

EduTube: Enhancing Credibility and User Experience in Online Learning

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Abstract

EduTube addresses a common challenge in online learning: the lack of credibility associated with YouTube tutorials. Recognizing that many learners rely on YouTube due to cost constraints, we've created an interactive mobile application. This AI-powered platform enhances credibility by offering dynamic quizzes generated from video subtitles through NLP. Users can add YouTube playlists, pending admin approval, and complete quizzes after each video. They can also explore playlists from other users. Any reported inaccuracies are promptly investigated. Upon successful completion, users receive a certification, providing tangible proof of their knowledge and enhancing their employability. EduTube bridges the gap between accessible learning and verifiable skills attainment.

Keywords: Machine Learning, Credibility, NLP, Certification, YouTube, Mobile App, Quiz Generation

INTRODUCTION

In today's fast-evolving technological landscape, staying updated is paramount. YouTube has emerged as a primary platform for accessing the latest information and updates. However, not everyone can afford paid courses from prominent Edtech platforms. This has led to a surge in self-guided learning through YouTube. While immensely valuable, this form of learning lacks a formalized recognition system, potentially hindering employability. In response to this gap, we introduce EduTube, a dynamic and user-friendly mobile application designed to add credibility to YouTube playlists and empower learners across all backgrounds. EduTube revolutionizes online learning by bridging the gap between accessibility and credibility. With EduTube, users can seamlessly integrate YouTube playlists into a structured learning path. To ensure credibility, each playlist is subject to approval by the admin panel before being added to the course list. As users progress through the videos, they are prompted to complete quizzes generated from video subtitles using NLP, validating their comprehension and mastery of the content. Moreover, EduTube fosters a sense of community by allowing users to explore and engage with playlists uploaded by other learners. Should a user identify any discrepancies in the questions or answers, they can report it directly to the admin panel for investigation. Upon successfully passing the quizzes for a given course, users are awarded a certification, providing tangible proof of their knowledge and enhancing their employability. EduTube aims to democratize learning, making quality education accessible to all, while ensuring that the knowledge gained holds the credibility needed to thrive in today's competitive job market.

Motivation

The motivation behind EduTube stems from the recognition of a critical need in the online learning landscape. While platforms like YouTube offer a wealth of educational content, the lack of formal recognition or certification for acquired knowledge poses a significant challenge for learners. This gap can hinder their ability to showcase their expertise to potential employers or academic institutions. EduTube seeks to bridge this divide by introducing a dynamic and user-friendly mobile application. It leverages advanced technologies like OCR and NLP to add credibility to YouTube playlists. This not only empowers learners from diverse backgrounds but also provides them with a tangible measure of their knowledge and skills. By combining accessibility with a credible certification process, EduTube revolutionizes online learning. It is driven by a mission to democratize education, ensuring that learners can access quality content and earn recognition for their efforts. Ultimately, EduTube is motivated by the belief that everyone should have the opportunity to showcase their knowledge and skills, regardless of their background or access to formalized education.

Problem Statement & Objectives

Problem Statement: In the digital learning landscape, learners face a significant challenge: the absence of recognized certification for self-guided online education. This hinders their ability to showcase expertise to potential employers or academic institutions. EduTube aims to bridge this gap by introducing a dynamic certification process for YouTube-based learning.

Objectives: The project aims to establish formal recognition for learners, streamline the learning process through OCR-driven automation, engage users with dynamic quizzes, foster a community, ensure a user-friendly interface, maintain assessment accuracy, and democratize learning through accessible education on online platforms like YouTube.

REVIEW OF LITERATURE

The reviewed literature encompasses a diverse range of topics related to education and technology, with a particular focus on the use of machine learning, natural language processing, and artificial intelligence in educational settings. In the paper titled "Automatic Quiz Generator" [1], the authors introduce a valuable contribution to educational technology by proposing an automatic quiz generation system that relies on machine learning and natural language processing. Notably, the system demonstrates an impressive ability to extract key concepts and relationships from text documents and generate high-quality quizzes, offering educators an efficient tool for creating engaging assessments.

In "A Question Answering and Quiz Generation Chatbot for Education" [2], the authors present a versatile chatbot capable of generating questions and answering student queries. This dual functionality enhances the learning experience by allowing students to interact dynamically with educational materials, while also aiding educators in generating relevant content tailored to the needs of their students.

The importance of assessment in establishing the credibility of online learning is the central theme of "Assessment Impact on Online Learning Credibility" [3]. The author discusses various assessment methods and their role in providing evidence of student learning, shedding light on the critical issue of trustworthiness in online education.

Meanwhile, "A novel approach to generate distractors for Multiple Choice Questions" [4] introduces an innovative approach to generating distractors for multiple-choice questions using machine learning. This

approach not only enhances the quality of assessments but also streamlines the question preparation process for educators, offering a practical solution to a common challenge.

The comprehensive survey presented in "Automatic question generation and answer assessment: a survey" [5] provides a valuable overview of the state-of-the-art in automatic question generation and answer assessment. This survey is a valuable resource for those looking to understand the range of systems and methodologies available, ultimately facilitating the development of automated educational assessment systems.

In "A hybrid approach for automatic generation of named entity distractors for multiple choice questions" [6], the authors propose a hybrid approach to generating named entity distractors in multiple-choice questions. Combining rule-based and machine learning approaches, this innovation significantly improves the quality of distractors, an essential element in crafting effective multiple-choice assessments.

Looking forward, "Shaping the Future of Education: Exploring the Potential and Consequences of AI and ChatGPT in Educational Settings" [7] explores the transformative potential of AI and ChatGPT in education while also emphasizing the need for careful consideration of ethical and practical implications. This forward-looking paper raises awareness of both opportunities and challenges in integrating these technologies into educational practices.

Lastly, "Student Perceptions Towards the use of YouTube as An Educational Tool for Learning and Tutorials" [8] investigates student perceptions regarding the use of YouTube for educational purposes. The findings underscore the importance of incorporating digital platforms like YouTube in education, particularly for topic-specific learning. Collectively, these papers contribute to the evolving landscape of educational technology, showcasing innovative approaches to assessment, content generation, and the integration of AI and digital platforms into educational practices. They highlight both opportunities and challenges, underlining the importance of a thoughtful and research-driven approach to leverage technology for educational advancement.

PROPOSED METHODOLOGY

System Architecture: The foundation of Edu-Tor lies in its robust and scalable system architecture. We employ a modular approach that integrates the user-facing mobile application and the backend services. Flutter (Dart) serves as the framework for developing the mobile app, ensuring cross-platform compatibility. Firebase, a comprehensive cloud-based platform, is chosen for its versatility in handling essential backend functions. This architecture not only supports the core functionalities of the platform but also allows for future scalability and feature expansion.

User Interface (UI): The user interface is meticulously crafted to provide an engaging and user-friendly experience. The UI development process involves several key elements:

- **Visual Design:** Aesthetically pleasing visuals, including a captivating splash screen and animated onboarding screens, are designed to make the onboarding process engaging and memorable.
- **User Authentication:** The integration of Google Sign-In simplifies the authentication process, allowing users to effortlessly log in with their Google accounts. This integration also fetches and stores essential profile data in the system.

Playlist Management: Users are empowered to build their course lists by adding YouTube playlists. However, an essential aspect is the curation and approval process:

- **User Submissions:** Users can submit YouTube playlists they want to include in their course list.
- **Admin Approval:** These submissions are reviewed by administrators through the dedicated admin panel. Admins have the authority to approve or reject playlist requests based on the relevance and quality of the content.

Admin Panel: The admin panel plays a pivotal role in ensuring the smooth operation of Edu-Tor. It provides administrators with powerful tools to manage and moderate the platform:

- **Web-Based Interface:** The admin panel is accessible through a web browser, allowing administrators to oversee operations and make decisions conveniently.
- **Playlist Management:** Admins can review, approve, or reject user-submitted playlists, ensuring that the content aligns with the platform's educational objectives.
- **Issue Resolution:** Administrators can investigate and address user-reported issues, such as inaccuracies in quiz questions or content-related concerns, fostering a supportive and well-moderated learning environment.

Certification Process: The Edu-Tor system features a robust certification process that validates a user's successful completion of a course:

- **Completion Criteria:** Users who complete a course by watching tutorial videos and passing quizzes become eligible for certification.
- **Automated Certificates:** Certificates are automatically generated and securely stored in Firebase. Users who meet the predefined passing criteria receive digital certificates as a testament to their achievements.

Machine Learning for Quiz Generation: The heart of Edu-Tor's quiz generation lies in the application of machine learning techniques:

- **Data Collection:** We amass a diverse array of educational YouTube tutorial videos and meticulously extract their subtitles. These subtitles serve as the textual foundation for our quiz questions.
- **T5 Model for Quiz Generation:** A pre-trained T5 model forms the cornerstone of automated quiz generation. The T5 model is fine-tuned using a dataset that pairs video transcripts with quiz questions. This model adheres to a text-to-text framework, where it transforms video transcripts into quiz questions.
- **BERT Model for Question Quality Assessment:** In parallel, we employ a pre-trained BERT model to assess the quality of generated quiz questions. Fine-tuning the BERT model involves using a labeled dataset of quiz questions to evaluate correctness and relevance.

Quiz Generation Process: The generation of quizzes is a multi-step, data-driven process:

- **Video Transcript Processing:** When a user selects a video, its transcript is subjected to processing by the fine-tuned T5 model.
- **Candidate Question Generation:** The T5 model generates a set of candidate quiz questions based on the content of the video transcript.
- **Quality Assessment:** The BERT model evaluates the quality of each candidate question, assigning scores that reflect correctness and relevance.

- **Selection and Filtering:** Only questions meeting predefined quality thresholds are selected for inclusion in the quiz.

User Interaction: Edu-Tor's mobile application is designed to be highly interactive and engaging:

- **Course Enrollment:** Users can browse, view, and enroll in courses offered on the platform.
- **Video Consumption:** Users can watch educational videos seamlessly within the app.
- **Quiz Completion:** After video consumption, users can attempt quizzes, ensuring knowledge retention and comprehension.
- **User Reporting:** Users are encouraged to report any inaccuracies or issues with quiz questions, fostering a collaborative environment for continuous improvement.

Feedback and Refinement: User feedback is an invaluable component of the platform's refinement process:

- **Reporting Mechanism:** User reports on quiz questions or content-related issues are diligently collected.
- **Administrative Review:** The admin panel plays a crucial role in investigating and addressing user-reported issues. Admins work to refine the quiz question generation process based on this feedback, ensuring accuracy and relevance.

Integration and Deployment: Seamlessly integrating the generated quizzes into the mobile app is essential:

- **User Access:** Users can easily access quizzes after watching tutorial videos, promoting a continuous learning experience.
- **Deployment Strategy:** Ensuring smooth deployment and regular updates of both the mobile app and the admin panel is crucial for maintaining a responsive and reliable platform.

Evaluation: Continuous evaluation is a cornerstone of Edu-Tor's methodology:

- **Performance Metrics:** Metrics such as quiz completion rates, user engagement, and certification rates are regularly monitored to assess the effectiveness of the Edu-Tor platform.
- **Model Assessment:** Ongoing evaluation of the T5 and BERT models' performance helps maintain quiz question quality and relevance.

Future Enhancements: Looking ahead, Edu-Tor has an ambitious roadmap for future enhancements:

- **Peer-to-Peer Quiz Rounds:** We plan to implement features like peer-to-peer quiz rounds, encouraging collaborative learning and knowledge sharing among users.
- **Automation with Machine Learning:** As the user base grows, automation in playlist approval will be explored through the implementation of machine learning models, reducing manual workload and enhancing efficiency.

RESULTS AND DISCUSSIONS

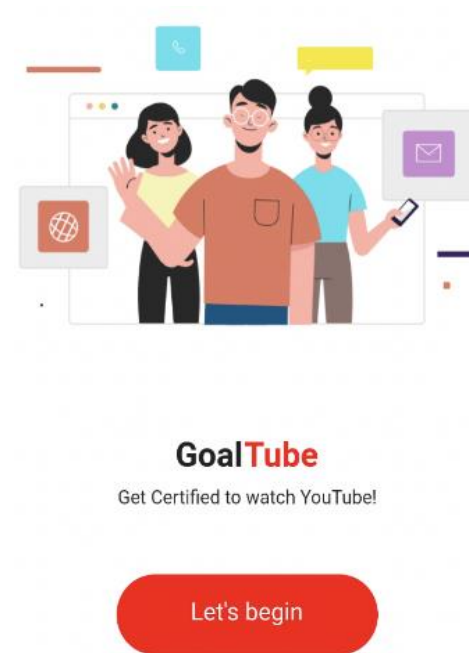


Fig. 1 Landing Page when application is launched

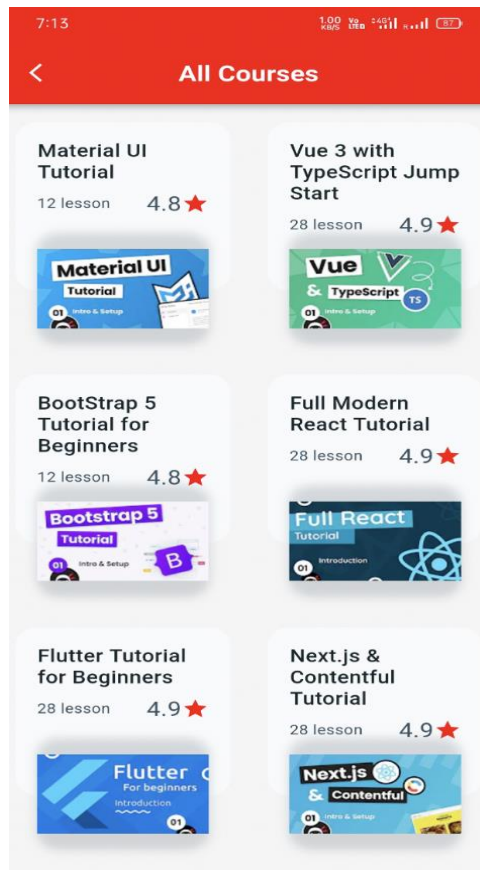


Fig. 2 Course section where all different courses can be navigated. Ratings of different courses are also available.

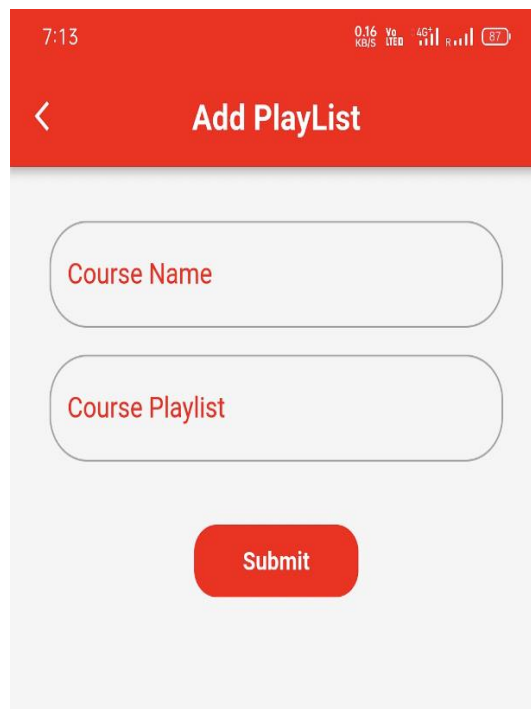


Fig. 3 Page to Add new Playlists and courses to get verified.

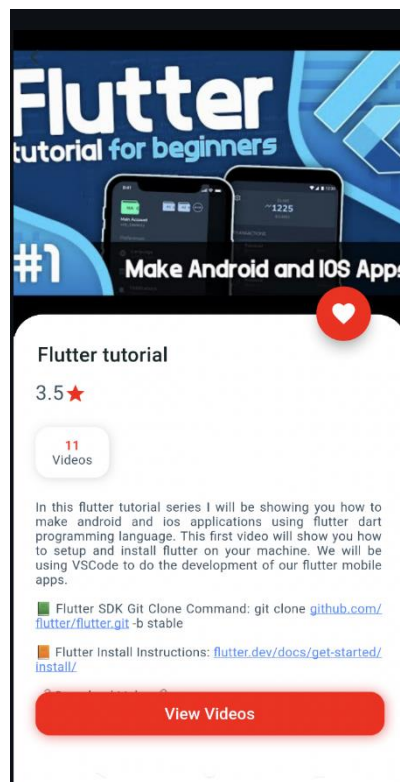


Fig. 4 Course Description and materials

CONCLUSION

The conclusion of the EduTube project signifies a significant advancement in the realm of online learning. By addressing the challenges of organization and progress tracking faced by learners using YouTube, EduTube introduces a transformative solution. The innovative "list to cart" feature, powered by OCR

technology, streamlines the process of transitioning from handwritten or digitally noted study materials to a structured digital format. This automation minimizes manual checks and greatly expedites the learning process. Furthermore, the integration of Natural Language Processing (NLP) for generating quiz questions from video subtitles revolutionizes assessment. It not only reinforces comprehension but also provides a tangible measure of mastery. This dynamic approach ensures active engagement with the material, elevating passive viewing to a more effective learning experience. EduTube empowers learners to embark on their educational journeys with confidence, offering a platform designed to enhance their learning experience. Through the seamless integration of cutting-edge technologies, EduTube sets a new standard for accessible, credible, and user-friendly online learning. This project marks a significant step forward in redefining how learners interact with educational content on platforms like YouTube.

FUTURE WORK

Peer to peer quiz rounds after each video in a playlist - At the end of every video, the user will be asked to submit a few questions along with their answer related to that video. These submitted quiz questions will be then shown to other users. Automate Admin panel -As the number of users grows, so will the number of playlist requests. As a result, we will implement an ML Model that will accept or deny requests based on the videos in the playlist, reducing manual work.

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