Assignment 3
Convolutional neural networks

1 Objective

- Building a CNN model for a classification task.
- Using some CNNs case studies.

2 Problem Statement

For your next vacation, you decided to spend a week with five of your friends from school. It is a very convenient house with many things to do nearby. But the most important benefit is that everybody has commited to be happy when they are in the house. So anyone wanting to enter the house must prove their current state of happiness.
As a deep learning expert, to make sure the "Happy" rule is strictly applied, you are going to build an algorithm that uses pictures from the front door camera to check if the person is happy or not. The door should open only if the person is happy.
You have gathered pictures of your friends and yourself, taken by the front-door camera. The dataset is labbeled.

3 Requirements

1. Build a CNN model that performs the required operation (checks if a person is happy or not).
2. Compile your model, you'll want to experiment with both the choice of optimizer and learning rate and evaluate how these affect the accuracy of the trained model.
3. Evaluate accuracy on the test dataset, what is your observation on the accuracy on the the test dataset and the accuracy on the training dataset?
4. Use Risenet model and VGG models architecture with out using any pretrained weights.
5. Compile both model with an optimizer, learning rate and regularizer of choice.
6. Get the pretrained weights of both Risenet and VGG models and fine tune the parameters to reach the best possible result.
7. Freeze the weights of some layers and check how this will affect the performance of both models.

8. You are required to show the running time, number of parameters and number of multiplication of your model in estimation and in training over the same number of epochs.

9. What is the highest accuracy you're able to achieve using each model?

4 Bonus

Your models will be tested against a private dataset. The highest three performing models will take the bonus grade.

5 Notes

- Parts of this assignment are based on Andrew Ng Stanford deep learning course.
- The dataset files and the starter code for the problems can be found in the resources section in Piazza.
- You should deliver a report explaining all your work.
- Cheating will be severely penalized (for both parties). So, it is better to deliver nothing than deliver a copy. Any online resources used must be clearly idenified.