進階機器學習

Homework #5
Due 2024 May 1 11:00 pm

(一) Use a standard MNIST training dataset, implement the following requirements for abnormal detection:

1. First train an ***image classifier*** that can recognize MNIST handwritten digits 1, 3, 5, and 7. Then use this classifier as an abnormal detection mechanism to detect those input handwritten numbers other than 1, 3, 5, and 7.
2. Train a ***normal autoencoder*** module for MNIST digit 1, 3, 5, 7, and again use this autoencoder as an abnormal detection mechanism to detect those input handwritten numbers other than 1, 3, 5, and 7.
3. Train a ***denosing autoencoder*** module for MNIST digit 1, 3, 5, 7, and again use this autoencoder as an abnormal detection mechanism to detect those input handwritten numbers other than 1, 3, 5, and 7.
4. Train a ***variational autoencoder*** module for MNIST digit 1, 3, 5, 7, and again use this autoencoder as an abnormal detection mechanism to detect those input handwritten numbers other than 1, 3, 5, and 7.
5. Use the ***Isolated Forest method*** directly to implement a detector that can identify MNIST digits other than 1, 3, 5, and 7.
6. Repeat method 5 but this time use a pre-trained model to extract the feature of the MNIST handwritten digit first.
7. Compare and discuss the anomaly detection capabilities of the above five methods. You have to find a suitable threshold for each method.

(二) Use Chroma database to implement a small simple QA system.

(三) Write a python program which can accept an image and a description and report if their contents match or not.