AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

Program of Computer Engineering and Software Systems

Fall Semester, 2020/2021	Course Code: *CSE 440*

CSE 440: Selected Topics in Software (Neural Networks)

Maximum Marks: 10 Marks **1 / 2**

Project

Implement CNN to classify the given images as 0,1,2,3,4,5,6,7,8,9

Data Description:
- Data type: .jpg
- Data size: 28x28
- Labels: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
- Data link: Link
-

Required:
- Build the neural network with TensorFlow and Keras
- Creating the .h5 model
- Create the following files
    - Train.py (to train the model)
    - Inference.py (to predict given images)
    - Word file
- Create the following functions
    - In Train.py
        - Load_data(directory):
            - Taking path to the train directory load every image inside it
            - Return two arrays
                - First array contains all images
                - Second array contain the label for each image
        - Train(images_array,label_array):
            - Taking the array containing the images and the array containing the labels
            - Write the model inside this function and start the train
            - After the training predict on some of the training data, and show the true label, the predicted label and the image itself

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- Save the .h5 of the model in the same directory as the Train.py
  - In Inference.py
    - Predict(image_path):
      - Load the image in the image path
      - Load the .h5 model
      - Inference on the image
      - Print and return the predicted label for this image
- Each function must be commented
- Each layer must be commented (number of channels, input shape, output shape)

Document:
- In the word file
- The model summary
- What is your hyperparameters
- Your environment (TensorFlow version, NumPy version, cuda version, etc…)
- If you are going to use google colab
  - Link to your notebook
  - The cells to train and test
- Screenshots to the model training and the predicted samples after training

Bonus:
- Make The model taking any input size for example: 20 x 20, 100x100, 50x50, without resizing the image (hint: modify the model input layer), and Using tensorboard (hint: making tensorboard event) (0.5 mark)
- Making a docker for your environment and the files (SUPER BONUS) (0.5 mark)

Deliverables: Submit Before **14 January 2021, 11:59 PM at LMS**.