Seekho

Project Team

Hassan Rasool	20I-0767
Aans Rehman Khan	20I-0865
Huzefa Tanveer	20I-0954

Session 2020-2024

Supervised by

Dr. Asif Malik

Department of Computer Science

National University of Computer and Emerging Sciences
Islamabad, Pakistan

June, 2024

Contents

List of Figures

List of Tables

Chapter 1

Introduction

The product described in this document is "Seekho," an innovative e-learning platform designed to revolutionize the method of content delivery and assessment. Utilizing Artificial Intelligence (AI) and Natural Language Processing (NLP), Seekho auto-segments video content and dynamically generates quizzes, enabling educators to deliver content seamlessly and assess learners effectively. This platform aims to provide a holistic e-learning environment, aligning with the ongoing digital transformation in the education sector. This document is intended for a diverse audience, such as Developers, users, and testers each with specific interests and needs related to the Seekho platform. **?**.

1.1 Problem Statement

The rapid advancement of digital technology has revolutionized many sectors, including education. However, traditional e-learning platforms often fall short in providing an engaging and interactive learning experience. These platforms typically offer static content and limited assessment tools, which can hinder learner engagement and the effective measurement of their progress. Moreover, educators face significant challenges in preparing and delivering dynamic content, as well as creating relevant assessments that accurately gauge student understanding. To address these issues, we are developing Seekho, an innovative e-learning platform that leverages Artificial Intelligence (AI) and Natural Language Processing (NLP) to enhance content delivery and assessment. Seekho auto-segments video content into manageable segments and generates quizzes dynamically, providing educators with tools to deliver content seamlessly and assess learners effectively. By doing so, Seekho aims to create a more engaging and interactive learning environment, reduce the workload on educators, and improve the overall efficacy of e-learning. This platform addresses the critical need for adaptive and intelligent e-learning solutions, aligning with the ongoing digital transformation in education and ensuring that

both educators and learners benefit from a holistic and efficient learning experience.

1.2   Scope

The "Seekho" project aims to develop an advanced e-learning platform that transforms the way educational content is delivered and assessed. The main functionalities of Seekho include auto-segmentation of video content and dynamic quiz generation using AI and NLP technologies. This platform will enable educators to upload video lectures, which will then be automatically analyzed and segmented into logical units for easier consumption by learners. Seekho will also generate quizzes based on these segments, allowing for real-time assessment and feedback.

Furthermore, Seekho will provide a user-friendly interface for both educators and learners. Educators will have access to tools for managing their courses, including content uploading, quiz customization, and performance tracking. Learners, on the other hand, will benefit from an interactive learning experience with seamlessly integrated video content and assessments, progress tracking, and personalized feedback.

The platform will support a variety of content formats and will be accessible across multiple devices, ensuring flexibility and convenience for users. Additionally, Seekho will include features such as discussion forums, collaborative learning tools, and integration with existing Learning Management Systems (LMS). The scope of this project encompasses the development, testing, and deployment of these functionalities, along with the creation of comprehensive documentation and user support resources.

By defining these boundaries, Seekho will deliver a robust, scalable, and efficient e-learning solution that addresses the current challenges in digital education and enhances the overall learning experience for both educators and learners.

1.3   Modules

1.3.1   Module 1: User Authentication

This module handles the registration, login, and profile management of users, ensuring secure access to the platform.

1. User registration with email verification

2. Secure login with password encryption

3. Profile management for updating personal information

1.3.2 Module 2: Content Upload and Management

This module allows educators to upload and manage their video content, including segmentation and organization of the course material.

1. Upload video lectures

2. Auto-segment video content into logical units

3. Organize and categorize course materials

1.3.3 Module 3: Quiz Generation and Management

This module facilitates the dynamic generation of quizzes based on video content and allows educators to customize assessments.

1. Auto-generate quizzes from segmented videos

2. Customize and edit quiz questions

3. Set quiz parameters such as time limits and scoring

1.3.4 Module 4: User Dashboard

This module provides users with an overview of their activities, progress, and performance within the platform.

1. Display recent activities and notifications

2. Track learning progress and completed modules

3. View quiz scores and feedback

1.4 User Classes and Characteristics

Table 1.1 Shows different users and their descriptions of how they can use Seekho for their activities.

User Class	Description
Educators	Educators are instructors or teachers who create and deliver educational content using Seekho. They can upload video lectures, segment videos, generate and customize quizzes, and track student performance. Educators will typically access the platform from their desktops or laptops. They require an intuitive interface for managing their courses and tools for effective assessment. Training on advanced features like AI-based video segmentation may be necessary for some educators.
Learners	Learners are students or individuals seeking knowledge through the Seekho platform. They will access educational content, participate in quizzes, and track their progress. Learners can use both web and mobile apps for convenience. They need a user-friendly interface that facilitates easy navigation through content and seamless interaction with quizzes and other learning activities.
Administrators	Administrators are responsible for managing the overall functioning of the Seekho platform. They oversee user accounts, manage content, generate analytical reports, and configure system settings. Administrators ensure the platform runs smoothly and meets institutional standards. They require comprehensive access to all system functionalities and an interface that supports efficient management and configuration tasks.
Testers	Testers are responsible for ensuring the quality and reliability of the Seekho platform. They perform rigorous testing of all features, identify bugs, and validate fixes. Testers use both automated and manual testing methods and need detailed documentation of features and expected behaviors. They require access to all modules and tools to create test cases, track issues, and monitor performance metrics.
Developers	Developers are tasked with building and maintaining the Seekho platform. They implement features, fix bugs, and enhance performance based on user feedback. Developers need detailed technical documentation, access to code repositories, and development environments. They work on both the web and mobile applications, requiring knowledge of relevant technologies and frameworks.

Table 1.1: User Classes and Characteristics

Chapter 2

Project Requirements

This chapter describes the functional and non-functional requirements of the Seekho.

2.1 Use-case

Use case diagrams are a powerful tool for illustrating the interactions between users and a system. In the context of the Seekho project, the use case diagram depicts the various functionalities and interactions that users (educators, learners, administrators, etc.) can have with the e-learning platform. This diagram helps to visualize the different use cases or scenarios in which users interact with the system to achieve specific goals.

5

Figure 2.1: Use Case Diagram for Seekho

2.2 Functional Requirements

2.2.1 User Authentication

1. The system shall provide a user authentication mechanism to ensure secure access.

2. Users shall be able to register for an account using a valid email address and password.

3. Upon registration, users shall receive a verification email to confirm their account.

4. Registered users shall be able to log in using their email address and password.

5. The system shall enforce password complexity requirements for user accounts.

2.2.2 Content Upload and Management

1. Educators shall be able to upload video lectures to the platform.

2. Uploaded video lectures shall be automatically segmented into logical units for easier consumption by learners.

3. Educators shall have the ability to organize and categorize course materials.

4. The system shall support a variety of content formats for upload, including video, audio, and documents.

5. Educators shall be able to edit and update uploaded content as needed.

2.2.3 Quiz Generation and Management

1. The system shall dynamically generate quizzes based on segmented video content.

2. Educators shall have the ability to customize quiz questions and parameters.

3. Quizzes shall be automatically graded, and results shall be recorded for both educators and learners.

4. Learners shall have access to quizzes associated with each video lecture.

5. The system shall provide immediate feedback to learners upon completion of quizzes.

2.2.4 User Dashboard

1. Users shall have access to a personalized dashboard upon logging in.

2. The dashboard shall display recent activities and notifications related to course materials and assessments.

3. Learners shall be able to track their progress and view completed modules and quizzes.

4. Educators shall have access to additional dashboard features for managing courses and tracking student performance.

5. The dashboard shall provide easy navigation to different sections of the platform.

2.2.5 Discussion Forums

1. The system shall include discussion forums for users to engage in collaborative learning.

2. Users shall be able to create new discussion topics and participate in existing discussions.

3. Discussion forums shall be organized by course or topic for ease of navigation.

4. Educators shall have moderation capabilities to manage discussions and enforce forum guidelines.

5. Users shall receive notifications for new posts and replies in forums.

2.2.6 Integration with Learning Management Systems (LMS)

1. The system shall integrate with existing Learning Management Systems (LMS) for seamless course management.

2. Educators shall be able to import course materials and student data from LMS platforms.

3. Integration with LMS platforms shall ensure synchronization of user accounts and course progress.

4. The system shall support Single Sign-On (SSO) for users authenticated through LMS platforms.

5. Course activities and assessments completed on the platform shall be reflected in the LMS gradebook.

2.2.7 Module 1: User Authentication

This module handles the registration, login, and profile management of users, ensuring secure access to the platform.

1. User registration with email verification

2. Secure login with password encryption

3. Profile management for updating personal information

2.2.8   Module 2: Content Upload and Management

This module allows educators to upload and manage their video content, including segmentation and organization of the course material.

1. Upload video lectures

2. Auto-segment video content into logical units

3. Organize and categorize course materials

2.2.9   Module 3: Quiz Generation and Management

This module facilitates the dynamic generation of quizzes based on video content and allows educators to customize assessments.

1. Auto-generate quizzes from segmented videos

2. Customize and edit quiz questions

3. Set quiz parameters such as time limits and scoring

2.2.10   Module 4: User Dashboard

This module provides users with an overview of their activities, progress, and performance within the platform.

1. Display recent activities and notifications

2. Track learning progress and completed modules

3. View quiz scores and feedback

2.3 Non-Functional Requirements

2.3.1 Performance Requirements

2.3.1.1 Load Time

The web application should load within 2 seconds under standard broadband conditions.

2.3.1.2 Video Stream

Videos should stream with a maximum buffer time of 3 seconds for users with at least a 5 Mbps connection.

2.3.1.3 Response Time

For user interactions such as enrolling in a course or taking a quiz, the system should respond within 1.5 seconds.

2.3.1.4 Concurrency

The system should handle a minimum of 10,000 concurrent users without degradation in performance.

2.3.1.5 Real-time Processing

Automated video segmentation through NLP should process within 5 minutes for an hour-long video.

2.3.2 Safety Requirements

2.3.2.1 Data Backup

Regular backups of user data, course content, and quiz results should be maintained to prevent data loss.

2.3.2.2 Operational Safety

Ensure safeguards against potential hazards of prolonged screen time, such as reminders for users to take breaks during long courses.

2.3.2.3 Disaster Recovery

A disaster recovery plan should be in place to ensure system recovery within 24 hours in case of any catastrophic events.

2.3.3 Security Requirements

2.3.3.1 Data Encryption

User data, especially personal information, should be encrypted both in transit and at rest.

2.3.3.2 Authentication

Multi-factor authentication should be available and encouraged for educators and administrators.

2.3.3.3 Role-Based Access Control (RBAC)

Ensure only authorized users can access specific features based on their roles (e.g., students can't delete courses).

2.3.3.4 Privacy Compliance

Ensure GDPR, CCPA, and other relevant data protection compliance for storing and processing user data.
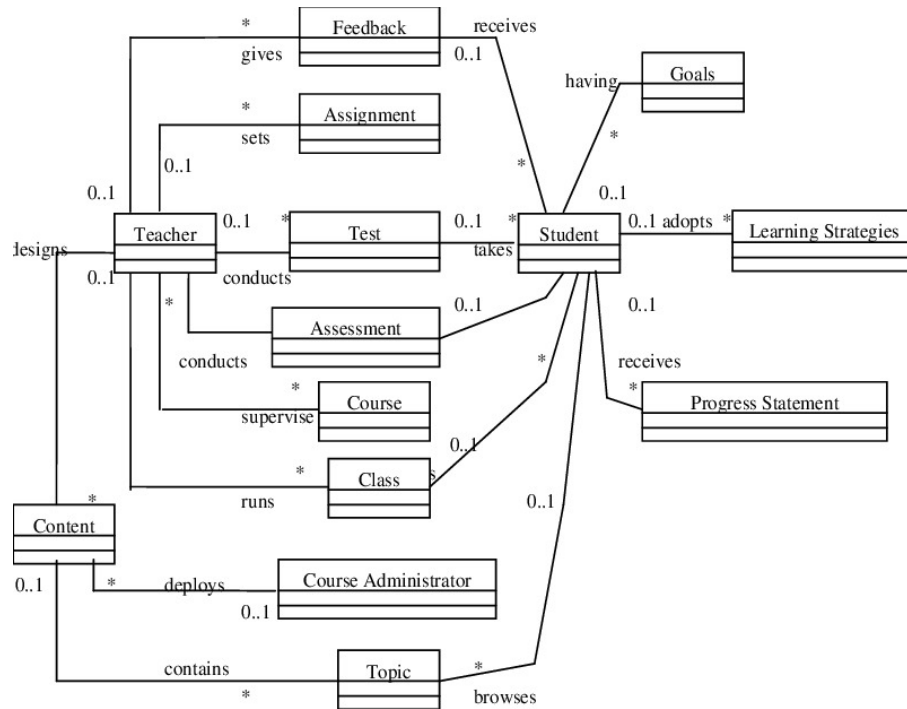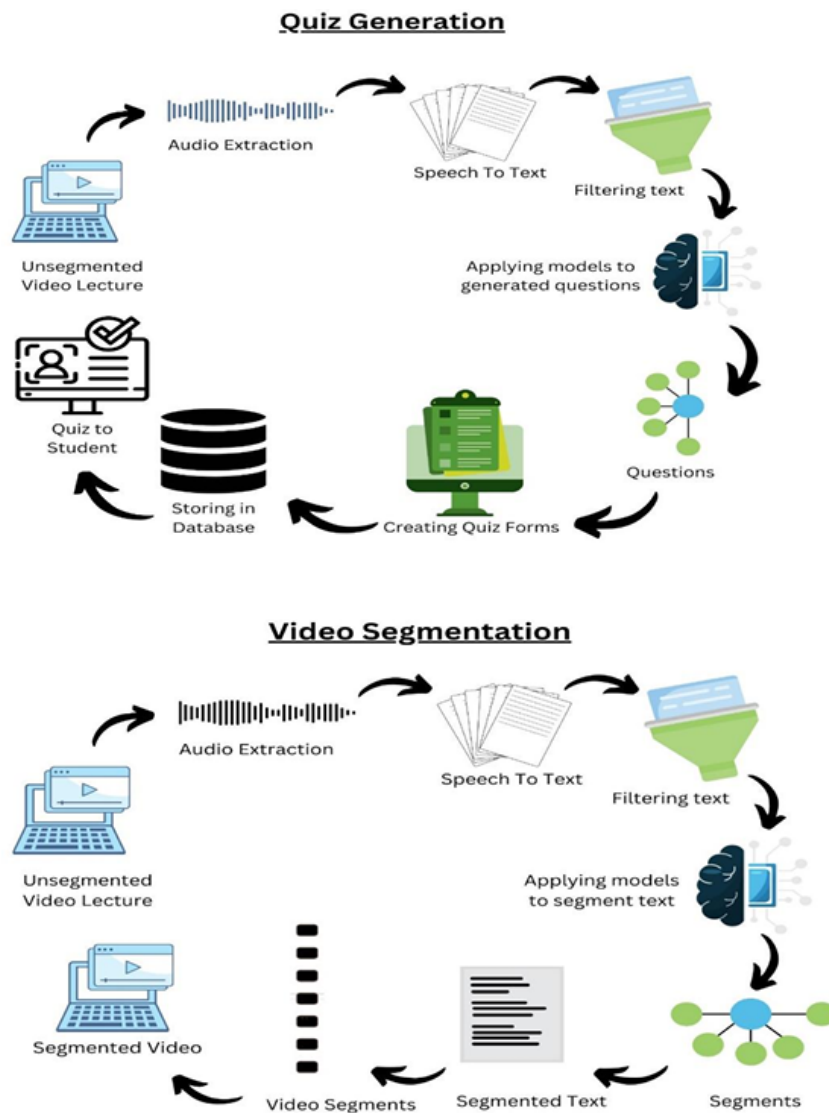
2.4 Domain Model

Figure 2.2: Domain Model for Seekho

Chapter 3

System Overview

3.1 Architectural Design

14

Figure 3.1: Architectural Diagram for Seekho

3.2 Sequence Diagram
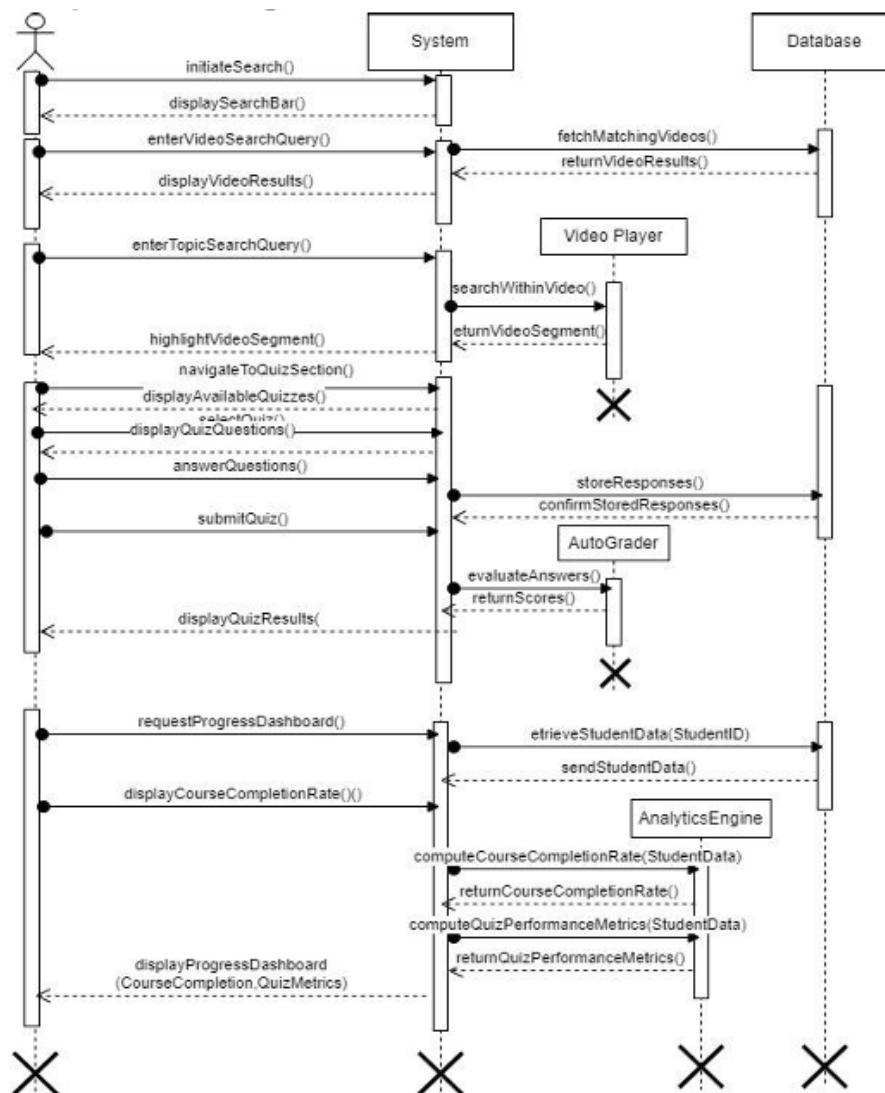

Figure 3.2: sequence Diagram for Seekho

3.3 ER Diagram

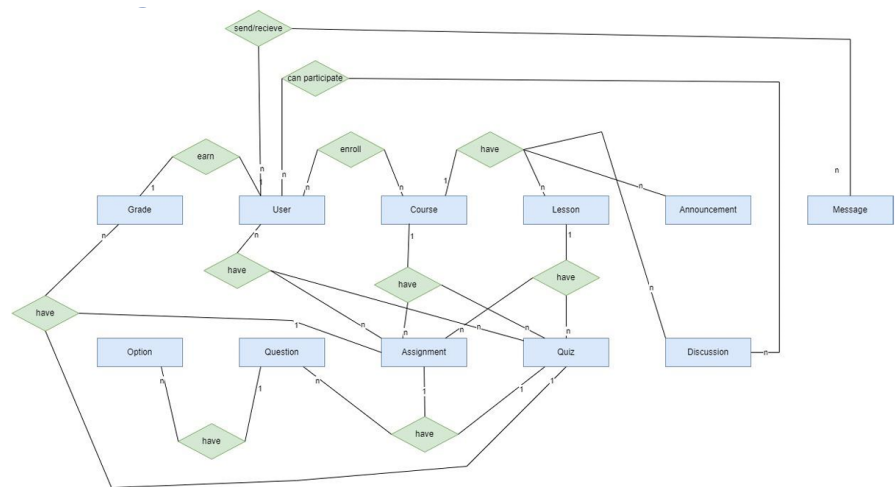Figure 3.3: ER Diagram for Seekho
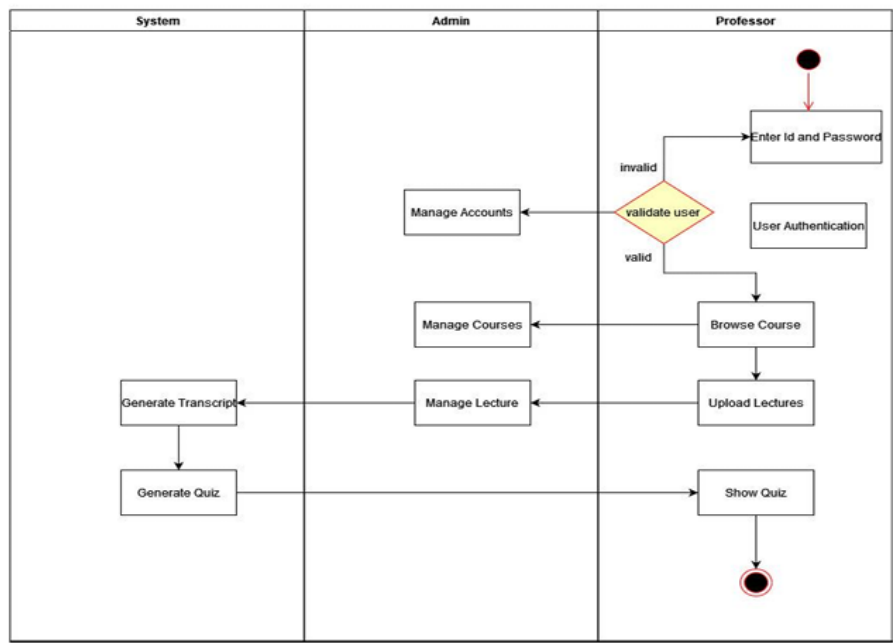
3.4 Activity Diagram

3.4.1 Create Quiz
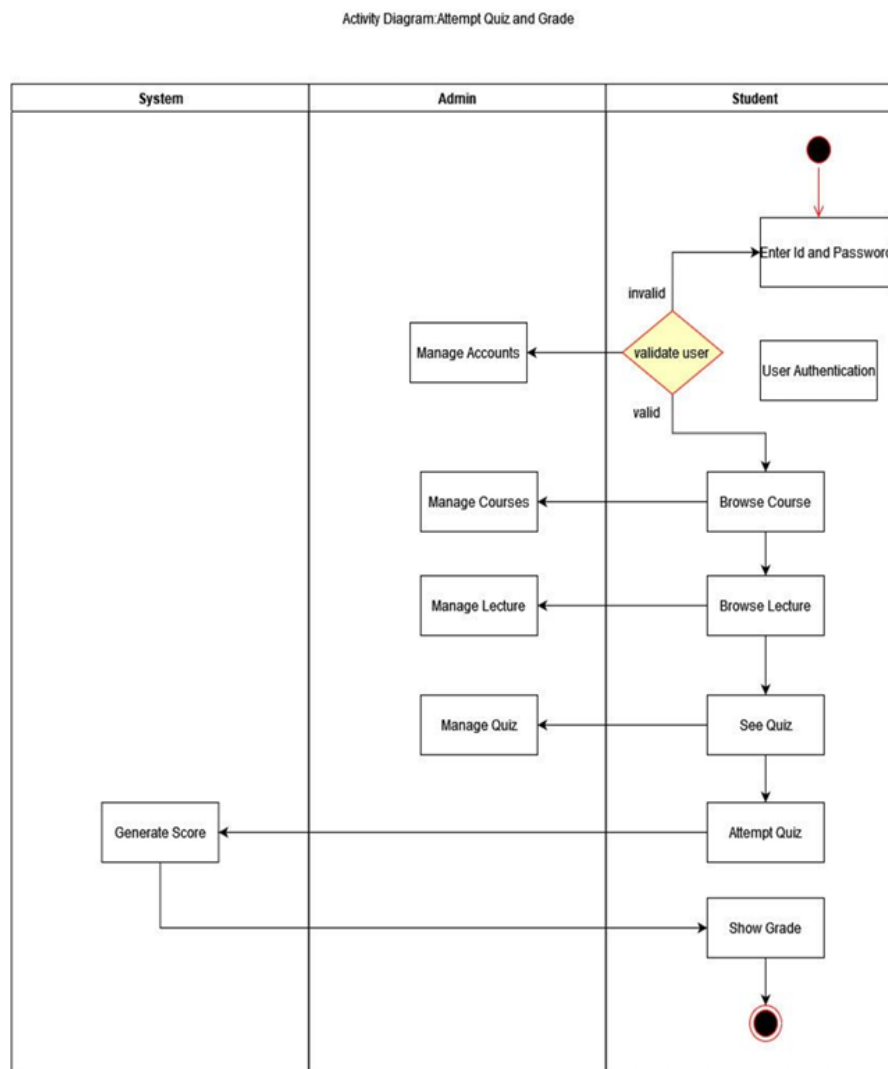

Figure 3.4: create quiz activity

3.4.2 Attempt Quiz

Activity Diagram:Attempt Quiz and Grade

System	Admin	Student

Enter Id and Password

invalid

Manage Accounts ← validate user

User Authentication

valid

Manage Courses ← Browse Course

Manage Lecture ← Browse Lecture

Manage Quiz ← See Quiz

Generate Score ← Attempt Quiz

Show Grade

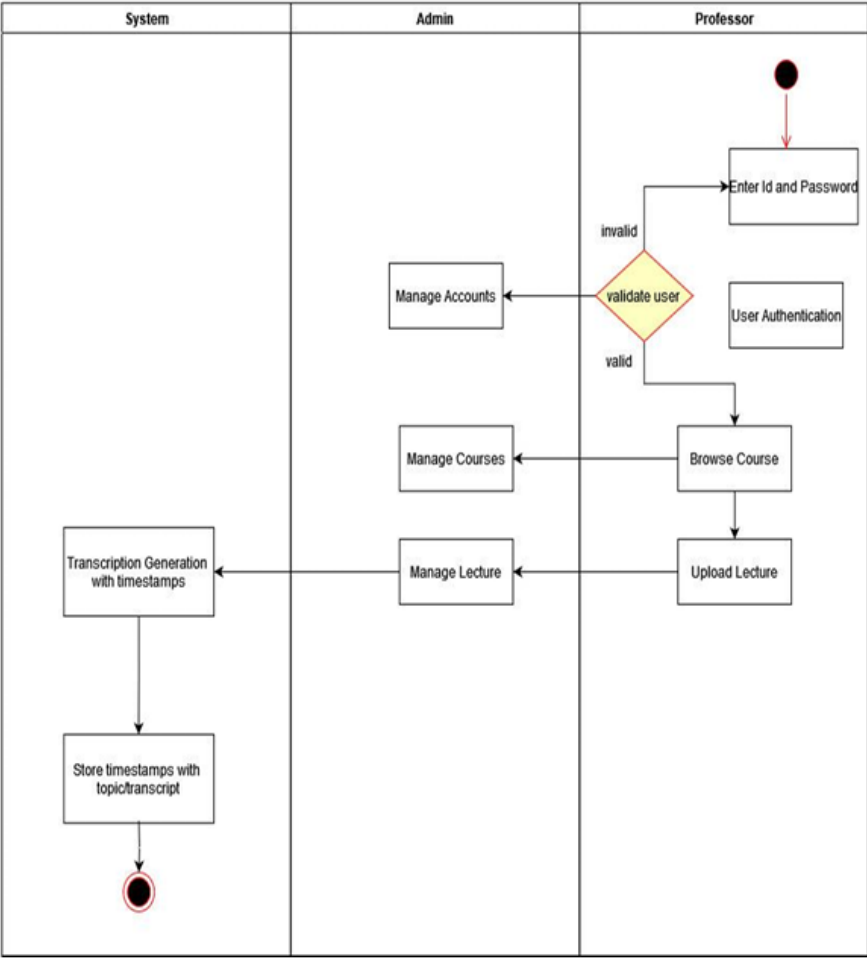Figure 3.5: attempt quiz activity

17

3.4.3 Video Segmentation

Figure 3.6: video segmentation activity

Chapter 4

Conclusions and Future Work

4.1 Conclusions

In conclusion, Seekho represents a significant step forward in the realm of e-learning platforms. By leveraging AI and NLP technologies, Seekho has successfully automated the process of content segmentation and quiz generation, providing educators with a powerful tool for delivering seamless and engaging learning experiences. Throughout the development process, we have demonstrated the feasibility and effectiveness of our approach, achieving our primary goal of revolutionizing content delivery and assessment in the education sector.

4.2 Future Work

While Seekho has achieved considerable success in its current form, there are several avenues for future improvement and expansion. Some potential areas for future work include:

- Enhanced Personalization: Implementing algorithms for personalized learning experiences tailored to individual learners' preferences and learning styles.

- Gamification Elements: Introducing gamification elements such as badges, leaderboards, and achievements to enhance learner engagement and motivation.

- Integration with Learning Management Systems (LMS): Integrating Seekho with existing LMS platforms to provide a seamless experience for educators and learners.

- Advanced Analytics: Developing advanced analytics tools to provide insights into learner progress, engagement, and performance for educators and administrators.

- Accessibility Features: Implementing accessibility features to ensure inclusivity and usability for learners with disabilities.

Overall, Seekho has laid the foundation for a cutting-edge e-learning platform, and future iterations will continue to push the boundaries of innovation in education technology.