Student Community Learning Platform

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Abstract- **The main idea of the project is to implement an online platform where students of a particular college can share their projects and research done on any particular technology over a secure network which is locally hosted and is accessible only to students and staff of a particular institution. The motto behind the project is to help build an interactive student/staff community where each user is able to showcase their talents and knowledge gained over an online platform. The content that can be uploaded ranges from any personal project, project ideas, blogs on new technology learnt or any research done on any tech related topics. This paper covers the various Filtering algorithms & Server hosting. Towards the end of the paper, the future scopes are also discussed.**

Keywords- Collaborative Filter, Server hosting, Machine Learning, Student Community, Learning Platform

I. INTRODUCTION

In this paper we introduce an online learning platform with knowledge sharing, news on new technologies, connection with alumni of the college which is locally hosted using the college servers. Both students and staff have access to edit their profiles and share valuable content which can only be viewed by other users where they can share their personal information and info about their interested or specialized domain that enables them to connect to them more easily. Students can react to the uploads of other users and download the projects and other details according to his/her needs and can even have a touch with the alumni of the college.

The user is able to upload his/hers personal projects, and other certified projects as well as tech-blogging and has space to display research work and shareable information related to technology. Applicable to all departments across college as it showcases anything innovative that can be put forward for other department students to access.With the implementation of such a platform.The main advantages are for the students as it helps them to refer to works done in the past as well as to connect with the students who own the content for any further queries and doubts. The main objective of the project is to build up a community platform for a college so that the students, faculties and even the college alumni can connect each other, share any technical blogs, showcase their projects and interests in specific domains.Filtering of profiles based on the interest of the user so as to make the searching more easier.

A chatbox facility with an automated email notification system so as to maintain or enable personal connections with the interested people in the community. Feature to download and upload technical news and to publish the academic projects as well as the personal projects by any of the users so that the people could view it in public and use it for future references and their upcoming projects. College students could get updates about the alumini's of the college, their current working fields and could connect with them for any help or queries. Suggestions of profiles of the users in the particular domain could be available to a specific user who is currently searching details in that particular domain. Fractions like the uploads in the platform option could increase the popularity of the post so as to reach more and more users. Considering it to be college specific, it keeps data private and innovative ideas admits the college and helps prevent data leakage.

II. FRONT-END TECHNOLOGY

Popular front-end Javascript library for web development is ReactJS. The majority of developers opted to utilize it to design user interfaces. The front-end and frameworks are essential and fundamental parts of web development. As technology develops daily, many new frameworks and libraries are emerging to produce good results. React is the second most popular web framework among software engineers globally, according to Statista. Many frameworks are available in this competitive

technological era, but we'll explain why React.js web development is of the utmost importance. The list of reasons why it is wise to use ReactJS while creating websites is provided below. Let's first provide a quick review of ReactJS so that you may better comprehend its underlying philosophy.

It's quite simple to learn. React is a framework that is much easier to work with than a number of well-known ones, including Angular and Vue. It might be a significant contributing element to ReactJS' rapid climb to fame. With its assistance, businesses can easily and quickly launch their projects. Launching the development programme will take much longer as the technology or framework becomes more complex. And as you are aware, everyone has a natural desire to avoid difficulties. ReactJS is the framework of choice for many business owners and major corporations because it is considered to be the easiest to understand.

React is quite adaptable. React has a reputation for being far more adaptable than other frameworks. Once you have it, you may utilize it to create excellent user interfaces on several platforms. React is a fantastic tool because it is only a library and not a framework. React was created specifically for creating web-based commercial applications. A React component can be any element in your online workflow, including a Grid, Text, Label, or Button. It enjoys enormous community and appeal. Not just among American ReactJS engineers, but also globally, React is incredibly well-liked. This technique has the added advantages of creating a fantastic network and the ecosystem it promotes. As React's popularity has grown, its community has grown to accommodate a variety of user applications. When creating a static website, React is also helpful because of tools like Gatsby. It encourages the creation of complex user interfaces. The user experience of any mobile or online application is crucial to the efficient running of the programme and the website. If the user interface is not totally effective, the website might be destroyed and its customers might not be kept. On the other hand, clients would pay attention to mobile applications with a great user interface (UI). They would be more inclined to do the same when they came back. Therefore, by designing proper UI for apps, you can achieve good results.

It has a lot of reusable parts. Due to important elements like components, React is hugely popular. Another crucial element of this is the possibility of reuse. This suggests that an element can have a single definition and multiple uses. React component libraries are numerous and very useful for creating a fantastic user interface for your project. Reusable components must be used if development is to be sped up and productivity increased. You will feel relieved and at peace when you use the same elements in different ways because building websites on a large scale will cost you money and time.

React Hook's potential to replace Redux sparked a lot of discussion when it originally appeared. However, JavaScript writers may now add states and other features to function components thanks to Hooks, a brand-new feature in React.js 16.8. You won't have to fight with any more difficult school work thanks to this. One of the reasons you should be using ReactJS hooks when creating web applications is that they make it easier to manage state logic between components, combine similar logic into a single component, and transmit data between components without the use of props or classes.

III. COLLABORATVE FILTERING

By offering individualized content recommendations to users, collaborative filtering recommendation algorithms are frequently utilized in e-commerce and social networks. The recommendation outcomes are more accurate than those produced by other algorithms, and collaborative filtering recommendation algorithms have several advantages including high speed, high efficiency, and superior resilience. The foundation of collaborative filtering methods is similarity calculation. However, as system scale continues to grow, user rating data environments become incredibly sparse, and the introduction of new projects will also result in cold start issues. The aforementioned issues can be somewhat resolved by the hierarchical clustering approach and the K-means clustering algorithm. The user behavior is examined during the similarity calculation process, and the time-interest weight factor is added to identify the person who is closest to another user. The user's level of project preference is used as the recommendation standard rather than the user's score to carry out

individualized recommendations to the user in light of the cold start issue.

1) Data Cleaning

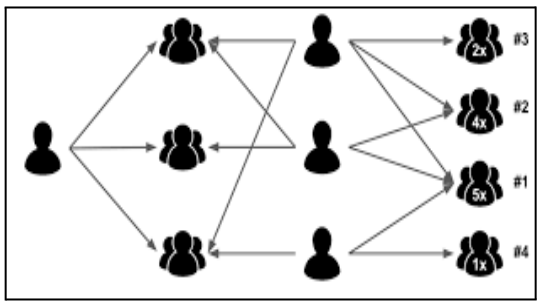
The user project scoring matrix Rm*n is built after the existing data are cleaned to remove information on users, projects, and project scores. User=u1,u2,.....ui,....., um, where "m" is the number of users, is how the user set is expressed. The number of items is indicated by the notation Item=itemi, item2, item j,..., item n.
r_{ij} represents the rating value of user u_i on $item_j$, and the value is 1-5. The larger the value is, the higher the user's preference is. Items which are not scored are represented by 0.
Input user “u”, item “i”, user-item rating matrix $R_{m\times n}$, Item-Logs rating matrix $V_{m\times n}$, and neighbor number “k”.

2) Recommendation process

Step 1: Obtaining from matrix I and II all users, items, and the scored item sets of target user "u" as well as the user implicit feedback behavior assessment set corresponding to the scored items.
Step 2: Implementing the user-interest function and the final user rating'uiR to weight the conventional modified cosine correlation coefficient.
Predicting user "score "'s on item I is the third step. The user's final score and the conventional predictive scoring formula may be enhanced if the neighbor has evaluated it.
Step 4: The target user "u"'s top-n recommendation set is composed of the top N items with the highest forecast score.

3) Recommendation generation

Output the top-n recommendation set corresponding to user “u”.



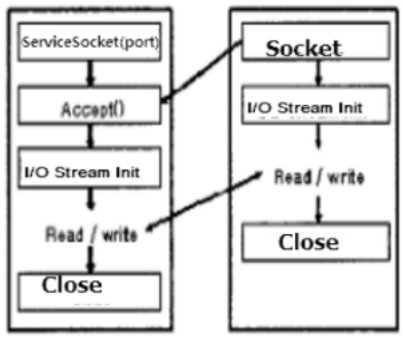
USER BASED COLLABORATIVE FILTERING

IV. SECURED SOCKET PYTHON FLASK FRAMEWORK

The Python framework was used for the system's design and development, along with another development language like Bootstrap 4 for the front end. After compilation, these applications are tested on hardware with two cores or more, Linux, and any Windows operating system. This application consists of three main modules, whose functional activities are connected by socket connectivity to create a server and client for a community information chat application. By clicking on the register link, the user can register for a user account and gain access to the chat room for information sharing. For access to the application's community chat dashboard, use the login module.

Network-based systems fundamentally consist of a server, client, and a communication medium. As demonstrated, a client machine is a computer that is running an application that requests services. A server machine is a computer that is running a programme that provides services that are requested by one or more customers. Wired or wireless communication media are also acceptable. Programs running on client machines typically send requests to a programme (commonly referred to as a server programme) running on a client system. They involve networking services offered by the transport layer, a component of the TCP/IP (Transport Control Protocol/Internet Protocol) stack that makes up the Internet software stack. TCP (Transport Control Protocol) and UDP are the two types of protocols that make up the transport layer . Sockets are the most popular programming interface for these protocols.

A dependable data flow between two computers is provided by the connection-oriented protocol TCP. Telnet, HTTP, and FTP are a few programmes that make advantage of these services. Datagrams, or individual packets of data, are sent from one device to another via the UDP protocol with no guarantees of arrival or order. Ping and the clock server are two examples of programmes that make use of these resources. Incoming data is mapped by the TCP and UDP protocols to a specific computer process using ports. The port is represented by an integer value that is positive (16 bits).



CONNECTION TO A SERVER AND A CLIENT USING SOCKET

Fig. 1. Client/Server Chat [20]

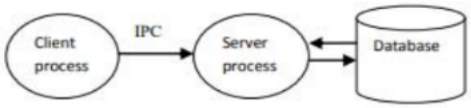


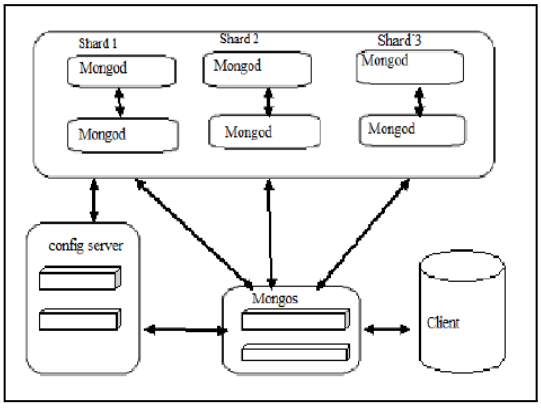
Fig. 2. Client Server Communication [22]

V. DATABASE IMPLEMENTATION MongoDB

A collection of records that can yield helpful information is referred to as a database. For various data processing tasks, the data can be accessed, updated, managed, controlled, and organized. In most cases, the data is indexed across rows, columns, and tables to speed up workload processing and data querying. There are various database types, including the following ones:

- Object-Oriented
- Relational
- Distributed
- Hierarchical
- Network

The term "database management system" refers to the technological approach used to enhance, manage, and retrieve data from databases. A DBMS provides a methodical way to manage databases through a user interface and to access the databases using apps. Rows of documents are combined into collections, which are arranged like tables. Field and value pairs make up the information structure of the document. Field values may include a variety of documents in the form of records, groups, and types of documents. As a result, MongoDB generates a primary key to identify each record in a unique way. MongoDB makes an effort to keep the majority of the data in memory to speed up simple queries by avoiding time-consuming hard drive recovery procedures.



Data files are an encryption method used by MongoDB's file storage system to automatically encrypt and decode this information. It implies that any attacker, active or passive, as well as any unauthorized user, can quickly get access to the file system and obtain the important or confidential data. Before updating/retrieving into/from the databases, the application should explicitly encrypt/decrypt any confidential data to minimize this.

The main differences between relational and flat record DBMS are that both database systems had problems with security, scalability, and rapid propagation of updates to ensure consistency and accessibility of information, while paying little attention to the network segment. The massive amounts of data created by the interactive apps were too much for relational and file record systems to handle. As a result, businesses are adopting NoSQL datastores. NoSQL datastores systems give the high performance and high scalability found in conventional DBMS.

VI. PYTHON USING FLASK FRAMEWORK

The technology we are utilizing to create the student community learning platform is the Python Flask Framework. Python-based Flask is a web framework. Because it has an internal database and may be used with any tools or libraries, it can be categorized as a micro framework. No database abstraction layer is present. However, Flask allows for the addition of application feature extensions. There are extensions for object-relational mappers, form validation, upload handling, several open

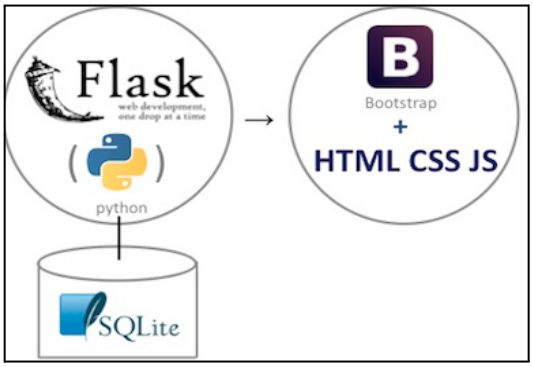
authentication protocols, and a number of utilities associated with popular frameworks. The Flask program's core is updated far less frequently than extensions.

If working with a database is necessary, choose one of the many solutions offered, construct your own model layer (which is not difficult), and be happy! The idea of a micro-framework is to provide you with the lowest (yet most helpful) feature set you require without getting in the way. It was created specifically for Flask and has good goals. Flask is a lot more Pythonic than the Django framework. With Flask, getting started is simple because there isn't a steep learning curve. Python is used to create web applications with Flask, which is implemented on Werkzeug and Jinja2. There are benefits to using the Flask framework.

- There is a built-in development server and a fast debugger provided.
- Lightweight Secure cookies are supported.
- Support for unit testing is built-in

Features of the Python flask framework

- It includes a debugger and development server.
- It has integrated support for unit testing and restful request dispatching, and it is very simple to deploy Flask in a live environment.
- Flask offers features for managing HTTP requests.
- It is quite adaptable, and its setup is even more so than Django's, providing you with a wide range of options to meet every production demand.



Overall, Flask is one of the best micro frameworks out there, with a tonne of features. The best extensions and a vibrant community may be found in the Flask ecosystem. All the advantages of quick templates, robust WSGI capabilities, rigorous unit testability at the web application and library level, and comprehensive documentation are included with Flask. Let's first make sure you comprehend how Python creates websites before moving on to creating something more visually appealing rather than just a webpage with plain text. Imagine a user typing your website's address into their browser. A request is sent to the web server by the user when they type the URL into the browser. To handle requests and work with CGI, a standard environment used by Python and other web development programming languages to dynamically generate web pages, you would need to write some Python code as a developer. Additionally, you would have to create the same code repeatedly for each web application you created.

VII. CONCLUSION

The student community learning platform web application could be implemented using the above mentioned technologies that would result in the successful implementation of the above mentioned platform. React.js front end technology could bring out the best front end interface to the web application. Compared to the other Front-End technologies,the best user interface could be implemented using the React.js technology.

On to the Back-End technologies, Python could be used for the implementation using the flask framework as flask remains as the best framework for the development of web application due to its flexibility, independence and the very basic structure of the flask. Machine learning algorithms could be more easily implemented using the same. Collaborative filtering could be implemented to bring out the best suggestions and user experience remarks. Python socket programming could be implemented to bring out the chat box facility. Sentimental Analysis could be used for the content,comment filtering. MongoDB database could be used to maintain and implement the huge unstructured database of the whole users.In short all the above mentioned features could be implemented using the above mentioned technologies if used and implemented.

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