Attendance: 10%, Continuous evaluation: 70%, Viva-20%

Assignment No. 6

i. Download and extract the flower image dataset from https://www.kaggle.com/alxmamaev/flowers-recognition.

ii. The dataset contains five classes of flower images of variable size namely chamomile, tulip, rose, sunflower, dandelion. Resize all images to 80*80 pixels and convert all color images to grey images.

iii. Randomly shuffle all images to create training, test set with ratio of 90: 10, respectively. (Reduce the training size by 1/ 5 if computation resources are limited).

iv. Train a Convolutional neural network with max pooling and a fully connected layer at the top, to classify the flower images. Now run the network by changing the following hyper-parameters :

a) Analyze the performance of convolution window kernel size

Convolution Layer	Convolution kernel_size	Convolution filters size	Pooling Layers	Activation	FC layer(After Flatten)	Regularization
3	(3*3, 3*3, 3*3)	[16,32, 64]	Max_pooling	Relu	1	Dropout of 0.1 after each layer
3	(3*3,3*3,5*5)	[16,32, 64]	Max_pooling	Relu	1	Dropout of 0.1 after each layer
3	(3*3, 5*5, 5*5)	[16,32, 64,]	Max_pooling	Relu	1	Dropout of 0.1 after each layer
3	(5*5, 5*5, 5*5)	[16,32, 64]	Max_pooling	Relu	1	Dropout of 0.1 after each layer

b) For the best set of parameters obtained above, use two and three FC layers (After Flatten).

c) For the best set of parameters obtained above, use average pooling instead of Max pooling.

d) For the best set of parameters obtained above, use the activation function: Sigmoid, ELU, Leaky Relu (alpha = 0.01)

e) For the best set of parameters from the above runs vary the regularization parameter:

Regularization
Dropout of 0.25 after each layer
Batch normalization after each layer (except the first)
Dropout of 0.1 after each layer along with Batch normalization after each layer (except the first)

f) For the best set of parameters from the above runs, add [1,2,3] more convolution layers, and compare the size of trainable parameters and also compare the time required to train each model for 10 epoch.

g) For the best set of parameters obtained here repeat the experimentation for color images. And visualize the test result.

v. Plot the graph for the loss vs epoch and accuracy(train, test set) vs epoch for all the above cases. Also, plot the accuracy for all experimentation in a bar graph along with the confusion matrix and F1 score.

vi. For the best model on the MINST dataset in Assignment 5, train a model with MNIST data using the best set of parameters obtained in Question 4. Compare the test accuracy and also the self-created images.

Submit a report with results.