Introduction to Artificial Intelligence

Project 3 – Classification & Clustering

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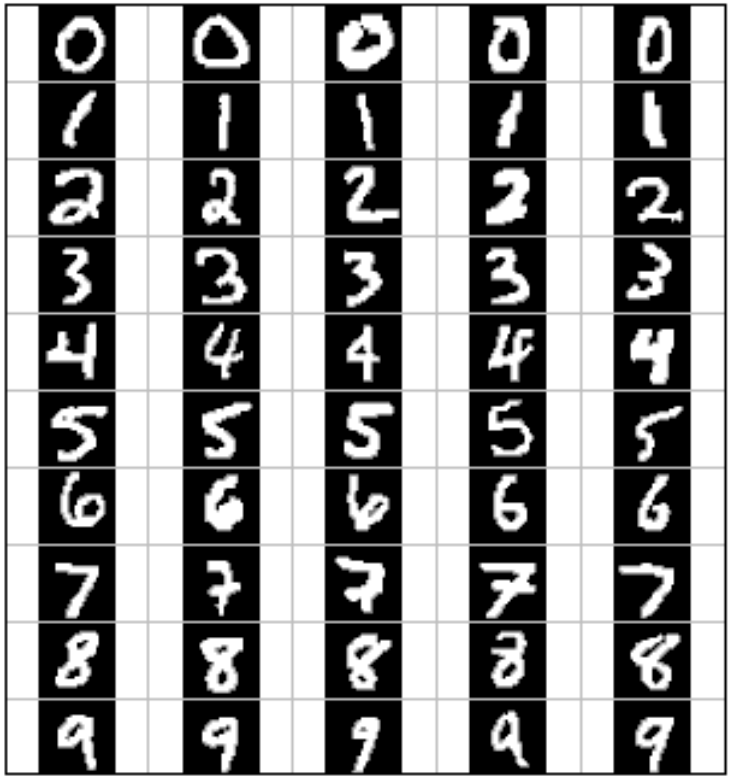
Supervised and Unsupervised Learning

- Training with MNIST



Pre-requirements

- At least 400MB disk space and 800MB memory
- Python package that you should be familiar with
  - numpy
  - sklearn
- Python packages that should be installed:
  - numpy
  - skimage
  - sklearn
- Anaconda is recommended

Basic Tasks (1)

- K-Means (4 points)
  - Implement KMeansCluster.fit in featureExtractor.py
  - python featureExtractor -f kmeans -s 10
- KNN (3 points)
  - Implement KNNClassifier.classify method in classifiers.py
  - python dataClassifier.py -c knn -n 5
- Softmax Regression (4 points)
  - Implement PerceptronClassifier.train in classifiers.py
  - python dataClassifier.py -c perceptron
- sklearn MUST NOT BE USED in the above tasks, OR you will not pass the autograder

Basic Tasks (2) & Bonus

- Training SVM with sklearn (2 points)
  - Implement SVMClassifier.train, SVMClassifier.classify using package sklearn, in classifiers.py
  - You should be familiar with some sklearn API
- Obtaining better classification results (2 points + 1 point bonus)
  - Implement BetterClassifier.train, BetterClassifier.classify in classifiers.py
  - You may make use of sklearn package
  - Try to obtain good accuracy as much as you can
  - 1 point extra credit for the leading classification accuracy

Submission

- A 1-3 pages report (either Chinese or English)
  - You MUST answer Question 1 in YOUR REPORT
  - You will not get full report credits if cannot answer the above questions correctly
  - Some analysis on different algorithms/feature extractor techniques is useful for better grading
- Zip the files as the following structure
  - student_id.zip (e.g. 20090112xx.zip)
  - student_id.pdf
  - classifiers.py
  - featureExtractor.py

Grading

- Due
  - 2023/5/24 23:59:59
- Correctness & performance of agents (80%)
- Report (20%)
  - You MUST answer Question 1 in YOUR REPORT

谢谢！