Project Design Phase-I
Solution Architecture

Date	23 October 2023
Team ID	Team-593009
Project Name	AI-enabled car parking system using OpenCV
Maximum Marks	4 Marks

Solution Architecture:

The AI-enabled car parking solution leverages computer vision and OpenCV to automate the parking process, making it seamless and efficient. It identifies empty parking spaces and provides real-time information on the availability of parking spots, improving the user experience and optimizing parking operations. By harnessing computer vision and OpenCV, this AI-enabled car parking solution enhances parking management efficiency, streamlines the parking experience, and provides valuable insights for optimizing parking lot operations.

1. Data Gathering:

- Utilizes strategically placed cameras within the parking lot to capture a live video feed.
- The system continuously collects video data, ensuring a real-time view of the parking lot.

2. Image Preprocessing:

- Preprocesses each frame from the video feed to enhance image quality and extract key features.
- Techniques like resizing, noise reduction, and contrast adjustment are employed to improve image clarity.

3. Model Building:

- Develops a robust machine learning model, possibly using convolutional neural networks (CNNs), to analyze the preprocessed images.
- The model is trained on labeled data to recognize parking spaces and accurately identify occupied and unoccupied spots.

4. Empty Parking Space Detection:

- The model systematically processes each frame to identify parking spaces.
- It classifies parking spaces as either 'occupied' or 'empty' based on the presence of vehicles.
- Object detection algorithms are employed to precisely locate vehicles within parking spots.

5. Real-Time Analysis:

- The system provides continuous, real-time analysis of the live video feed, actively monitoring parking space status.
- Updates are made to the count of available parking spots in real-time.

6. User Interface:

- Offers a user-friendly interface, such as a mobile app or a digital display at the parking lot entrance.
- Provides an up-to-the-minute count of available parking spots, ensuring drivers can quickly locate parking spaces.

7. Alerts and Notifications:

- Generates alerts or notifications for parking management personnel and drivers when specific conditions are met, such as the parking lot reaching a certain capacity or detecting unauthorized parking.

Example - Solution Architecture Diagram: