Pusat Sains Matematik UNIVERSITI MALAYSIA PAHANG AL-SULTAN ABDULLAH	**SUBJECT: BSD3513** **INTRODUCTION TO ARTIFICIAL INTELLIGENCE** **TOPIC:** Chapter 5: Computer Vision **LAB REPORT 5**	**MARKS**: 25(5%)

CLO	Description	PLO Mapping	Percentage	Marks
CLO1	Acquire the artificial intelligence concepts and methodologies in data science.	PLO1: Knowledge and Understanding C3: Application	1%	5
CLO2	Demonstrate critical thinking ideas of artificial intelligence knowledge in problem-solving situation.	PLO2: Cognitive Skills and Functional work skills with focus on Numeracy skills CLO3: Application	1%	5
CLO3	Develop an artificial intelligence system prototype using appropriate software.	PLO3: Functional work skills with focus on Practical, and Digital skills P4: Mechanism	3%	15

Laboratory Report Objectives

By the end of this lab, students should be able to:

1. articulate AI capability types and their relevance to real deployments;
2. develop computer vision model in dealing with vision problems.
3. implement a minimal, reliable web app (Streamlit or similar) that runs computer vision, explains their complexity, and is reproducible from a GitHub repository (with a live deployment link).

CASE STUDY:

Computer Vision (CV) is an Artificial Intelligence (AI) field enabling machines to interpret and understand the visual world from images/videos, mimicking human sight using deep learning and algorithms to identify objects, patterns, and actions for tasks like facial recognition, autonomous driving, medical analysis, and quality control.

Computer vision operates similarly to human vision, although humans possess a significant advantage. Human vision benefits from a lifetime of contextual experience, enabling the differentiation of objects, assessment of distance, detection of motion, and identification of anomalies within an image.

Question 1
General Knowledge

Explain what image recognition is and how a digital image is represented as numerical pixel data, pixel intensities and locations are used by AI based systems to learn patterns and recognise images.

(5 Marks)
(CO1 PO1)

Question 2
Python: Computer Vision

Create a simple CPU-based computer vision web application for image classification using PyTorch and Streamlit by following the steps as follows:
Step 1: Create a new Streamlit application using Python and configure an appropriate page title and layout.
Step 2: Import the required libraries including Streamlit, PyTorch, Torchvision, PIL, and Pandas.
Step 3: Configure the application to run only on CPU settings.
Step 4: Load a pre-trained ResNet18 model from torchvision.models and set the model to evaluation mode.
Step 5: Apply the recommended image preprocessing transformations associated with the ResNet18 pre-trained weights.
Step 6: Design a user interface that allows users to upload an image file (e.g., JPG or PNG).
Step 7: Convert the uploaded image into a tensor and perform model inference using PyTorch without gradient computation.
Step 8: Apply the softmax function to the model output and display the top-5 predicted classes along with their probabilities.
Step 9: Visualize the prediction probabilities using a bar chart in Streamlit.
Step 10: Run the Streamlit application and test the system using multiple images. Discuss the classification results obtained. Discuss the level and the process path clearly.

(5 Marks)
(CO2PO2)
(15 Marks)
(CO3PO3)

Save your work in both .py and PDF formats. Name your files using the following format: StudentID_LabX. Submit both files through the Kalam platform by 5th January 2026, 11:59 PM. In addition, deploy your Streamlit application and include the public URL to your deployed app and GitHub repository link inside your report. Late submissions will only be considered with prior approval.

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Mark for CO1: /5

Rubric for CO2.

Instruction: For CO2, assess each item using the given scales.

Demonstrate critical thinking ideas of artificial intelligence knowledge in problem-solving situation.								
Item Assessed (Cognitive)	**Very Poor 0**	**Poor 1**	**Fair 2**	**Good 3**	**Very Good 4**	**Excellent 5**	**Weightage**	**Score**
Apply and analyse relevant artificial intelligence knowledge.	The work has not done.	Poorly applied and analysed relevant artificial intelligence knowledge and results.	Applied and analysed relevant artificial intelligence knowledge but failed to achieve successful results.	Applied and analysed relevant artificial intelligence knowledge but arrive at satisfactory results.	Applied and analysed relevant artificial intelligence knowledge to arrive at successful results.	Applied and analysed relevant artificial intelligence knowledge to arrive at excellent results.	0.5	
Using logical, rational or problem-solving appropriate to the artificial intelligence problems.	The work has not done.	The work needs to demonstrate logical, rational or problem-solving understanding appropriate to the artificial intelligence problems.	The work has demonstrated some logical, rational or problem-solving understanding appropriate to the artificial intelligence problems.	The work has demonstrated logical, rational or problem-solving understanding appropriate to artificial intelligence problems.	The work has demonstrated a thorough logical, rational or problem-solving understanding appropriate to artificial intelligence problems.	The work has demonstrated a thorough and classy logical, rational or problem-solving understanding appropriate to artificial intelligence problems.	0.5	
						Total Score	**1**	**/5**

Rubric for CO3.

Instruction: For CO3, assess each item using the given scales.

CO3: Develop an artificial intelligence system prototype using appropriate software.							
Item Assessed (Cognitive)	**Very Poor 0**	**Poor 1**	**Fair 2**	**Good 3**	**Very Good 4**	**Excellent 5**	**Score**
Utilizing the appropriate tools / software effectively	No relevant tool used.	Tools used but did not enhance solution or information clarity.	Tools used but with limited enhancement; minimal functionality demonstrated.	Tools used appropriately to produce a functional solution with clear output.	Tools used effectively to enhance clarity, performance, and solution quality.	Tools used optimally with advanced features, clear design, and effective interaction to display the solution.	
Code functionality, clarity & structure	No code constructed.	Code incomplete or mostly non-functional; unclear and poorly structured.	Partially functional code; errors present; structure somewhat difficult to follow.	Mostly functional code with minor errors; clear structure and readable.	Fully functional and well-structured code; clearly commented and readable.	Fully functional, optimized, modular, and well-documented code; demonstrates best practices.	
Deployment & Version Control (GitHub + Streamlit or etc)	No deployment and no GitHub repository.	GitHub repo exists but incomplete OR app deploy attempt failed.	GitHub repo available with basic files; deployment page exists but app not functioning correctly.	Working deployment provided; GitHub repo contains main code files.	Working deployment with complete repository (README, code, requirements); clearly accessible.	Fully deployed app with professional GitHub repo (README, screenshots, instructions, modules, tags); live Streamlit app runs smoothly and reliably.	
						Total Score	**/15**