Assignment 3: Development of Convolutional Neural Network for Image Classification

The purpose of this exercise is to develop a CNN for a simple image classification task. As ordinary PC, notebook or Colab is the hardware platform for this exercise, the task must be relatively simple to avoid the need for abundant computational resources.

Expectations:

Image size	Suggest around 50x50 pixels (RGB or grayscale)
Number of classes	No more than fifteen
Images per class	At least twenty/thirty, to at most several hundred
Percentage of images for training	Around 70 to 80%
Training time	no more than an hour
Software platform	use of tensorflow or Keras is highly recommended
Hardware platform	notebook/PC/Colab

The creation of a database to .npz is recommended.

As there could be many variations on the structure of CNN, you should aim to focus on just some aspects, and to avoid exploring not too many features. Your report writeup should clearly indicate the nature of your task, and your efforts in achieving a reasonable accuracy. Summary your results and document the efforts and ideas in the course of the assignment. The report should be no more than ten pages.

Report format: Individual report, submit two files: report (pdf) & all codes and dataset (zip)

- cover page

- description of the task

- database and setup of the problem

- structure of the CNN

- parameters for variation

- results

- discussion of the results

- references

- Table of Summary

Table of Summary:

Classification task	
Objective of investigation	
Image size, Color or grayscale	
Reference/source of the images	
Number of classes	
Available Images per class	
Number of training images	
Number of testing images	
Structure of CNN	
Parameters of variation	
Training time	
Testing accuracy	
Software platform	
Hardware platform	
Discussion of results	
Observations and Comments	

Sample images:

Possible Databases for your assignment:

1. five_pattern_demo

2. scene_demo

3. HandSign

4. Fashion MNIST database

5. Kaggle :   https://www.kaggle.com/

Ideas for investigation:

- faster training time

- higher accuracy

- different structure of CNN (number of layers, filter size, stride, FC layers, number of hidden neurons)

- with or without dropout

- improve the five_pattern_demo accuracy

- HandSign demo

- data augmentation

- batch normalization

- number of training images verses testing accuracy

- input image dimension verses performance/accuracy

Marking criterion (12%):

- Problem setup (2)

- Approach to the solution of the problem (2)

- Solutions and Technical results (3)

- Presentation of the results and Discussion (3)

- English writing (2)