AI-Powered Interactive Learning Assistant for Classrooms

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Problem Statement

AI-Powered Interactive Learning Assistant for Classrooms:

Modern classrooms lack real-time, interactive tools to address diverse student needs and keep them engaged. There is a clear need for a system that can understand and respond to students across multiple modalities like text, speech and visuals, while adapting dynamically to each learner's level of engagement.

Software / Hardware requirements

Software Requirements
Hugging Face Transformers
OpenCV
PyTorch
TensorFlow
Python
OpenVINO

Hardware Requirements	
Component	**Specifications**
CPU	Intel i5 or higher
RAM	16 GB or more
GPU	Dedicated GPU
Storage	-
OS	Any (Windows preferred)

Objectives

- Accept and process text, voice, and visual queries from students in real-time.
- Provide contextual responses, including textual explanations, charts, and visual aids.
- Detect disengagement or confusion using facial expression analysis and suggest interventions.

Document Upload and Processing

Utilizes pre-trained transformer models such as T5-small and DistilBART to generate concise, coherent summaries from large chunks of educational text. This module assists in quick content review and comprehension.

AI Summarization

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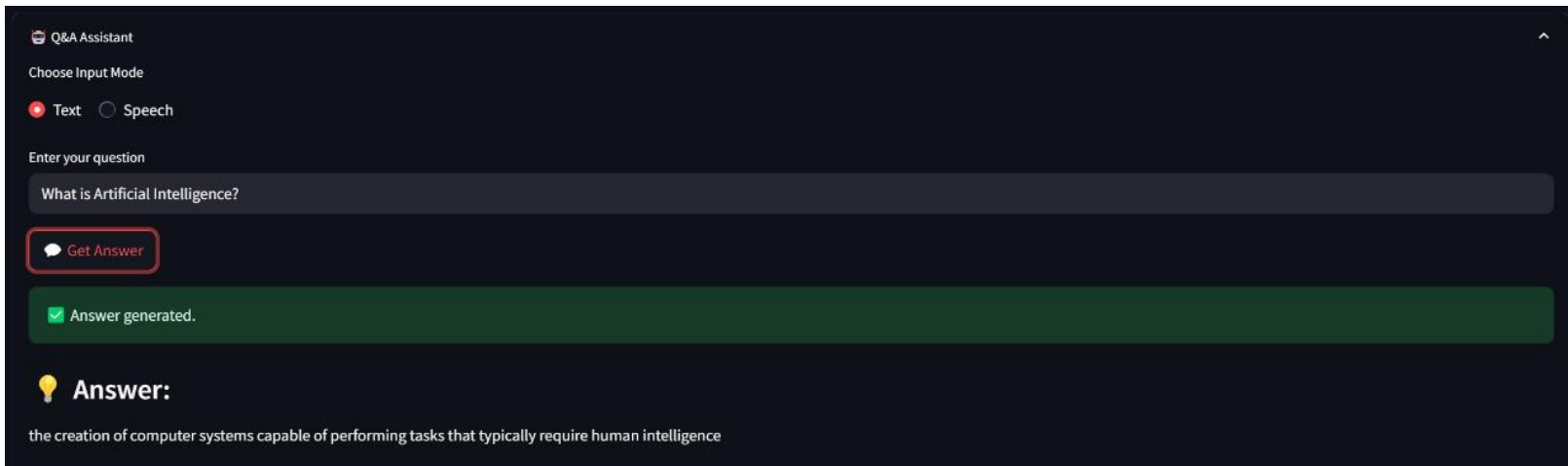🧠 AI Summary ⌃

Generate Summary

✅ Summary generated.

📄 **Summary:**

Artificial Intelligence (AI) refers to the creation of computer systems capable of performing tasks that typically require human intelligence . AI systems are designed to mimic or simulate human thought processes . Machine Learning is a subset of AI that focuses on building systems that can learn from and make decisions based on data . The model works with unlabeled data and tries to find hidden patterns or groupings . Common algorithms include Linear Regression, Decision Trees, and Support Vector Machines . Deep learning has revolutionized fields such as speech recognition, computer vision, and natural language processing . Deep learning allows machines to read, understand, and generate human language . It bridges the gap between human communication and computer understanding . n (NER): Identifying names of people, places, etc.- Part-of-Speech Tagging: Assigning grammatical labels to words .- Sentiment Analysis: Determining the emotion behind text .- Text Generation: Producing coherent and contextually relevant text using models like GPT or BERT .

Q&A Assistant

Employs a contextual Q&A pipeline powered by Hugging Face transformers. It allows users to type or speak their questions using Google Speech Recognition. The system retrieves relevant answers grounded strictly in the uploaded content, ensuring contextual relevance.

🤖 Q&A Assistant

Choose Input Mode

⦿ Text ◯ Speech

Enter your question

What is Artificial Intelligence?

💬 Get Answer

✅ Answer generated.

💡 **Answer:**

the creation of computer systems capable of performing tasks that typically require human intelligence

Test Generator and Evaluator

Automatically generates 5 MCQs and 5 Fill-in-the-Blank questions using NLP-based keyword extraction and masking. The module scores user inputs and provides instant evaluation, enabling self-assessment.

Question Bank Generator

Builds a categorized bank of 1-mark, 2-mark, 3-mark, and 5-mark questions from the input content. This module is optimized for exam preparation and revision planning.

Flashcard Generator

Highlights key concepts and generates flashcards containing definitions and explanations, presented in a collapsible format ideal for active recall and spaced repetition.
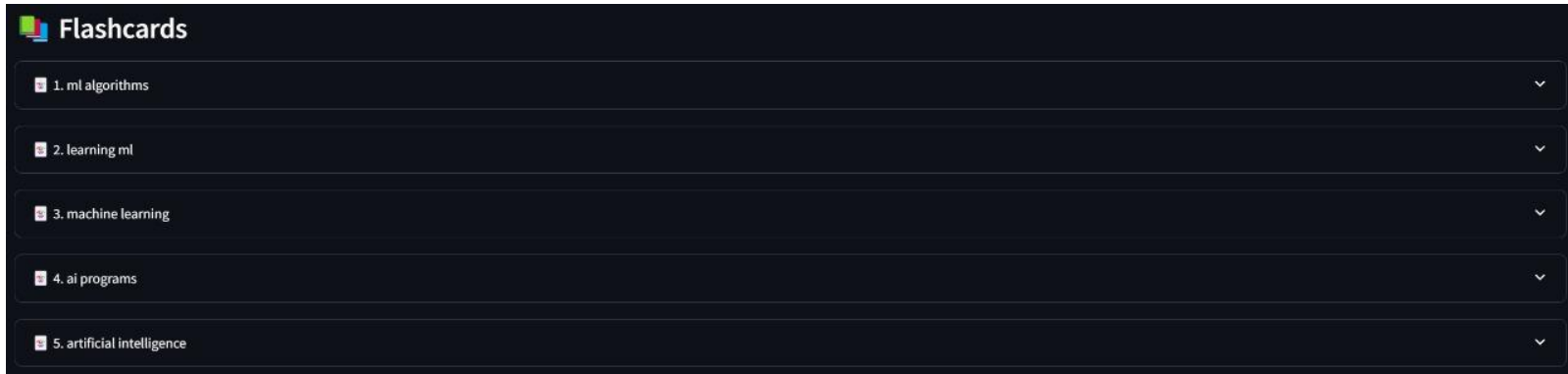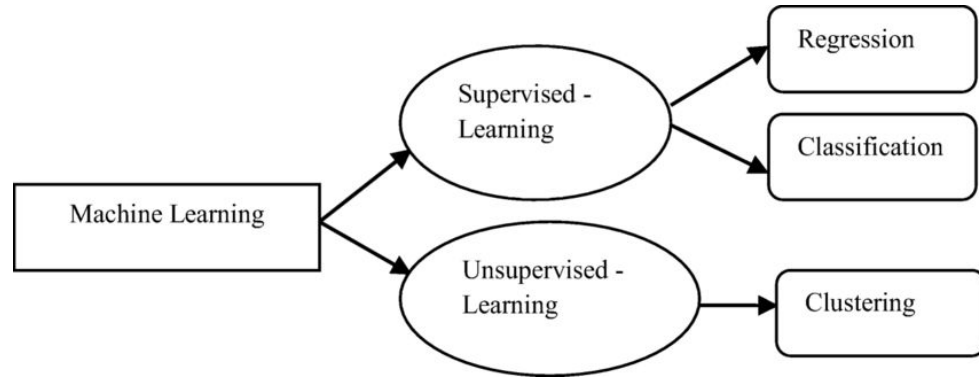
Diagram/Image Analyzer

Uses Tesseract OCR to interpret images containing diagrams or charts. The text extracted from these visuals is contextually matched with document content to generate informative explanations.

It will give a short explanation about the diagram/image with respect to the input documents/files

Future Scope

- **Handwriting recognition** for notes
- **Multilingual support** via MarianMT or IndicTrans
- **User personalization:** adaptive learning paths based on usage
- **Gamification:** badges, points for completing flashcards or tests
- **Integration with LMS** platforms (e.g., Moodle, Google Classroom)
- **Group learning mode:** collaborative flashcard or quiz battles.
- **Mobile App version** for anytime-anywhere learning.

Conclusion

The AI Learning Assistant makes studying easier and more interactive. It turns documents into summaries, flashcards, questions, and explanations using AI. With support for voice and image input, it helps students learn better and faster in a smart, user-friendly way.

Thank You