



INNOVATION. AUTOMATION. ANALYTICS

PROJECT ON
Virtual Quiz Game

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INTRODUCTION

This project is a Virtual Quiz Game using hand gestures and computer vision. It allows users to answer quiz questions without using a keyboard or mouse. A webcam is used to detect hand movements in real time and select answers using finger gestures. The system provides a simple, touch-free, and interactive way to take quizzes.



BUSINESS PROBLEM

Traditional quiz systems depend on physical input devices like keyboards, mice, or touchscreens, which limit user interaction and accessibility. These methods are not always convenient or hygienic, especially in shared learning environments. With the rise of digital education, there is a need for a more interactive and contactless solution. This project addresses the problem by introducing a gesture-controlled virtual quiz game using hand gestures and a webcam to improve user engagement and accessibility.



Dataset Description (CSV File)

The quiz questions are stored in a CSV file to allow easy modification and scalability. Each row in the file represents one multiple-choice question. The dataset contains the question, four options, and the correct answer index. This approach allows the quiz content to be updated without changing the program code.

CSV Structure:

Question | Option1 | Option2 | Option3 | Option4 | Answer

| Question | Option1 | Option2 | Option3 | Option4 | Answer |
|---|----------|----------|----------|------------|--------|
| Which of the following is a string? | String | Integer | Tuple | Set | 2 |
| Which of the following is an assignment operator? | Addition | Multiply | Exponent | Assignment | 4 |
| Which of the following is a function? | Module | Class | Package | Function | 3 |
| Which of the following is a dictionary? | List | Tuple | Set | Dictionary | 1 |
| Which of the following is a power operator? | ** | + | % | ** | 2 |

Objectives of the Project

The objective of this project is to design and develop a gesture-controlled virtual quiz system that allows users to answer questions using hand gestures captured through a webcam. The system aims to provide a touchless, interactive, and user-friendly quiz experience by eliminating the need for physical input devices. It also focuses on improving user engagement, accessibility, and the overall effectiveness of digital assessments using computer vision techniques.

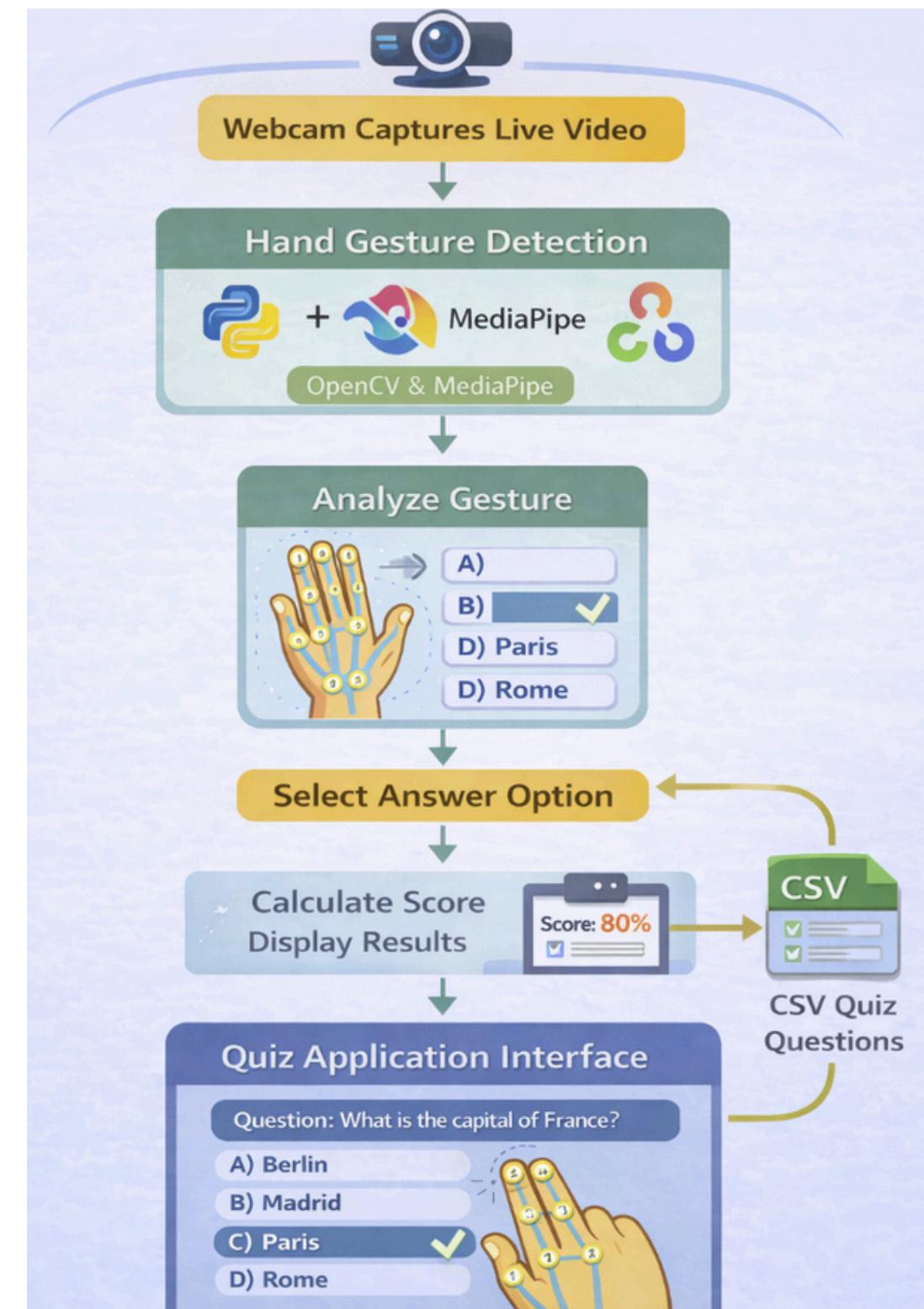
Technologies Used

- Python – Core programming language
- OpenCV – Video capture and image processing
- CVZone – Simplified computer vision utilities
- MediaPipe – Hand landmark detection and tracking
- CSV File – Storage of quiz questions and answers
- Webcam – Input device for gesture recognition



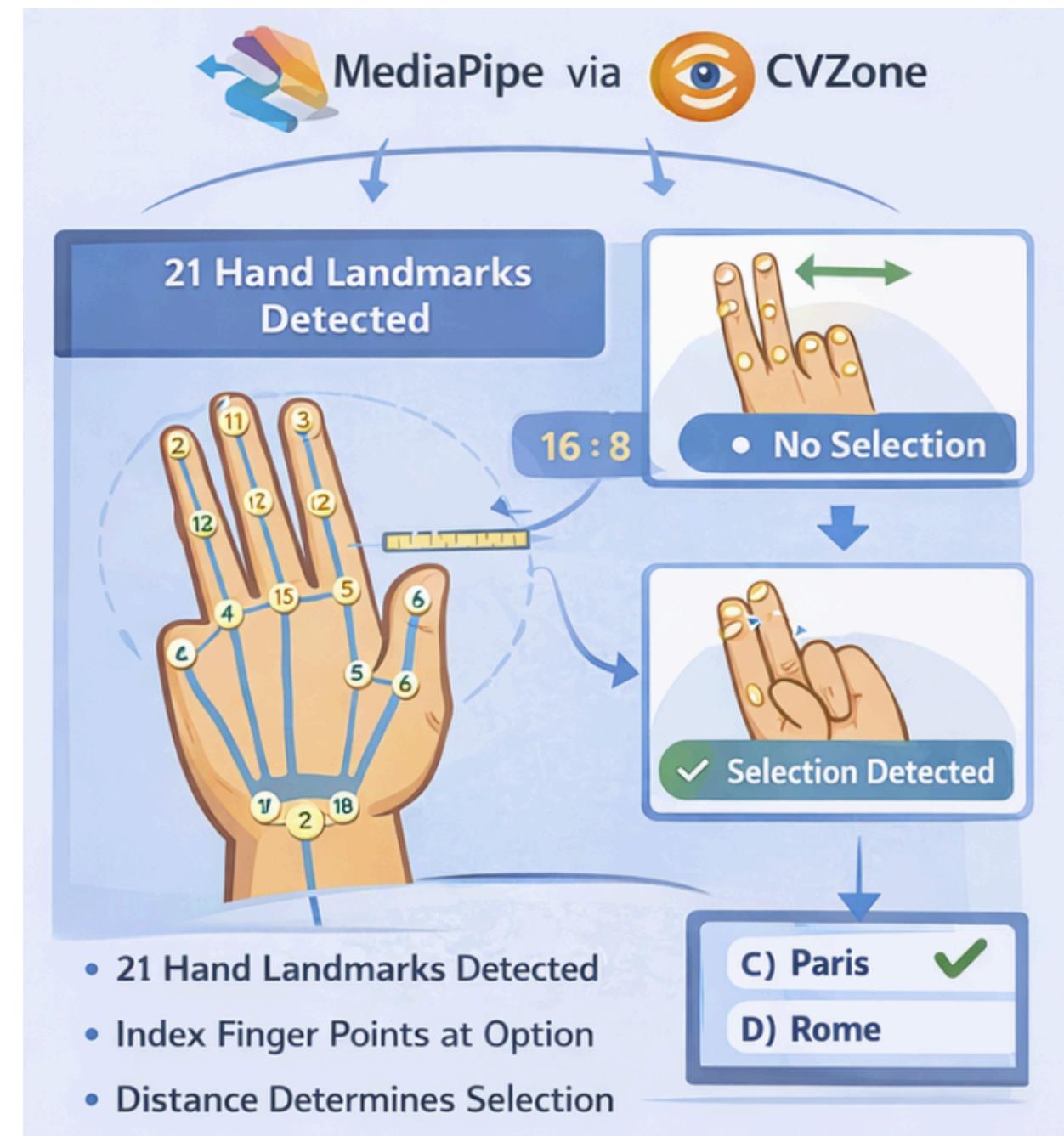
System WorkFlow

- Webcam captures live video input
- Hand is detected using the hand tracking model
- Finger landmarks are extracted
- Gesture is analyzed to detect selection
- Selected option is recorded
- Next question is displayed
- Final score is calculated and shown



Hand Gesture Recognition Methodology

The system uses MediaPipe through the CVZone library to detect and track hand landmarks in real time. A total of 21 landmarks are identified on the hand. The index finger is used to point at quiz options, while the distance between the index and middle fingers is measured to detect a selection gesture. When the fingers are close together, the option is selected.



Implementation Details

- The quiz questions, options, and correct answers are stored in a CSV file and loaded dynamically using Python's CSV module.
- An MCQ class is created to store each question, its options, the correct answer, and the user's selected response.
- OpenCV is used to access the webcam, capture real-time video frames, and display the quiz interface.
- CVZone is used to draw question text, option boxes, progress bars, and score information on the screen.
- The HandDetector module detects hand landmarks and tracks finger positions in each video frame.
- User input is recognized by measuring the distance between fingers to detect selection gestures.
- The system updates the selected answer, moves to the next question, and displays real-time progress and final score.

Output & Results

iVCam

Which of these supports inheritance?

Function

Module

Class

Package

Right

40%

Challenges

- Gesture Accuracy: Small or fast finger movements can lead to incorrect option selection.
- Dependency on Libraries: The system relies on third-party libraries like CVZone, which require proper installation and compatibility.
- Lighting dependency: Hand detection accuracy reduces in poor or uneven lighting conditions.
- Camera quality issues: Low-resolution webcams affect hand landmark detection.
- Background interference: Complex or cluttered backgrounds may confuse the hand tracking model.

CONCLUSION

The Virtual Quiz Using Hand Gesture Recognition project demonstrates an effective application of computer vision in education. The system provides a contactless, interactive, and engaging way to conduct quizzes using hand gestures. This project highlights the potential of gesture-based interfaces in creating innovative learning experiences.

**THANK
YOU**

