Introduction to Artificial Intelligence
Project 3 – Deep Learning

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Deep Learning on Multiple Tasks

Pre-requirements

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

PyTorch

Pre-requirements

- Learn PyTorch framework
  - Run PyTorch.ipynb and learn how it works
  - https://pytorch.org/docs/stable/index.html
- About IPython Notebook
  - An interactive computational environment
  - code execution, rich text, plots rich media and etc.
- Startup (after the Anaconda is installed)
  - Run ipython notebook --port 8888 in terminal
  - Open a browser and visit website http://localhost:8888
  - Input token/password given in your terminal

Basic Tasks (1)

- Digit Classification (4 points)
  - Train MNIST with ConvNet
  - Design a 5-layer convolutional network and implement DigitClassificationModel in models.py

- Non-Linear Regression (4 points)
  - Approximate $\sin(x), x \in [-2\pi, 2\pi]$
  - Implement RegressionModel in models.py

- Automatic Gradient Computation (3 points)
  - Generate adversarial examples of given images
  - Implement DigitAttackModel in models.py

Basic Tasks (2) & Bonus

- Language Identification (4 points + 1 bonus)
  - Identify language for one word with RNN
  - Implement LanguageIDModel in models.py
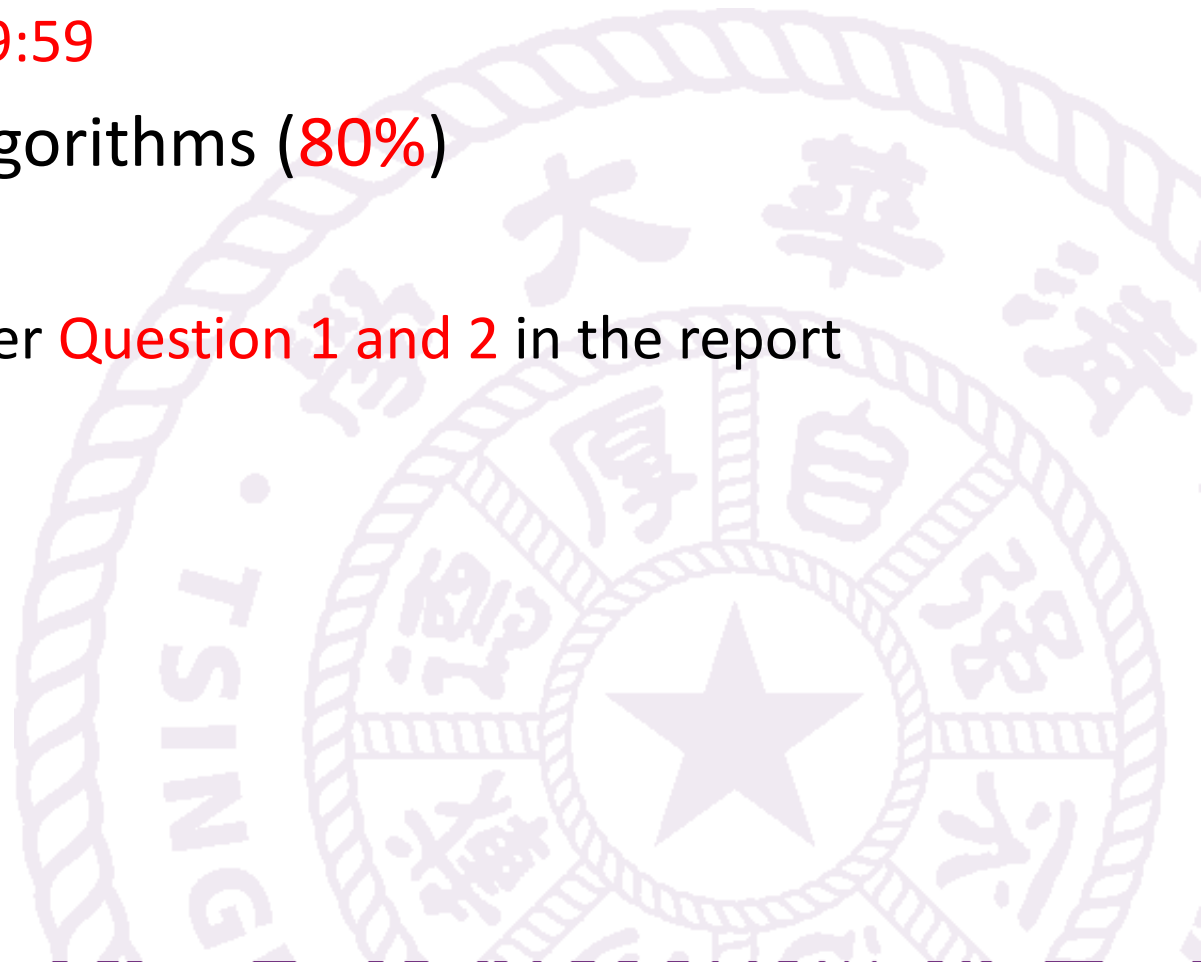 - Extra credit for assignments with the best 10% classification accuracy
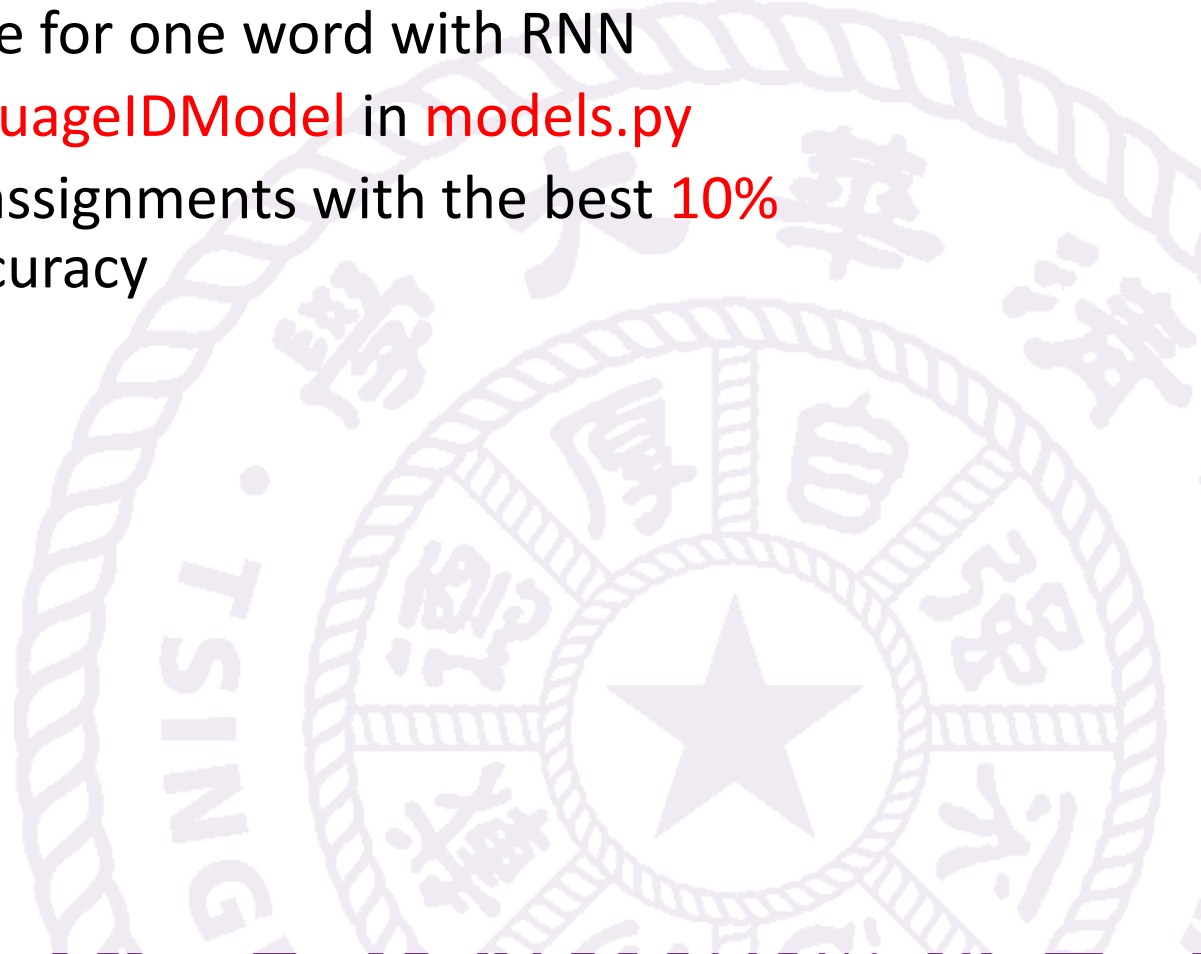
Submission

- A 1-3 pages report (either Chinese or English)
  - You MUST answer Question 1 and 2 in YOUR REPORT
  - You will not get full report credits if cannot answer the above questions correctly
  - Some analysis on different algorithms/hyper-parameters is useful for better grading
- Zip the files as the following structure
  - student_id.zip (e.g. 20090112xx.zip)
    - student_id.pdf
    - models.py

Grading

- Due
  - 2024/6/30 23:59:59
- Correctness of algorithms (80%)
- Report (20%)
  - You MUST answer Question 1 and 2 in the report

谢谢！