Due date: 23th Khordad 1404 [23:59]

Task 1: Denoising Images using Convolutional Autoencoders

Background:
In real-world scenarios, image data is often corrupted by various types of noise — such as sensor errors, environmental interference, or data compression artifacts. Denoising autoencoders are a class of neural networks designed to remove such noise by learning how to map noisy images to clean ones.

In this assignment, you will implement a **Convolutional Autoencoder (CAE)** using deep learning to clean noisy images. The model will be trained in an **unsupervised** manner using only images — no labels required.

Dataset:
You are provided with a dataset consisting of **500 natural images** captured from a variety of everyday scenes, including landscapes, people, and objects. The dataset is divided into two parts:
- **Training set:** 490 images
- **Test set:** 10 images

You can download it here.

Objective:
Design and train a convolutional autoencoder that learns to **denoise images** from a custom dataset. You'll apply synthetic noise to clean images, train the model to remove that noise, and evaluate its performance visually and quantitatively.

Your task:
Prepare the dataset by preprocessing all images and applying two types of synthetic noise: **Gaussian noise** and **salt-and-pepper noise**. Then, design and train a **convolutional autoencoder** that can learn to reconstruct the original clean images from their noisy versions. Finally, evaluate your model by presenting both **visual** and **quantitative** results that demonstrate the effectiveness of the denoising process.

Evaluation:
- Visualize the denoising results by comparing:
  - Noisy input
  - Denoised output
  - Original clean image
- Report reconstruction loss on the test set.
- Compute **PSNR** or **SSIM** scores.

Task2:

Background:
In this assignment, you will implement a **Convolutional Neural Network (CNN)** model for **text classification**. You will use a provided dataset of news articles to train and evaluate your model. This will help you understand how to:

- Preprocess and tokenize text data.

- Build a vocabulary and encode text.

- Design a CNN model for text classification.

- Train, validate, and test the model.

Dataset:
You are provided with two CSV files: **train.csv** which contains news articles for training and also **test.csv** which contains news articles for testing. Each row represents a news article.
You can download it here.

Objective:
Your task is to classify each article into one of the given classes based on the **Title** and **Description**.

Your task:
After training, evaluate your model on the **test set**.
Report the following metrics on the test set:
Accuracy, **Precision, Recall, F1-score** and **Confusion matrix**.

Notes:
▪ Allowed programming languages: **Python**, **MATLAB**
▪ Any sign of cheating would result in a **zero** grade for this assignment.
▪ You should upload your submissions at: Link
All of the files should be in a ZIP file named in this format:
"FirstNameFamilyName-SudentNumber.zip"
Ex: "AmirZamani-4033040.zip"
▪ Your reports should be in a PDF file including: key points of your implementation, explanation of your chosen approach, reports of your final results and answers of assignment questions (if given)