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Home Assignment - 1

Computer Vision & Deep Learning Applications

To be Submitted By: Student of Lord Institute of Technology, Hyderabad, India

Institution: Lord Institute of Technology, Hyderabad, India

Author/ Instructor: Dr. Ahmed Rimaz Faizabadi

Date of Submission: 29/9/2025 5:00 PM (Extended)

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Instructions

This assignment consists of two parts (A & B).

Part A: Attempt any one question.
Part B: All questions are compulsory.

You may use open-source AI software, libraries, or GitHub repositories. However, you must:

- Run and execute the code,
- Record outputs, and
- Demonstrate your understanding of the code.

For Part B, you may source test data from the internet. Data for Q1 and Q2 is provided via the given link. For Part B, you may source test data from the internet.

PART A (Attempt any ONE)

Q1. License Plate Character Break Detection

Develop a program that analyzes paired vehicle images (Front FR and Rear RE) and determines whether the license plate characters are broken or damaged.

Q2. Vehicle Attribute Identification and Scene Summary

Develop a program to detect vehicle attributes (type, class, color, make) and provide a scene summary with the following details:

1. Incoming traffic (Yes/No)
2. Outgoing traffic (Yes/No)
3. Total number of vehicles in the image
4. Details of each vehicle:
   (a) Type/Class of vehicle
   (b) Color
   (c) Make / Company name (Hint: Identify logo)
   (d) Logo bounding box location
   (e) Vehicle bounding box location
   (f) License Plate present (Yes/No)
   (g) License Plate bounding box and License Plate color
   (h) Lane (Left/Right)

Output Requirement: Generate annotated images with detected details.

PART B (All Questions Compulsory)

Q3. Face Detection and Feature Localization

Develop a program to detect faces in images. Locate the tip of the nose and the centers of the eyes, then annotate the images accordingly. What type of computer vision problem is this? Provide justification.

Q4. Face Blurring in Video Feeds

1. Capture live video feed from a webcam or CCTV.
2. Detect and blur all faces in the feed.
3. Display the processed video feed.
4. Add functionality to save a video clip when required.

Q5. String Similarity Matching

Write a Python program that accepts two strings (6–10 characters).

- Calculate the percentage similarity between the two strings.
- Generate a match report indicating:
  - Which characters match,
  - Which characters do not match.
- Perform alignment if necessary to improve comparison.

Q6. Automated Testing of License Plate Matching

Write a Pytest script to test 1000 valid and invalid Indian license plate strings against the program developed in Q5. Report and summarize the test results.

Q7. Cat vs. Dog Classification (Pre-trained Model)

Use an ImageNet pre-trained model to classify images of cats and dogs. Collect five sample images where dogs are misclassified. Record and discuss the results.

Submission Guidelines

1. Submit your code, annotated images, and reports in a well-organized folder structure.
2. Clearly label your files (e.g., `Q1_code.py`, `Q3_output.png`, `Q5_report.txt`).
3. Include a README file explaining:
   - Steps to run the code,

- Dependencies required,
- Any assumptions made.

4. Code implementations should be properly commented and attached as separate files or GitHub links.
5. Screenshots or annotated images should be included to support results.
6. Each question must be answered clearly with proper headings and sub-sections.
7. Ensure that the report is plagiarism-free. Proper references should be cited where applicable.
8. Deadline for submission: **20/09/2025, 5:00 PM**.