Homework 9

Anomaly Detection using Autoencoders

Description

In this assignment, you will use Convolutional Autoencoders to detect anomalies in images. For the purposes of this assignment, you will use the Flowers Recognition dataset [1]. The dataset contains 4,242 images of five categories of flowers: daisy, dandelion, rose, sunflower, and tulip.

Tasks

Part A:

1. Create a Convolutional Autoencoder as described in this article [2].

Part B:

2. Train your Autoencoder on the **sunflower** images (feel free to use a split of your choice). Output the same examples of the original vs. reconstructed images.
3. Evaluate your Autoencoder to each one of the other flower types to detect anomalies and find the MSE between the normal and anomalous images.
4. Output the distribution of density scores among training, validation, and anomalies for each flower type [2].
5. How does the autoencoder work for anomaly detection?
6. What other methods can be used instead of autoencoders for anomaly detection?

Submission Guidelines

1. Upload on teams a pdf of your notebook along with the respective .ipynb files (name: HW09-ICA-Report-Firstname-Lastname.pdf)

References

1. "Flowers Recognition dataset," https://www.kaggle.com/datasets/alxmamaev/flowers-recognition?select=flowers
2. "Image Anomaly Detection / Novelty Detection Using Convolutional Auto Encoders In Keras & Tensorflow 2.0," https://medium.com/@judewells/image-anomaly-detection-novelty-detection-using-convolutional-auto-encoders-in-keras-1c31321c10f2