

**Department Computer Science and Engineering (CSE)**

**LAB PROJECT PROPOSAL REPORT**

**Student Identity**

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| **Semester** | **6th, Autumn-2022** | |
| **Section** | 6BF | |

**Course Information**

**Course Code: CSE-3636**

**Course Title: Artificial Intelligence Lab**

**Submitted To,**

Mrs. Subrina Akter

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# Project Name: Camera Classifier in Python

Background:

A camera classifier is designed to identify and categorize objects and scenes captured by a camera. The goal is to automatically classify images into predefined categories, such as landscapes, portraits, animals, vehicles, etc. The development of camera classifiers is driven by the increasing demand for visual recognition technology in various applications, including surveillance, image retrieval, autonomous driving, and more.

Building a camera classifier involves a deep understanding of the underlying algorithms and techniques used in computer vision and machine learning. By working on a camera classifier project, we can gain a deeper understanding of these areas and improve our skills.

Objectives:

The main objective of our project is to train the model to identify different objects and predict them when any similar object is shown in the future.

# Complex Engineering Problem:

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| Complex Problem Solving (CP) Please Tick (√) Relevant WPs | | | | | | | | | | |
| WP1 | | | | | WP2 | WP3 | WP4 | WP5 | WP6 | WP7 |
| Depth of Knowledge | | | | | Range of Conflicting Requirement | Depth of Analysis Required | Familiarity of Issues | Extensive Applicable Codes | Extend of Stakeholders Involvement & Conflicting Requirement | Interdependence |
| WK3 | WK4 | WK5 | WK6 | WK8 |
| Engineering Fundamental | Engineering Specialist | Engineering Design | Engineering Practice | Literature Review |
| √ | √ | √ | √ | √ | √ | √ |  |  |  |  |

**WP1- Depth of Knowledge**

* **WK3- Engineering Fundamental**

Object oriented programming with objects, methods, class, constructors, lists, arrays as well as conditions, loops, mathematical formulas.

* **WK4- Engineering Specialist**

Learning image processing in depth by researching and exploring the following python libraries; PIL, OpenCV and NumPy and algorithm; SVM.

* **WK5- Engineering Design**

Engaging and interactive GUI, training and testing program model to be able to predict and detect any object automatically. Input is an image and output generate a text describing the type of image shown.

* **WK6- Engineering Practice**

Implementing using SVM (Support Vector Classifier), PIL (Python Imaging Library), OpenCV and Numpy as well as carrying out image directory, file handling, colour conversion, object detection.

* **WK8- Literature Search**

In comparison with other Image Classifiers, with limited detection to objects, this program is trained to detect any objects first and is then tested to ensure it correctly detects the object correctly. The GUI can be redesigned to make it more engaging and interactive.

**WP2- Range of Conflicting Requirement**

There are possibilities to add “feature detection” and “image matching”, but this makes the program implementation more complex and some of the modules such as SIFT and SURF of OpenCV library require payment to use. It may also require more time for training and testing the model of the program.

**WP3- Depth of Analysis Requested**

This program gives accurate results with enough model training by using these libraries and algorithm;  
**SVM**

Its objective is to fit to the data you provide, returning a "best fit" hyperplane that divides, or categorises, your data.  
It works relatively well when there is a clear margin of separation between classes.

It is more effective in high dimensional spaces and is relatively memory efficient.

It is also effective in cases where the dimensions are greater than the number of samples.

**PIL**

It aids in editing, creating and saving different image file formats.

**OPENCV**

It provides a wide range of features, including object detection, face recognition, and tracking.

Memory consumption is often low in comparison to other frameworks when we are doing inference using OpenCV.

The inference speed is also fast. Even the models trained with darknet framework run faster with OpenCV as the cv2. dnn module is optimized for inference using Intel CPUs.

**NUMPY**

It provides a high-performance multidimensional array object, and tools for working with these arrays.

It facilitates advanced mathematical and other types of operations on large numbers of data. Typically, such operations are executed more efficiently and with less code than is possible using Python's built-in sequences.

It has a syntax which is simultaneously compact, powerful and expressive.

**WP4- Familiarity of Issues**

*Does not apply to this project.*

**WP5- Extensive Applicable Codes**

*Does not apply to this project.*

**WP6- Extend of Stakeholders Involvement and Conflicting Requirement**

*Does not apply to this project.*

**WP7- Interdependence**

*Does not apply to this project.*