Report on the Pedagogy Methods used in the course “Data Structures and Algorithm” from B. Tech. (CS)/Sem-III

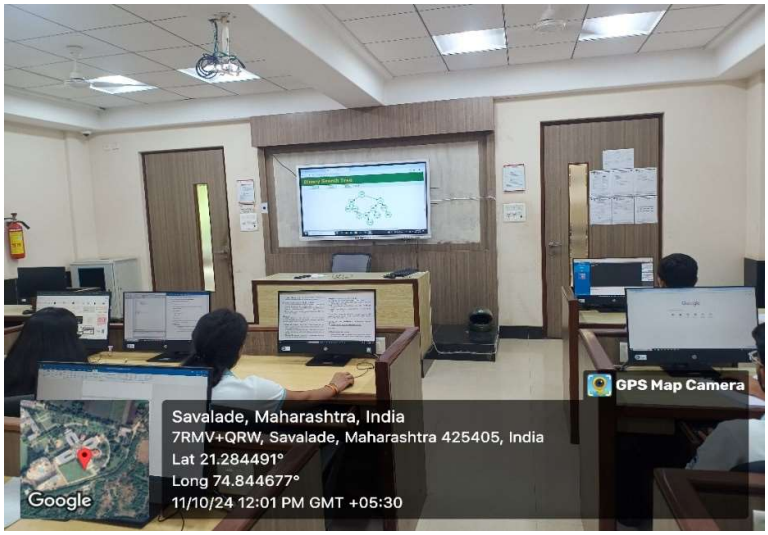
Three method of Innovative pedagogy were used in the delivery of the course

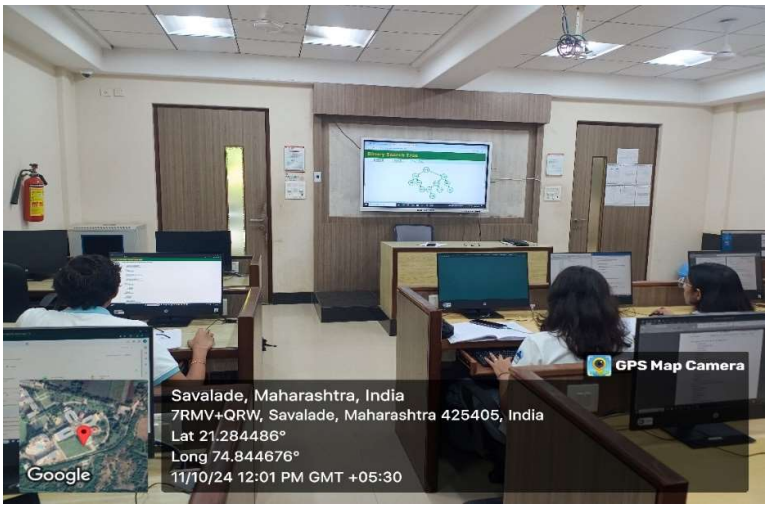
1. Use of Virtual Lab/Visualization tool

The virtual laboratory from IIIT Hyderabad and Data structure visualization tool from University of San Francisco for the same course were used in the laboratory for detailed explanation of the topic, as given in the image below.

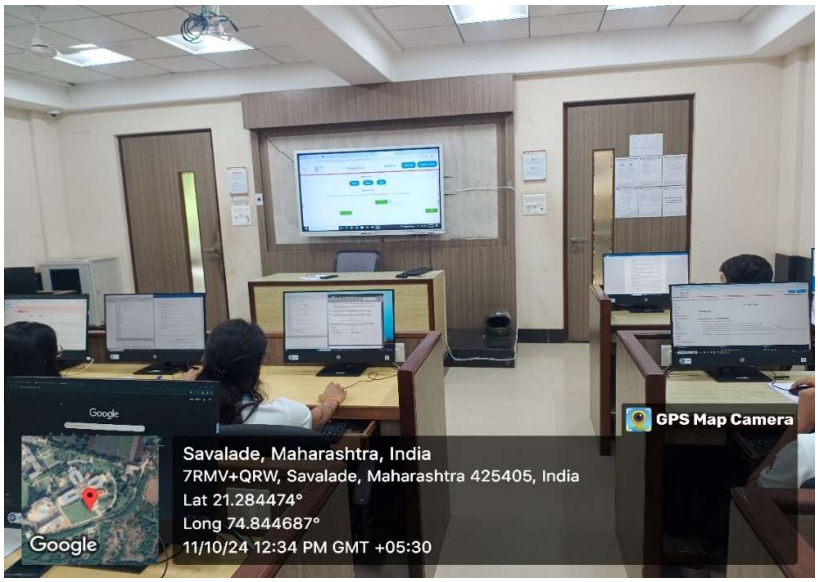
1. Data Structure Visualization tool from Department of Computer Science, University of San Francisco, USA

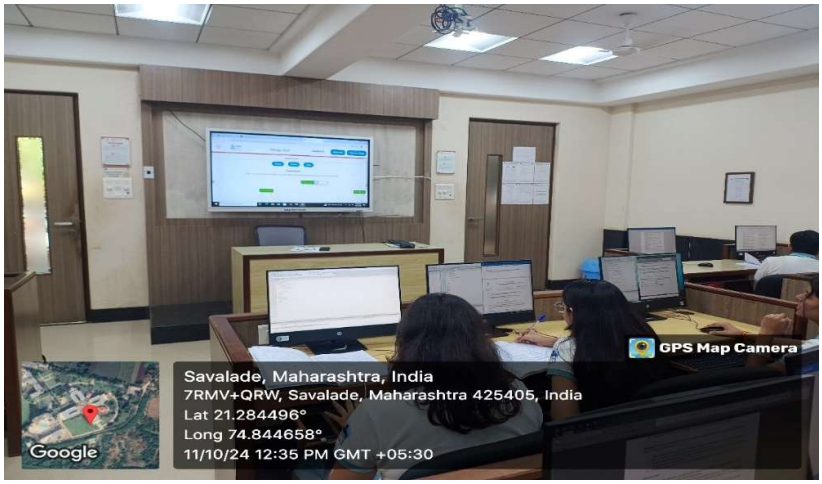
   Source : https://www.cs.usfca.edu/~galles/visualization/Algorithms.html





2. Virtual Lab from IIIT, Hyderabad (Department of Computer science & Engineering
   Source : https://ds1-iiith.vlabs.ac.in/





2. One Subject One Webinar (OSOW):

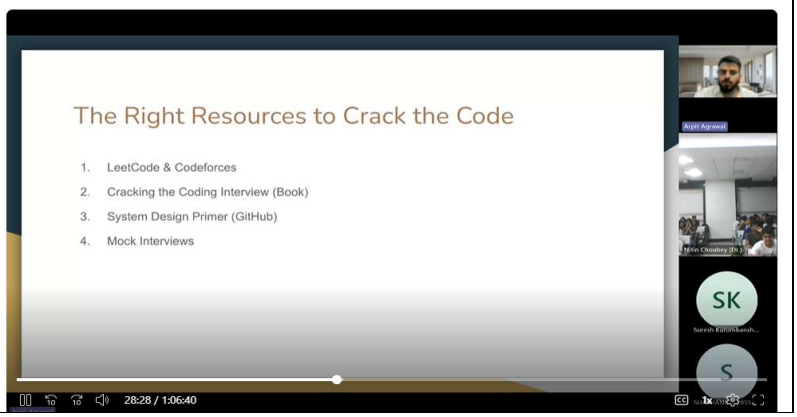
A webinar was arranged for the student to enable them in understanding the importance of subject in industry.

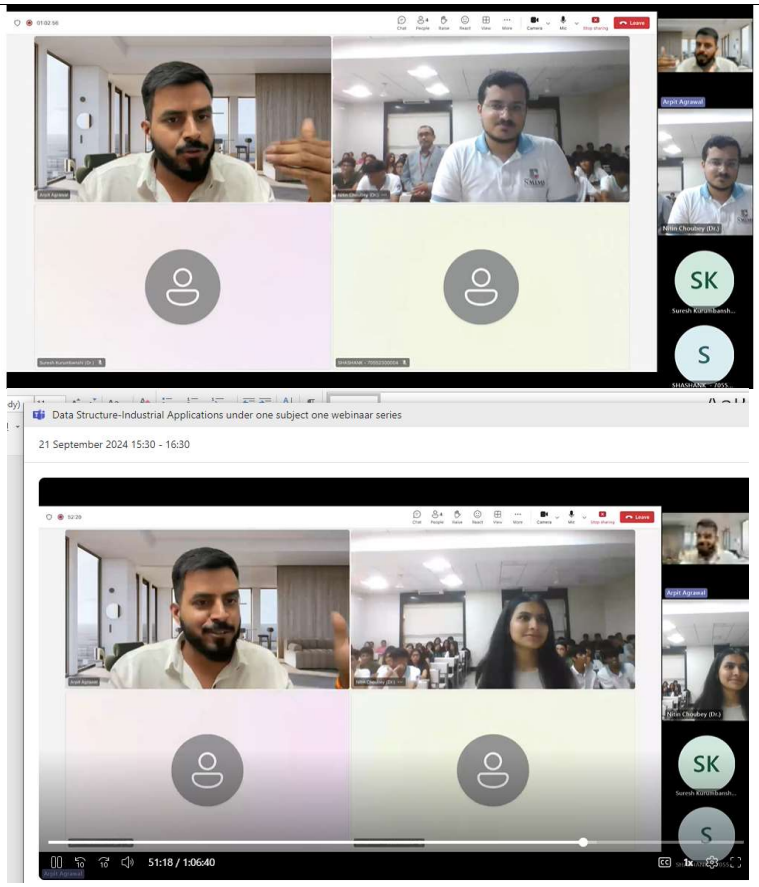
Webinar on Data Structures- Industrial Applications

Mukesh Patel School of Technology Management and Engineering, Shirpur

Department of Computer Science
Academic year (2024-25)
Event Report: One Subject One Webinar on "Data Structures- Industrial Applications"

Objective	To bridge the gap between academic knowledge and industry practices, preparing students for technical interviews and encouraging continuous learning and self-practice to build a strong skill set for a successful career in the tech industry.
Organizer	Department of Computer Science
Number of participant	55 students from B. Tech. CS Second Year & Other + Dr. Choubey & Dr Kurumbanshi(Online Mode)
Day and Date	21.09.2024
Time	03.30 PM-04.30 PM
Venue	MS Teams-Online Platform for The Speaker & LR-08 for Students
Co-ordinator	Dr. Nitin Choubey, Professor, CS Department
Name of Teaching staff	Mr. Arpit Agrawal, Senior Software Engineer, Uber, Bangalore
Brief Report on Activity	**Event Report: Webinar on "Data Structure - Industrial Applications"** **Event Details** • **Organizer**: Dr. Nitin Choubey, Subject Faculty for "Data Structures and Algorithms" • **Date**: 21st September 2024 • **Time**: 03:30 PM to 05:00 PM • **Venue**: Classroom LR-08, MPSTME, Shirpur • **Speaker**: Mr. Arpit Agrawal, Senior Software Engineer, Uber, Bangalore • **Audience**: B.Tech CS Second Year, Semester III students • **Anchor/Host**: Mr. Shashank, B.Tech CS Second Year **Event Summary** The Department of Computer Science at MPSTME, Shirpur, under the "One Subject One Webinar" series, organized a webinar on "Data Structure - Industrial Applications." The session was conducted online and featured Mr. Arpit Agrawal, a Senior Software Engineer at Uber, Bangalore, as the speaker. The event was attended by second-year B.Tech Computer Science students in Classroom LR-08. Mr. Arpit Agrawal covered several critical topics, including: • **Importance of Data Structures in the Industry**: Highlighting how data structures are fundamental in solving complex problems and optimizing performance in software development. • **Interview Process in the Industry**: Providing insights into the technical interview process, emphasizing the role of data structures and algorithms in cracking technical rounds. • **Online Coding Platforms**: Discussing the significance of platforms like LeetCode and CodeChef for practicing coding problems and improving problem-solving skills.

	• **Continuous Learning and Self-Practice**: Stressing the importance of continuous learning and self-practice in building a strong skill set and staying updated with industry trends. The session was highly interactive, with numerous questions from the students, all of which were answered satisfactorily by Mr. Agrawal. The event concluded with a vote of thanks by Mr. Shashank Kumar. **Vote of Thanks** Mr. Shashank Kumar expressed his gratitude to: • **Dr. Nitin Choubey** for organizing the insightful session and providing the students with an opportunity to learn from an industry expert. • **Dr. Suresh Kurumbanshi**, Faculty In-charge for "One Subject One Webinar" series, for his continuous support and guidance. • **Dr. Venkatadri**, Associate Dean, MPSTME, Shirpur, for his encouragement and support in organizing such events. • **Dr. Sunita Patil**, Director, Shirpur Campus, for providing the platform and opportunity to conduct the webinar. • **Central Administration Team and SVKM's Management** for their excellent infrastructure and support, which made the event possible. **Feedback** The students expressed their happiness and satisfaction with the event, appreciating the opportunity to interact with an industry professional and gain practical knowledge. The session was well-received, and the students enjoyed the interactive format.
Event Photographs	 



Mapping and Justification of the Event to Program Outcomes (POs)

PO1: Engineering Knowledge

Justification: Students applied their knowledge of data structures and algorithms to understand their importance in solving complex engineering problems in the industry.

Level of Mapping: High

PO2: Problem Analysis

Justification: The session helped students identify and analyze the role of data structures in technical interviews and real-world applications.

Level of Mapping: High

PO3: Design/Development of Solutions

Justification: Insights into designing efficient solutions using data structures were provided, considering industry needs and constraints.

Level of Mapping: High

PO5: Modern Tool Usage

Justification: The importance of using modern coding platforms like LeatCode and CodeChef for skill enhancement was emphasized.

Level of Mapping: High

PO6: The Engineer and Society

Justification: The session highlighted the societal and professional responsibilities of engineers in the tech industry.

Level of Mapping: Medium

PO12: Life-long Learning

Justification: Continuous learning and self-practice were encouraged, aligning with the need for lifelong learning in the rapidly evolving tech field.

Level of Mapping: High

The webinar on "Data Structure - Industrial Applications" aligns well with PO1, PO2, PO3, PO5, and PO12 at a high level, while it aligns with PO6 at a medium level. This reflects the event's significant contribution to the students' educational and professional development.

Mapping and Justification of the Event to PEO Statements

PEO 1: Graduates emerging from B.Tech Computer Science program will be successful in the field of Computer Science or related areas, utilizing their education.

Justification: The webinar provided students with practical insights into the importance of data structures in the industry, enhancing their understanding of how academic concepts are applied in real-world scenarios. This knowledge is crucial for their success in the field of Computer Science, as it prepares them to tackle industry challenges effectively.

Level of Mapping: High

PEO 2: Graduates emerging from B.Tech. Computer Science program will be contributing to the development of software systems that address real-world problems.

Justification: By emphasizing the role of data structures in solving complex problems and optimizing software performance, the session equipped students with the skills needed to develop efficient software systems. The practical examples and industry insights shared by Mr. Arpit Agrawal will help students contribute to creating solutions that address real-world problems.

Level of Mapping: High

PEO 3: Graduates emerging from B.Tech. Computer Science program will be well-prepared to pursue higher education, furthering their expertise in computer science and related fields.

Justification: The session encouraged continuous learning and self-practice, which are essential for students aiming to pursue higher education. The introduction to online coding platforms and the emphasis on staying updated with industry trends will help students build a strong foundation for advanced studies in computer science and related fields.

Level of Mapping: Medium

The webinar aligns well with PEO 1 and PEO 2 at a high level, while it aligns with PEO 3 at a medium level. This reflects the event's significant contribution to the students' educational and professional development.

3. Role Playing model in the course delivery and evaluation of the student

Activity Report: Innovative Pedagogy Method - Role Playing

Objective: To enhance student understanding of the various topics from Data Structure through an innovative role-playing pedagogy method.

Methodology:

1. **Introduction and Demonstration:**
    - The faculty conducted a role-playing example with the help of volunteer students to teach the topic "Singly Linked List Structure."
    - A sample document containing various aspects of the topic and its applications was provided to the students.
2. **Group Assignment:**
    - Students were given multiple real-life scenarios to choose from and were instructed to form groups to perform the role play.
    - Each group was tasked with preparing a document detailing their selected scenario and the relevant information about the topic. They were also tasked with demonstrating the role play activity for the selected topic and it was evaluated as group assignment for ten marks.
3. **Role Play Activity:**
    - Students performed the role play as a group assignment.
    - The activity was evaluated on a scale of ten marks based on the following parameters:
        - Documentation: 5 Marks
        - Role Play Performance: 3 Marks
        - Contribution to Teamwork: 2 Marks
4. **Evaluation and Recording:**
    - Student performances were recorded.
    - Selected performances were uploaded to YouTube and shared on LinkedIn to showcase the innovative teaching method.

Evaluation Criteria:

- **Documentation (5 Marks):**
    - Clarity and completeness of the document.
    - Relevance and accuracy of the information provided.
- **Role Play Performance (3 Marks):**
    - Engagement and creativity in the role play.
    - Understanding and explanation of the topic.
- **Teamwork Contribution (2 Marks):**
    - Collaboration and participation of all group members.
    - Effective communication and coordination within the group.

Outcomes:

- Enhanced understanding of the Data Structure among students.
- Improved student engagement and participation through an interactive learning method.
- Positive feedback from students on the effectiveness of the role-playing activity.
- Increased visibility and recognition of the innovative pedagogy method through social media platforms.

The students feedback was collected for the pedagogical methods, through MS-Forms, as summarised below :

Students Feedback Summary of Findings on Pedagogical Tools

1. **Role-Playing Pedagogy**:
    - **Effectiveness**: The majority of students found the role-playing pedagogy to be extremely effective in enhancing their understanding of the course contents. Specifically, most responses rated it as “Extremely effective,” with a few students rating it as “Very effective.”
2. **Data Structures Visualization Tools**:
    - **Effectiveness**: The visualization tools from the University of San Francisco and the Virtual Laboratory from IIIT Hyderabad were also highly appreciated. Most students rated these tools as “Extremely effective,” with some rating them as “Very effective” and a few as “Moderately effective.”
3. One Subject One Webinar: on "Data Structure - Industrial Applications"
    - Participants expressed a high level of satisfaction with the webinar, praising the speaker, Mr. Arpit Agrawal, for his effective delivery and engaging presentation style. The content was deemed highly relevant to their studies and future careers, with many noting the practical insights into data structures and their applications in the industry. The interactive nature of the session was particularly appreciated, with participants highlighting the value of real-world examples and the emphasis on core concepts such as arrays, linked lists, stacks, queues, trees, graphs, and key algorithms.

Detailed Analysis

- **Role-Playing Pedagogy**:
    - **Extremely Effective**: This was the most common rating, indicating that students felt this method significantly enhanced their understanding.
    - **Very Effective**: A smaller group of students found it very effective, suggesting that while beneficial, it might not have been as impactful for everyone.
- **Data Structures Visualization Tools**:
    - **Extremely Effective**: These tools were highly rated, showing that visual aids are crucial in understanding complex concepts.
    - **Very Effective**: Some students found these tools very effective, indicating a strong positive impact.
    - **Moderately Effective**: A few students rated these tools as moderately effective, suggesting room for improvement or varying levels of engagement with these tools.
- One Subject One Webinar: on "Data Structure - Industrial Applications"
    - Participants reported gaining a deeper understanding of the importance of data structures for job interviews and technical roles. They appreciated the focus on practical problems and the detailed explanation of various data structures and algorithms. The session helped clarify which topics are crucial for corporate roles and provided guidance on how to approach learning and practicing these concepts.
    - Suggestions for Improvement: Some participants suggested organizing multiple webinars to cover more topics in-depth and incorporating more interactive elements such as live coding demonstrations and problem-solving exercises.
    - The positive feedback on the speaker's ability to deliver content effectively and maintain high levels of interactivity was appreciated.

Conclusion

Overall, the feedback indicates a strong positive reception towards the pedagogical tools used, particularly the role-playing pedagogy and the data structures visualization tools. These methods were generally seen as highly effective in enhancing students' understanding of the course material. The few moderate ratings suggest that while the tools are effective for most, there may be opportunities to further refine and adapt these methods to cater to all students.

Students Feedback Summary of Findings on Instructor's teaching Methods

1. **Effectiveness in Explaining Concepts**:
    - **Extremely Effective**: The majority of students rated the instructor as extremely effective in explaining the concepts of Data Structures and Algorithms.
    - **Very Effective**: A smaller group of students found the instructor very effective.
2. **Approachability and Helpfulness**:
    - **Extremely Approachable and Helpful**: Most students found the instructor to be extremely approachable and helpful.
    - **Very Approachable and Helpful**: Some students rated the instructor as very approachable and helpful.
3. **Overall Teaching Methods**:
    - **Excellent**: The majority of students rated the overall teaching methods (lectures, discussions, practical exercises) as excellent.
    - **Very Good**: A few students rated the teaching methods as very good.

Detailed Analysis

- **Effectiveness in Explaining Concepts**:
    - **Extremely Effective**: This was the predominant rating, indicating that students felt the instructor was highly effective in conveying the course material.
    - **Very Effective**: A smaller portion of students found the instructor very effective, suggesting a generally high level of satisfaction with the instructor's explanations.
- **Approachability and Helpfulness**:
    - **Extremely Approachable and Helpful**: The majority of students felt that the instructor was very accessible and supportive, which is crucial for a positive learning experience.
    - **Very Approachable and Helpful**: Some students rated the instructor slightly lower but still positively, indicating a strong overall perception of the instructor's approachability.
- **Overall Teaching Methods**:
    - **Excellent**: Most students rated the teaching methods as excellent, reflecting a high level of satisfaction with the instructional strategies used in the course.
    - **Very Good**: A few students rated the methods as very good, suggesting that while the teaching methods were effective, there might be minor areas for improvement.

Conclusion

The feedback indicates a very positive reception towards the instructor's teaching methods. The instructor was generally seen as highly effective in explaining concepts, very approachable, and supportive. The overall teaching methods were rated as excellent by most students, with a few suggesting they were very good. This feedback highlights the instructor's strong impact on the students' learning experience and suggests that the teaching methods used were well-received.

The sample video for the Role play pedagogy were uploaded on youtube and also posted on linked in for public domain reach.

Post 1:

Data Structure : Role Play in Teaching Learning

Title: Airport Runway Management System Using Queue | B.Tech.(CS) Second Year Role Play Project

Description:

Welcome to our latest video showcasing an Role Playing model project by the second-year B. Tech. Computer Science students..!

In this video, you'll see a detailed demonstration of the "Airport Runway Management System using Queue," a project developed as part of their Teaching Learning Pedagogy. This group assignment challenged students to identify and implement a linear data structure, and they chose to tackle the complexities of airport runway management using queues.

What to Expect:

- An introduction to the project and its objectives.
- A step-by-step walkthrough of how queues are used to manage runway scheduling and prioritization.
- Insights into the challenges faced and solutions devised by the students.
- Real-world applications and the importance of efficient data structures in software development.

Join us as we dive into this fascinating project and celebrate the creativity and technical skills of our students. Don't forget to like, comment, and subscribe for more exciting content!

Your positive comments and advice will encourage the students to do more such activities…

You tube Video Link:

https://youtu.be/SSkkpVJ0rOQ

Linked-in Post Link:

https://www.linkedin.com/posts/drnitinchoubey_role-play-model-groupg2-airport-runway-activity-7260968274740322304-WnvC?utm_source=share&utm_medium=member_desktop

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Post 2:

Data Structure: Role Play in Teaching Learning

Title: Music Playlist Management System Using Doubly Linked List | B.Tech.(CS) Second Year Project

Description:

Welcome to our latest video featuring an innovative project by the second-year B.Tech. Computer Science students!

In this video, you'll witness a comprehensive demonstration of the "Music Playlist Management System using Doubly Linked List," a project developed as part of their Teaching Learning Pedagogy. This group assignment tasked students with identifying and implementing a linear data structure, and they chose to explore the intricacies of managing a music playlist using a doubly linked list.

What to Expect:

- An introduction to the project and its objectives.
- A detailed walkthrough of how doubly linked lists are used to manage playlist operations such as adding, removing, and navigating through songs.
- Insights into the challenges faced and the innovative solutions devised by the students.

- Real-world applications and the significance of efficient data structures in software development.

Join us as we delve into this exciting project and celebrate the creativity and technical prowess of our students. Don't forget to like, comment, and subscribe for more inspiring content!
You tube Video Link:
https://youtu.be/khmf1FeGgoA
Linked-in Post Link:
https://www.linkedin.com/posts/drnitinchoubey_g6-music-playlist-management-system-dll-activity-7265676881226551296-xEOf?utm_source=share&utm_medium=member_desktop

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Post 3:

Data Structure: Role Play in Teaching Learning

Title: Blog Post Management Using Singly Linked List | B.Tech.(CS) Second Year Project
Description:
Welcome to our latest video showcasing an innovative project by the second-year B.Tech. Computer Science students!
In this video, you'll see a detailed demonstration of the "Blog Post Management using Singly Linked List," a project developed as part of their Teaching Learning Pedagogy. This group assignment challenged students to identify and implement a linear data structure, and they chose to manage blog posts using a singly linked list.
What to Expect:

- An introduction to the project and its objectives.
- A step-by-step walkthrough of how singly linked lists are used to manage blog post operations such as adding, removing, and navigating through posts.
- Insights into the challenges faced and solutions devised by the students.

Join us as we dive into this fascinating project and celebrate the creativity and technical skills of our students. Don't forget to like, comment, and subscribe for more exciting content!
You tube Video Link:
https://youtu.be/pai-2waOa_Y
Linked-in Post Link:
https://www.linkedin.com/posts/drnitinchoubey_g8-blogs-post-management-system-activity-7265690255171723264-thEF?utm_source=share&utm_medium=member_desktop