ASSIGNMENT- ML Level −1

Please feel free to use Google/ Stackoverflow/ ChatGpt to help you with the answer, but you should be able to answer questions that will be asked during the interview about the same topic.

Question 1

- The process of estimating the parameters of a camera is called camera calibration.
  This means we have all the information (parameters or coefficients) about the camera required to determine an accurate relationship between a 3D point in the real world and its corresponding 2D projection (pixel) in the image captured by that calibrated camera.

  Write a python script to automatically find the camera calibration parameters of your mobile-phone camera using a 6x8 checkerboard pattern.
  Record a video (or share photographs) to show how the calibration setup works.

  You can find the checkerboard pattern here:

  https://raw.githubusercontent.com/MarkHedleyJones/markhedleyjones.github.io/master/media/calibration-checkerboard-collection/Checkerboard-A4-30mm-8x6.pdf

Question 2

Task 1:

- Download the dataset from the following link:
  https://hacklabsol-my.sharepoint.com/:u:/g/personal/vikram_hacklab_solutions/EfwbVaCVefNJp8FuxeJPNEwBNuxdBLS-XqIdQfxzQ2IKmQ?e=06MaNi
  This dataset consists of various images containing people
- Implement a person detection model using YOLOv5, to detect individuals in the images. You can use any programming language of your choice.

Task 2:

- To enhance the performance of your small object detection model, several techniques can be useful. These include capturing higher-resolution images, using a higher input resolution for your model, dividing images into smaller tiles, generating additional data using augmentation methods, and automatically determining model anchors.
- Apply any of the above techniques and apply it to your model. Compare the results with and without the implementation of the technique to demonstrate how it has improved the performance of the detection model.

Task 3:

- Write a report summarizing the results, including the accuracy and precision of the model before and after the implementation of the chosen technique. You can also include visualizations of the detected individuals in the images to illustrate the impact of the technique on the model's performance.

- Submission:

Submit the report, along with the source code and any relevant visualizations

Question 3

- Write a C code for a singly linked list that stores data of type int (using struct). It should contain functions :

    ○ Adding a new node,
    ○ Deleting a particular node (referenced by the location),
    ○ Delete all the nodes from the list which contain a particular data say a number 5
    ○ Delete the complete linked list
    ○ Display the linked list
    ○ Display the inverted linked list
    ○ Display the total memory space occupied by the linked list
    ○ Delete all the nodes from the list which contain a particular data say a number 5 and the next subsequent node

Put all solutions on github and share the results.

Question 4

As an AI engineer, you're responsible for ensuring the operational integrity and advanced functionality of a newly installed camera system at an industrial facility. Your current task is to test and validate the camera system's capabilities in real-time video streaming, timestamping, and motion detection - crucial for security and monitoring purposes.

You can use Python with libraries such as OpenCV for video processing and additional libraries as needed for motion detection.

Real-Time Video Streaming Setup:

- Set up a mock RTSP (Real Time Streaming Protocol) video link to simulate a live camera feed from the installed system.
- Develop a Python script using OpenCV to connect to and stream video from this RTSP link.

Timestamp Implementation:

- For each frame in the video stream, add a timestamp in the bottom right corner. The timestamp should have black text on a yellow background, resembling a typical surveillance camera output.
- Ensure that the timestamp is accurate and updates in real time.

Motion Detection:

- ∉ Implement a motion detection algorithm within the video stream. The algorithm should identify and flag any significant movement within the camera's field of view.
- ∉ When motion is detected, save the corresponding frame as a JPEG image in a designated folder, named with its timestamp, to simulate incident capture and logging.

Image Saving and Logging:

- ∉ Along with motion-triggered saves, regularly save frames (e.g., one frame per minute) as part of routine surveillance logging.

Share a screen recording as well as the code for the above.

Question 5
Port Scan on LAN:

- ∉ Use Nmap to perform a scan on each host active on your lan/wifi network to check if any ports are open. Subnet mask (255.255.255.0). Share the result

Bash script

- ∉ Create a Bash script that performs a health check of a network. This script should automate checking various aspects of network health and performance.

Host Availability Check

- ∉ The script should accept a list of IP addresses or domain names from a file named hosts.txt. The file will be in the same folder as the script. The script must perform a ping test for each host in the list to check if the host is reachable. Sample hosts.txt file:
  - ∉ www.google.com
  - ∉ 8.8.4.4
  - ∉ 142.251.46.174
  - ∉ 2607:f8b0:4005:80c::200e

Network Latency Test

- ∉ Perform a traceroute to each host and record the number of hops and total time taken.

Logging and Reporting

- ∉ Generate a log file that records the status of each host (reachable or not), open ports, traceroute results, and bandwidth measurements.
- ∉ Provide a summary report at the end of the script execution showing the network's health.

Error Handling

- ∉ Ensure that the script gracefully handles any errors, such as unreachable hosts or failed commands.