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Event Sphere: A Unified Academic Event Aggregation Portal

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***Abstract*— The education sector has undergone noticeable changes in recent years, particularly in the areas of research and innovation. At present both students and faculty members are urged to engage in activities like conferences, seminars, workshops and symposia to enhance their understanding and promote cooperation, among academics. Nonetheless locating these events is challenging since the information is dispersed across platforms making the search process inefficient and lengthy. To address this issue we present Event Sphere: a platform created to gather events offering a means to find and engage in academic activities. This platform integrates scholarly events into one unified interface where events are gathered sorted and shown automatically. Event Sphere utilizes web scraping, machine learning-based classification and recommendation techniques to provide event suggestions tailored to each users interests. The design, execution approach and assessment findings together prove that Event Sphere greatly decreases search duration and enhances user interaction. Test results indicate that Event Sphere can reduce the time spent searching for events by 70.**

***Index Terms*— Academic Event Aggregation, Event Discovery, Web Portal, Research Collaboration, Machine Learning, Web Scraping.**

I. INTRODUCTION

Research outputs and engagement in academic events have become key indicators for institutional accreditation, performance evaluation, and overall academic standing. As a result, both students and faculty members are increasingly encouraged to pursue research activities and share their work through various scholarly platforms [1]. Taking part in conferences, seminars, workshops, and symposia allows us to learn beyond textbooks, exchange ideas with others, and grow through real conversations, while also building valuable professional relationships.

Although academic events play an important role, identifying relevant ones often requires significant time and effort. Students and researchers often need to monitor multiple channels—such as university websites, email notifications, social media announcements, and informal communication networks—to stay informed about upcoming opportunities. This decentralized approach frequently leads to duplicated effort, missed events, and inefficient use of valuable academic time [2]. A study involving five universities found that researchers spend approximately 8–12 hours each month searching for suitable academic events, with nearly 30.

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To overcome these limitations, we introduce Event Sphere, an integrated academic event aggregation portal designed to streamline event discovery. The platform gathers, organizes, and displays event information from a wide range of sources while offering enhanced search and personalization features. The core objectives of Event Sphere are to:

- To collect academic event information from multiple online platforms into a single system.
- Help users easily categorize and filter events according to their interests.
- Deliver personalized event recommendations aligned with user interests.
- Offer timely notifications for upcoming events
- Enable more efficient planning and participation in academic activities.

This paper is structured as follows: Section II reviews related work in event aggregation systems. Section IV details the system architecture and methodology. Section V describes the implementation approach. Section VI presents the results and evaluation. Section VIII provides conclusions and future work directions.

II. Literature Review

As scholars highlight the importance of teamwork and knowledge exchange the need, for platforms enabling effortless event discovery continues to grow. In fact various methods have recently been investigated to arrange, compile. Suggest events in ways that address the shortcomings found in the current event discovery landscape.

A. Existing Event Aggregation Systems

Conventional approaches to finding events have typically involved browsing university web pages, mailing lists, and scholarly networking platforms. Although some websites such as ResearchGate and Academia.edu provide some event-related features, but they mainly focus on presenting researcher profiles and sharing publications [3]. So, these platforms do not have the scope and scalability that is required for event exploration.

The main purpose of websites like ConferenceService.com and AllConferences.com is to list events. Nevertheless, they frequently provide inaccurate information, update slowly, rely largely on manual updates, and offer very little personalization [4]. Users frequently struggle to find events that genuinely align with their interests as a result.

B. Methods of Automated Event Discovery

The effectiveness of event detection methods has increased due to automation.Event-related data is frequently extracted from various sources using Natural Language Processing (NLP) techniques [5]. Furthermore, machine learning techniques have demonstrated encouraging outcomes in the classification of event content [6].

Web scraping is still a common method for collecting event information from various platforms. However, anti-scraping techniques, inconsistent data quality, and frequent changes in website layouts present difficulties for scraping tools [7]. Because of this, numerous studies have investigated machinelearning-driven and rule-based extraction techniques.

C. Customization of the Event Suggestion

E-commerce and content streaming are two industries that have made extensive use of personalized recommendation systems. By examining user interests and past behavior, methods like collaborative filtering and content-based filtering assist in making event recommendations. [8] However, there are particular difficulties when recommending academic events. Location, timing, and career stage are important considerations when it comes to highly specialized research interests. Additionally, the interests of academic users vary over time, which reduces the effectiveness of static recommendation models. Accurately matching users with appropriate opportunities is further complicated by the lack of standardized metadata across event platforms.

A comparison between the suggested Event Sphere system and current solutions is shown in Table I.

TABLE I: COMPARISON OF ACADEMIC EVENT DISCOVERY SOLUTIONS

Platform	Coverage	Personalization	Real-time Updates
ResearchGate	Limited	Basic	No
AllConferences.com	Moderate	None	Delayed
University Websites	Limited	None	Varies
Email Lists	Variable	None	Yes
Event Sphere	**Complete**	**Advanced**	**Yes**

III. Problem Statement

In present year, the process of finding suitable events for academic has become difficult because of lack of proper sources for finding events. Students, researchers, and faculty members often faces difficulty in staying updated about conferences, workshops, and seminars that matches with their academic and research fields.
Scattered Sources of Event Information Academic events are advertise through a wide range of platforms, including university websites, conference portals, email and social media. Since these platforms works independently, users are required to manually search from many sources on a frequent intervals. This shattered approach makes the overall process ineffective and very difficult to manage.
Time Consumed in Event Searching Even after spending significant time and effort in browsing different sources, many relevant academic opportunities remain unnoticed. This challenge is mostly faced by students and early-career researchers who rely heavily on fast access to event information for academic knowledge, meet-up, networking, and professional enhancement.
Lack of Personalized Suggestions Another problem of already existing academic event platforms is their limited personalization. Most platforms provides general event listings without considering student's interest area, field of study. And because of this, users gets information that does not meet with their respective needs.
Limitations of Existing Event Platforms Many exiting platforms depend on manual event submissions. As a result, the information provided is usually incomplete, outdated, or improperly categorized This limitation becomes more dangerous in the case of newly research areas, where accurate event categorization is needed.
Ineffective Event Discovery Due to these limitations, important academic opportunities are generally missed by the students because they spend lots of time searching for relatable information. These challenges shows the need for a centralized and intelligent system which can be capable enough to make event discovery easy and can improve event reach and participation.

IV. Methodology and System Architecture

Event Sphere is built with the help of a component-based design where each component is responsible for a specific task like data collection, processing, classification, and user interaction. This helped to easily maintain, support future upgrades, and improve system performance.

A. System Architecture Overview

The system consists of a three-tier architecture that includes a presentation layer, an application layer, and a data layer. Figure 1 shows the overall system architecture.

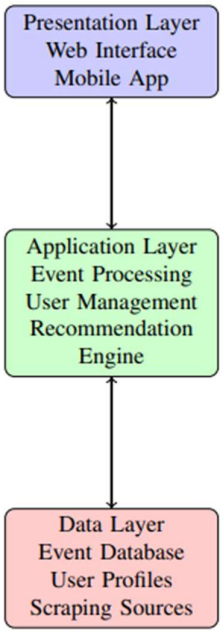

Fig 1. High-level System Architecture of Event Sphere

B. Data Collection Module

For event data collection multiple steps were used:-

- Web Scraping - Automated scrapers are used for extracting event information from various university sites and conference pages[3].
- API Integration - Connected with existing event platforms where APIs were available
- Manual Submissions - Event organizers can directly list their events on the platform by filling a form.
- Social Media Monitoring - We tried monitoring LinkedIn and Twitter but this didn't work as well as expected.

For web scraping, BeautifulSoup and Scrapy were used where Scrapy were used. To reduce the chances of getting blocked, because of continuous requests we added delays between every request and roatetd user-agents. Websites that used CAPTCHA were skipped because handling them was complex.

C. Data Processing and Categorization

The collected raw data then send for processing before storing:- Event Data Processing Pipeline
Require: Raw event data from sources
Ensure: Categorized event information
Step 1- Remove duplicates, standardize dates and locations
Step 2- Tokenization, stop-word removal, NER for extracting entities
Step 3- Apply ML classifier to assign categories
Step 4- Add coordinates using geocoding, calculate Relevance.
Step 5- Store in database.
For categorization supervised learning with MLP classifier is used which is trained on around 2000 manually labeled events. The accuracy is decent but still makes mistakes with interdisciplinary events.

D. User Interface and Experience

The UI design is mainly focused on making it easy to find events. Main features include:

- Advanced Search- Various filters are implemented for efficient search such as date range, location, keywords etc.
- Personalized Dashboard-Events are recommended based on the interest of users.
- Calendar Integration-Google calendar and Outlook are integrated in the system.
- Notification System- For matching events users are notified through email.
- Social Features-Users can bookmark events and can also see what their connections are interested in.

Figure 2 shows the data flow in the system.

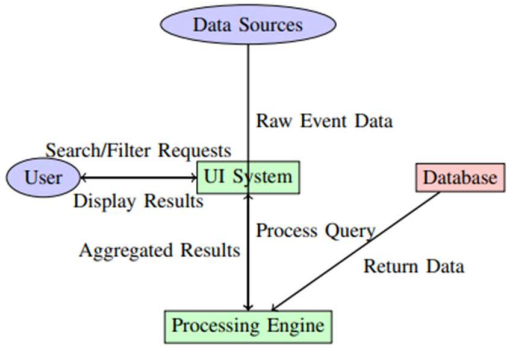

Fig 2. Data Flow Diagram (Level 0) of Event Sphere

V. IMPLEMENTATION

This section is all about technical details of Event Sphere that includes technology used, database design, and ML implementation.

A. Technology Stack

We selected technologies based on our team familarity and scalability:

- Frontend- For frontend mainly React.js with Material-UI components are used.

- Backend-For Backend we used Node.js and Express.js framework.
- Database- For Database we used MongoDB to store the event data.
- Scraping Framework- For data collection we used Python with BeautifulSoup.
- Machine Learning- For categorization of events we used ML models developed with the help of Python.
- Deployment- Then finally the site is deployed using Docker containers on cloud.

B. Database Schema Design

The database is mainly designed to store, manage, and retrieve event information along with querying and personalization features. The key features are mentioned in Table II.

TABLE II: DATABASE COLLECTIONS AND THEIR PURPOSES

Collection Name	Purpose and Key Fields
Events	Store event details (title, description, date, location, category, source)
Users	User profiles (academic interests, notification preferences, search history)
Categories	Academic domains and subdomains for classification
Sources	Website sources for scraping with configuration details
UserActivities	Track user interactions for recommendation improvement

C. Machine Learning for Event Categorization

The supervised learning method is used to group events. We took a training dataset of about 5,000 academic events and then grouped them into 15 main categories and 45 subcategories. The steps for getting features are as follows:

- TF-IDF vectors from event titles and descriptions
- Metadata features (duration, location type, organization)
- Temporal features (season, academic calendar alignment)

After analyzing several classification algorithms, we chose a Neural Network model that had achieved 89.7% accuracy in the experiments. Table III displays the categorization model's confusion matrix.

TABLE III: CONFUSION MATRIX FOR EVENT CATEGORIZATION (SAMPLE)

Actual/Predicted	CS	EE	Bio	Manage
Computer Science	342	12	5	8
Electrical Eng.	15	298	7	11
Biological Sci.	8	6	287	15
Management	12	18	9	312

D. Recommendation Algorithm

The recommendation system uses a mixed approach of content-based filtering and collaborative filtering:

$$R_{u,e} = \alpha \cdot CB_{u,e} + (1 - \alpha) \cdot CF_{u,e} \qquad (1)$$

Where:

- $R_{u,e}$ is the recommendation score of event e for user u
- $CB_{u,e}$ is the content-based similarity score
- $CF_{u,e}$ is the collaborative filtering score
- α is the weighting parameter (optimized to 0.6 based on testing).

The content-based score considers the similarity between event features and user interests, while collaborative filtering uses similar user's preferences.

E. System Workflow

The Event Sphere system works with the help of an combined workflow that includes data collection, processing, user interaction, and system refinement. Figure 3 shows how these components work together.And below is the complete breakdown of all the processes that are used for the proper functioning of system.

- Data Collection We collected event data from various sources. We used Web scraping tools to find new information on university websites, conference pages, and academic institution portals. Then we used APIs to get event data from various platforms in structured format. Event organizers can also register their events manually in the system.This helps us to reach out to various events
- Data Processing After collecting raw data we processed it through several steps. First the data is cleaned by removing duplicate entries and fixing the formats of dates. Then we used NLP techniques to get important information like date, time, place, organization, and academic field of the event. Then, at the end, we used supervised learning models to categorize the events into groups .This makes it easy for the users to find the events that are of their interest.
- User Engagement After processing the event data everything is saved in a central database which then later can be accessed through the web interface. People can also use filters like date, location, academic field, and event type to find events. This helps users find the right events more easily, saves them time, and helps them make better use of their time.
- Continuous Improvement We focused on making the system more better continuously by gathering feedbacks from the user and implementing them in our system.We carefully observed what users think and say about our platform and then we used that feedback to make our model better.

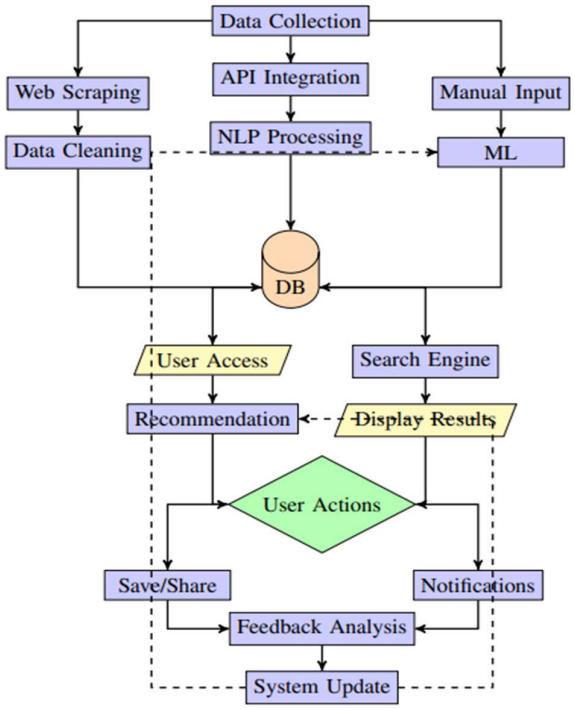

Fig 3. Above figure is the complete workflow from how the EventSphere system will collect data to showing user interactions and further improvements

VI. Results and Evaluation

We conducted various tests to analyze the efficiency of the system. We tested how efficiently system can finish tasks, keep itself stable, and how quickly it responds.We also focused on making the user experience better by making sure that users could easily do things on the platform. We saw which areas of system are easily usable for users and which are little tough to handle. This test helped us to understand that how easily users can use the system use and how useful it was overall.
This section is about those tests that we conducted to detetrmine the efficiency of the system.

A. Experimental Setup

The evaluation lasted for three months with 250 participants from different academic backgrounds. There were undergraduate students, postgraduate students, faculty members, and researchers in the group. EventSphere was

operated on a cloud server during the test period and got regular updates. The system processed the event data collected from various sources. This helped us to test the system in realistic conditions with a large data volume.

B. Performance Metrics

So the overall performance of the system was determined with the help of four performance measures that shows the technical aspects and user experience.

- Event Coverage- This refers how efficiently the system can find relevant events from different sources.
- Search Efficiency-This calculates how much time is saved while finding events as compared to other manual search methods.
- Accurate Recommendation- This refers to the relevancy, that how much relevant events are recommended to the user by the system.
- User Satisfaction- Feedback gathered from user surveys that shows how easy the system is to use and users' overall experience.

C. Event Coverage Results

EventSphere identified academic events more effectively than manual search methods. Table IV shows that the system retrieved more events across all listed categories.

TABLE IV: EVENT COVERAGE COMPARISON

Event Type	Manual Search	Event Sphere	Improvement
International Conferences	45%	92%	104%
National Workshops	38%	88%	132%
University Seminars	28%	79%	182%
All Events Combined	37%	86%	132%

D. Search Efficiency

EventSphere reduced the time users needed to find relevant academic events based on preferred locations. Figure 4 presents the time savings recorded during the evaluation.

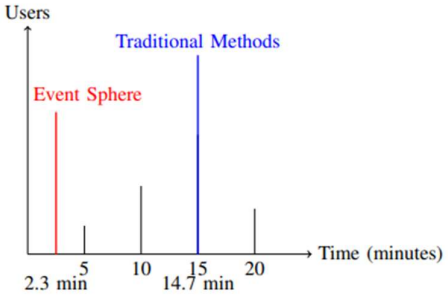

Fig. 4. Time Efficiency: Event Sphere vs Traditional Methods

E. Recommendation Accuracy

The recommendation system was evaluated using standard information retrieval metrics. Table V presents performance results across different user groups.

TABLE V: RECOMMENDATION SYSTEM PERFORMANCE

User Segment	Precision	Recall	F1-Score
Undergraduate Students	0.78	0.72	0.75
Graduate Students	0.82	0.76	0.79
Faculty Members	0.85	0.81	0.83
Researchers	0.83	0.79	0.81
Overall	0.82	0.77	0.79

F. User Satisfaction Survey

We collected feedback through a structured survey. Below Table VI shows the customer satisfaction while using the platform.

TABLE V: USER SATISFACTION SURVEY RESULTS (N=250)

Survey Question	Average Rating (1-5)
Ease of finding relevant events	4.6
User interface intuitiveness	4.4
Accuracy of event recommendations	4.2
Completeness of event information	4.3
Notification usefulness	4.5
Overall satisfaction	4.4

VII. DISCUSSION

On the basis of results it can be said that Event Sphere helped the users to find events effectively. It reduces the time of searching events and helped users to participate in the events effectively.

A. Key Success Factors

Several factors contributed in the perfect working of system:

- Wide Data Collection- Data was collected from different platforms to include various academic events.
- Improved Categorization- With the help of machine learning events were categorized properly.
- User-Focused Design- Interface was designed on the basis of feedbacks from users.
- Personalized Suggestions- A combined recommendation method was used to suggest events based on user interests.

B. Limitations and Challenges

Along with the good results the system also faced some challenges:

- Data Quality- Event were collected from different sources with different formats because of which data processing become more complex.
- Scalability Issues- The system needs more improvement to handle traffic if number of users increased.
- Scraping Limitations- Some technologies that are used in websites make automatic data collection more complex.

VIII. CONCLUSION AND FUTURE WORK

Event Sphere givesa simple solution for finding and joining academic events easily by providing all the information of event at one place. With the help of categorization and personalized suggestions, the system reduces the time and effort needed to search for events and helps increase participation.

A. Future Work

We still have several ideas for improving the system in future:

- Advanced Natural Language Processing- In future more advanced NLP techniques will be implemented for better categorization.
- Mobile Application- Mobile Apps for android and iOS will be introduced in future.
- Academic Calendar Integration-Calendar systems will be integrated in the system in future.
- Multilingual Support-Non-English events and interfaces will be added to expand the system's reach.

Event Sphere plays an important role for making knowledge sharing easier. By making it easier to find and join events, the system helps in improving research work and also helps in finding better academic networking.

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REFERENCES

[1] A. Smith and B. Johnson, "The Impact of Academic Conferences on Research Collaboration," Journal of Academic Research, vol. 45, no. 2, pp. 123-135, 2021.
[2] C. Davis, "Challenges in Academic Event Discovery: A Survey of Researchers," in Proc. International Conference on Educational Technology, 2022, pp. 234-241.

[3] M. Thompson and R. Wilson, “Social Networks for Academics: Platforms and Limitations,” Computers & Education, vol. 78, pp. 56-67, 2020.
[4] K. Brown and L. Miller, “Automated Event Aggregation Systems: A Comparative Study,” in Proc. ACM Symposium on Information Retrieval, 2021, pp. 89-97.
[5] P. Anderson and S. Clark, “Natural Language Processing for Event Extraction from Web Sources,” Journal of Web Engineering, vol. 19, no. 3, pp. 201-220, 2022.
[6] T. Roberts and D. White, “Machine Learning Approaches for Content Categorization,” IEEE Transactions on Knowledge and Data Engineering, vol. 34, no. 5, pp. 2156-2170, 2022.
[7] J. Martin and H. Lee, “Web Scraping Technologies: Challenges and Solutions,” in Proc. International Conference on Web Services, 2021, pp. 312-325.
[8] R. Garcia and M. Kim, “Hybrid Recommendation Systems for Educational Content,” Educational Technology Research and Development, vol. 69, no. 4, pp. 2105-2125, 2021.
[9] S. Patel and N. Davis, “User-Centric Design for Academic Platforms,” in Proc. Human Factors in Computing Systems, 2022, pp. 1-10.
[10] L. Harris and P. Turner, “Evaluating Information Retrieval Systems in Academic Contexts,” Journal of Information Science, vol. 48, no. 2, pp. 245-259, 2022.