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Techvision AI: Revolutionising Teaching Evaluation

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Abstract—

TechVision AI is an intelligent teaching evaluation system designed to improve educational quality using Artificial Intelligence, Machine Learning, and smart analytics. The system analyzes lecture sessions through visual, audio, and text-based processing to evaluate teaching performance on parameters such as clarity, engagement, confidence, communication, and pacing,

The project integrates frontend technologies, backend processing, and AI-based models to generate automated feedback and performance reports. The frontend interface was developed using HTML, CSS, JavaScript, and Bootstrap to provide a responsive and user-friendly experience. Backend integration and data processing are handled using Python frameworks such as Flask and FastAPI.

Technologies including OpenCV, MediaPipe, DeepFace, Whisper, BERT, and Transformer-based models are considered for video analysis, speech recognition, text understanding, and feedback generation. The system aims to support educators and institutions by enabling efficient, unbiased, and data-driven teaching evaluation.

development, backend integration, and AI-based processing to create an intelligent educational support platform.

The frontend interface provides interactive dashboards, login systems, and visual analytics, while the backend handles data processing and AI model integration. Technologies such as audio processing, computer vision, natural language processing, and deep learning are integrated to improve evaluation accuracy and automation.

The main objective of the project is to assist teachers and institutions in continuously improving teaching quality through smart feedback and performance analysis.

I. INTRODUCTION

Teaching quality plays an important role in improving student learning outcomes and classroom effectiveness. Traditional teaching evaluation systems mainly rely on manual observations and student feedback forms, which may be biased, inconsistent, and time-consuming. With the advancement of Artificial Intelligence (AI) and Machine Learning (ML), smarter and more efficient evaluation systems can be developed.

TechVision AI is a web-based teaching evaluation platform that analyzes lecture sessions and generates structured feedback based on teaching parameters such as clarity, confidence, engagement, communication effectiveness, and pacing. The system combines frontend

II. LITERATURE REVIEW

Several researchers have explored the application of Artificial Intelligence and Machine Learning in the education sector to improve teaching effectiveness and learning outcomes. Existing teaching evaluation systems mainly focus on manual observations, survey forms, and student ratings, which often produce subjective and inconsistent results.

Recent studies use computer vision, speech analysis, and natural language processing techniques to evaluate classroom interaction and communication quality. Technologies such as OpenCV, speech recognition systems, and deep learning models are increasingly being used for automated educational analysis.

However, many existing systems lack real-time analytics, interactive dashboards, and integrated multimodal evaluation. TechVision AI aims to overcome these limitations by combining AI-based concepts with responsive web technologies to provide structured feedback, visual analytics, and intelligent performance monitoring.

III. METHODOLOGY

The proposed system follows a multimodal AI-based architecture for evaluating teaching performance. The workflow includes lecture monitoring, data processing, AI analysis, feedback generation, and dashboard visualization.

The frontend of the system was developed using HTML, CSS, JavaScript, and Bootstrap to create responsive and interactive web pages. The backend uses Python frameworks such as Flask or FastAPI for handling data processing and communication between modules.

Computer vision technologies such as OpenCV, MediaPipe, and DeepFace are used for analyzing facial expressions, gestures, and engagement levels. Audio analysis techniques including Librosa, wav2vec2, and MFCC features are considered for evaluating speech clarity, tone, and pacing. Whisper and Google ASR are used for speech-to-text conversion, while NLP models such as BERT and Transformer-based architectures assist in text understanding and feedback generation.

The final output is presented through dashboards containing teaching scores, feedback reports, and performance graphs.

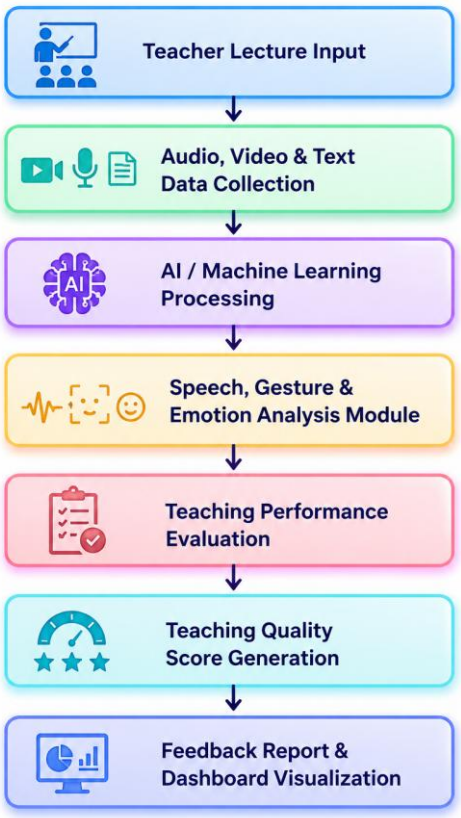

Figure 1: Flow Diagram of TechVision AI System

IV. RESULTS AND DISCUSSION

The developed TechVision AI system successfully demonstrates the integration of frontend technologies, backend processing, and AI-based educational analytics within a unified platform. The system provides interactive dashboards and visual reports for monitoring teaching performance.

The generated results include teaching quality scores, feedback reports, and graphical visualization of parameters such as clarity, engagement, confidence, and pacing. The responsive user interface improves accessibility and usability for educators and administrators.

The implementation highlights the effectiveness of combining Artificial Intelligence, Machine Learning, Natural Language Processing, and modern web technologies to create a smarter and more efficient teaching evaluation system.

V. CONCLUSION

TechVision AI is an intelligent teaching evaluation platform developed to improve educational quality using Artificial Intelligence and Machine Learning concepts. The system integrates frontend technologies, backend processing, and multimodal AI analysis to provide automated feedback and performance monitoring.

The project demonstrates how modern technologies can support educators by reducing manual evaluation efforts and providing structured, data-driven insights. Future improvements may include real-time AI analysis, cloud integration, and advanced predictive analytics for personalized teaching recommendations.

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