Machine Learning HW3

MLTAs
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Links

- Sample Code
- Kaggle
- Programming Report
- Math problems

Outline

- Task Description - AutoEncoder
- Programming Report
- Requirements & Regulation
- Grading Policy

AutoEncoder - outline 1/7

- Task: Image Classification
  - Given (64, 64, 3) jpg image → which of the 10 classes



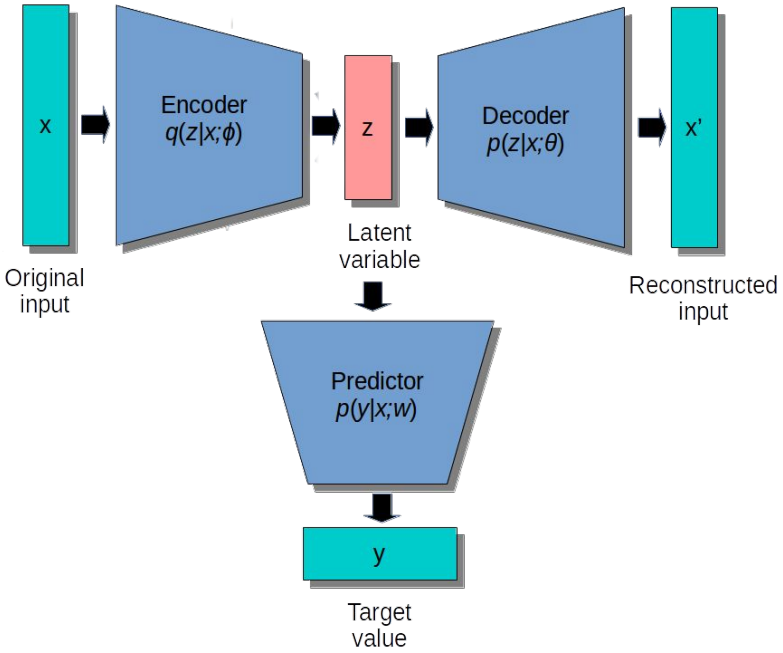
AutoEncoder - data 2/7

- Unlabelled: 100000 images
- Labelled: 3750 images
- Test: 6000 images
  - Public: 3000 images
  - Private: 3000 images

AutoEncoder - methodology 3/7

- Semi-supervised Learning
  - Pre-train with unlabelled data (100000 images)
    - AutoEncoder
    - Image reconstruction loss
  - Fine-tune with labelled data (3750 images)
    - Encoder of the pre-trained AutoEncoder
    - Classification loss
    - (optional) Image reconstruction loss

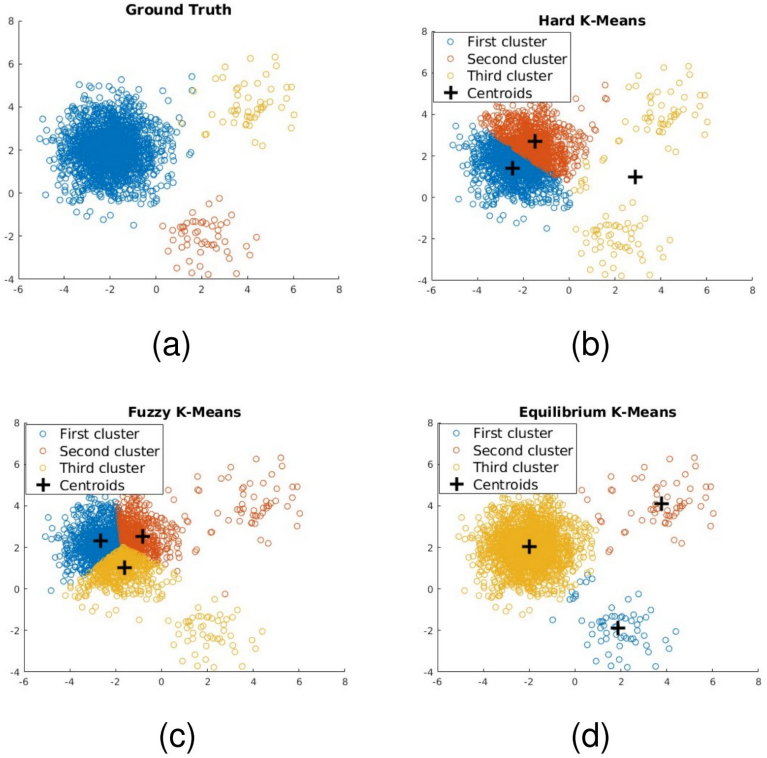
AutoEncoder - model 4/7



Ref: https://julien-vitay.net/lecturenotes-neurocomputing/_images/semisupervised-autoencoder.png

Programming Report - Clustering

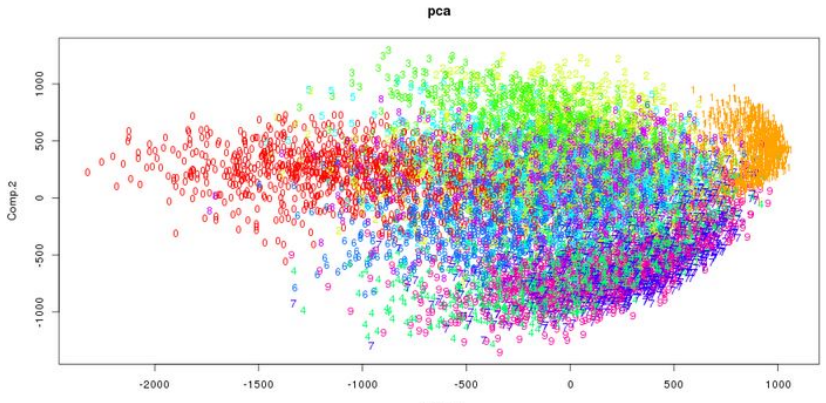
- Equilibrium k-means
  - Imbalanced data
  - Repulsion mechanism

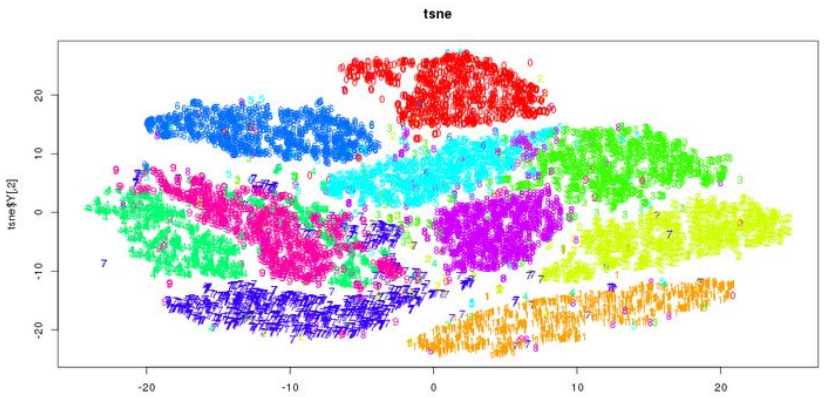


Ref: https://arxiv.org/pdf/2402.14490

Programming Report - t-SNE

- t-SNE
  - Reduce to 2-dimensional data for visualization

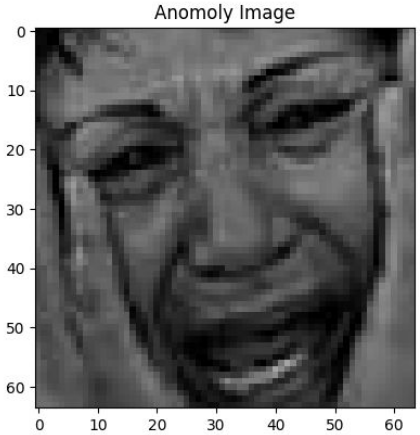


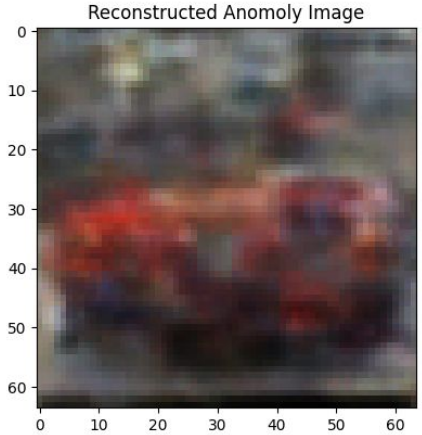


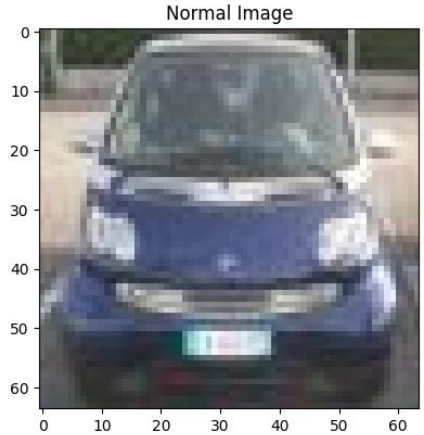
Ref: https://www.biostars.org/p/392321/

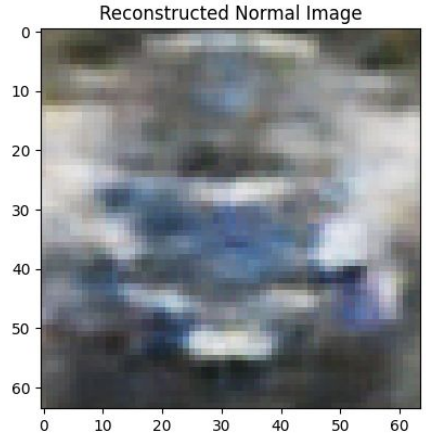
Programming Report - Anomaly Detection

- Distinguish unfamiliar/anomaly data
  - Poor reconstruction with the pre-trained AutoEncoder









Kaggle - Info 1/2

- Kaggle 連結 : https://www.kaggle.com/competitions/ml2024-fall-hw3/overview
- 個人進行，不需組隊
- 隊名:
  - 修課學生:**學號(底線)任意名稱 (e.g., b09901105_謝博揚喜洋洋)**
  - 旁聽:旁聽_任意名稱(旁聽請於期限過後再上傳)
- 每天上傳上限 5 次
- 在Kaggle Deadline前可以選擇2份submission作為private score的評分依據。
  如果未勾選，系統會自動選擇Public Leaderboard中表現最佳的兩次。
- Bonus(Optional)- 1%
  - 修課生 private leaderboard 排名前五名可繳交。
  - 繳交投影片描述實作方法，另外需錄製一份講解影片(少於三分鐘)作一個簡單的 presentation，助教將公布給同學們參考。

Kaggle - format 2/2

請預測test set 6000筆資料並將結果上傳Kaggle

- 上傳格式為csv。
- 第一行必須為id,label，第二行開始為預測結果。
- 每行分別為id以及預測的label，請以逗號分隔。
- Evaluation: Accuracy

```
id,label
0,6
1,4
2,0
3,0
4,6
5,1
6,4
7,4
8,3
9,0
10,0
```

Regulation

- 開放使用套件
  - numpy
  - pandas
  - pytorch
  - torchvision
  - cv2
  - pillow
  - sklearn
- 若需使用其他套件，請儘早寄信至助教信箱詢問，並請闡明原因。
- No extra data allowed
- No pre-trained model allowed

Grading Policy - Deadline

- Kaggle Deadline: 2024/11/08 23:59:59 (GMT+8)
- Cool Deadline: 2024/11/08 23:59:59 (GMT+8)

Grading Criteria

- Kaggle - 4%
  - 超過public leaderboard的simple baseline分數： **0.5%**
  - 超過private leaderboard的simple baseline分數： **0.5%**
  - 超過public leaderboard的strong baseline分數： **0.5%**
  - 超過private leaderboard的strong baseline分數 : **0.5%**
  - code template
- Programming report - 4%
  - report template
- Math problem - 6%
  - math problem
  - 若有和其他修課同學討論，請務必於題號前標明 collaborator（含姓名、學號）

Cool Submissions

在Cool上分別繳交以下檔案:

1. **report.pdf**
2. **math.pdf**
3. **code.ipynb**

Grading Policy - Others

- Lateness
  - Cool 遲交每小時分數*0.95，兩天後歸0
  - 有特殊原因請找助教
- Runtime Error
  - 當程式錯誤，造成助教無法順利執行，請在公告時間內寄信向助教說明，修好之後重新執行所得kaggle部分分數將x0.5。

學術倫理

- Cheating
  - 抄code、抄report（含之前修課同學）
  - 開設kaggle多重分身帳號註冊competition
  - 於訓練過程以任何不限定形式接觸到testing data的正確答案
  - 不得上傳之前的kaggle競賽
  - 教授與助教群保留請同學到辦公室解釋coding作業的權利，請同學務必自愛