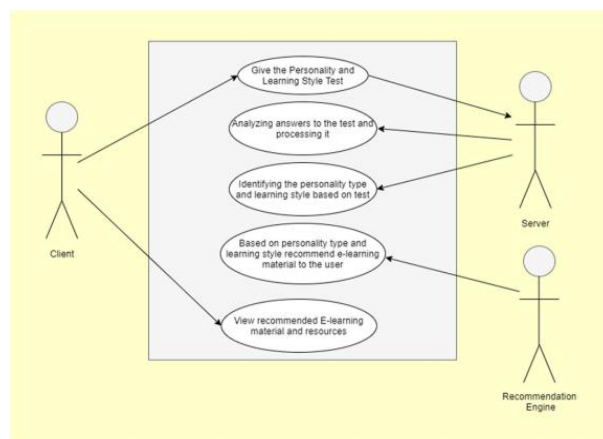The functionality of the e-learning system is illustrated in the use-case diagram shown below.

Fig 2. Use Case Diagram

Combined sets of these unique preferences offer 16 different personalities and are usually represented by four characters to represent human movement on four scales. For example, ESTP stands for Extroversion, Sensing, Thinking, and Perceiving, highlighting four preferences for this user's highest performance.

The MBTI test highlights the unique nature of each student's preferences.

Apart from the sixteen personality types, each type of person has one unique choice (governing process) used with great confidence. It guides our personality and reveals our motives and goals in the longer phase of life.

Identifying Student Learning Style
After submitting the test, the system gives both personality type as well as students learning style as output. Fig. 3 shows the personality type and learning style output.

Your Personality type is:
ESFP
Performer
Your Learning Style is:
Accommodating

Fig 3. Learning style

To Identify Student Learning Style, we are using Kolb's Experiential Learning Model. Kolb model was developed by Professor David Kolb. There are four types in which Kolb's model is divided:
Accommodating
Assimilating
Converging
Diverging

Table 1 represents the Kolb's learning model types and their corresponding e-learning types:

Table 1. Learning styles and corresponding e-learning material recommendation

Learning Styles	Corresponding e-learning material
Accommodating	• Animation • Graph-based • Charts
Assimilating	• Audio • Video • Lectures
Converging	• Text-based • Web pages
Diverging	• Tutorials(Web) • Web pages

Analysis and Recommendation System: After submitting the test, we would analyze the user's data and can get the personality type and learning style. Based on that our recommendation system will recommend e-learning material to the user.

Technologies Used
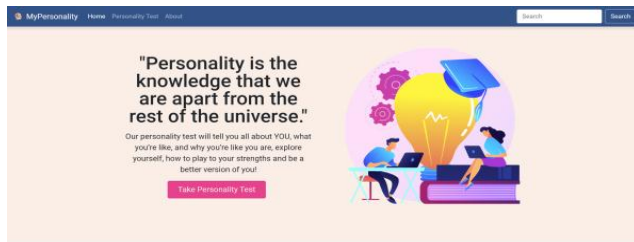
Front End
- HTML5
- CSS3
- JavaScript
- Bootstrap5

Back End
- Mongo DB
- Node Js
- Express Js

V. RESULTS AND DISCUSSION

MBTI test can provide a lot of help in building your personality, which is probably the reason that it has become so enormously popular. It can also be helpful for an individual to identify the perfect learning style suitable for the user. Even without taking the formal questionnaire, you can recognize some of these qualities in yourself.
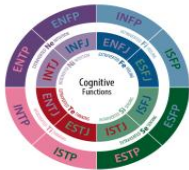
Fig 4. Represents the landing page of the website. It includes basic information about the MBTI test and what are the benefits of taking the test.

Fig 4. Landing Page

Fig 5. represents the part of the result page where the user will be redirected after submitting the test. Here, the user will get detailed information about the personality type, learning style, preferable e-learning style, strengths, career options, and much more to explore about the personality.

Fig 5. Result Page

The sixteen personality types are further classified as per their dominant traits. These traits include their attitude towards thinking about a problem, their nature, their enthusiasm, and their knowledge. Fig 6. represents the dominant traits of the resultant personality type in the form of a percentage bar graph.
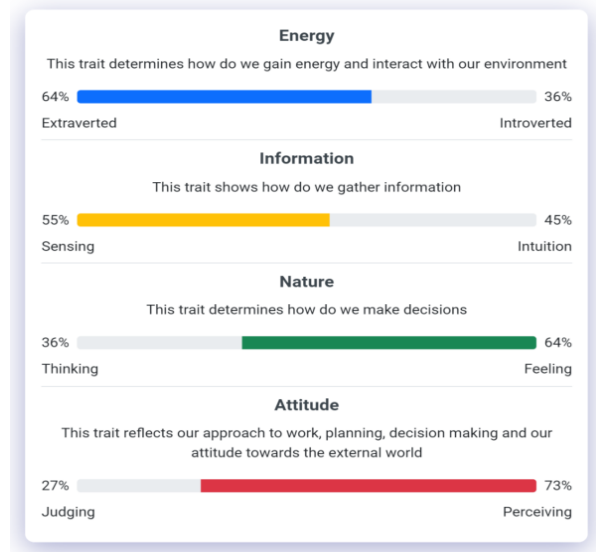

Fig 6. Percentage Bar graph

The dominant traits and each letter of the personality type are also stored in the backend, using Mongo Db. Here, Each letter dominant trait is stored in the database, as per the option selected by the user while giving the test. Fig 7. shows the data stored in the database using Mongo Db Atlas.
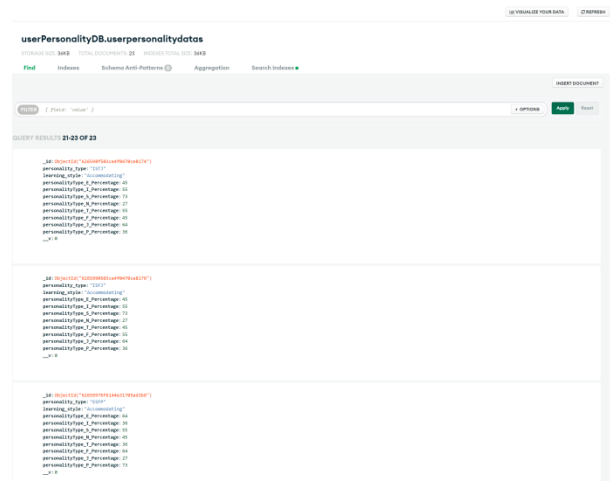

Fig 7. Database

VI.   CONCLUSION

The Myers & Briggs Foundation helps us to understand that, it is very important to remember that all personality types are equal, and unique in nature and that every type has equal value, and all have different abilities. It is the part where taking the test helps you to understand more about yourself.

The combination of the MBTI type indicator and Kolb's Learning Model fulfills the goal of the instrument, which is to simply offer further information about your unique personality. Identifying your strengths, weaknesses, and career opportunities better for your personality is quite helpful in shaping your career. When working in group situations in school or at work, for example, identifying your strengths, your passion, and understanding the strengths and weaknesses of others can be very helpful. When you are working toward completing a project with other members of a group, by giving this personality test, you might realize that certain members of the group are skilled and talented at performing particular actions. By recognizing these differences, the group can better assign tasks and work together on achieving their goals.

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