Challenge #1: Object Recognition (by Microsoft)

2018 Spring DLCV Final Project

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Tasks

Task 1: Training with a Small Amount of Data

- Train a classifier to beat Microsoft Custom Vision AI baseline
- Use a limited version of Fashion MNIST dataset
- You are allowed to apply any external dataset or techniques like transfer learning to improve the performance

Task 2: One-Shot / Few-Shot / Low-Shot Learning

- Design a model to recognize a number of novel classes with insufficient number of training images to beat TA’s baseline

Dataset for Task 1: Fashion Mnist (Simplified)

- Images: gray-scale image of size 28 x 28 pixels
  - Training / Testing: **2K labeled** / 10K unlabeled images (*Fashion_MNIST_student.tar.gz*)
  - The images are split equally in 10 classes
- Labels: 10 classes
  - 0: T-shirt/Top
  - 1: Trouser
  - 2: Pullover
  - 3: Dress
  - 4: Coat
  - 5: Sandal
  - 6: Shirt
  - 7: Sneaker
  - 8: Bag
  - 9: Ankle boots

Dataset for Task 2: Cifar-100 (Customized)

- Images: RGB images of size 32 x 32 x 3 pixels
  - Train (*task2-train-dataset.tar.gz*):
    - Base (80 classes): 500 images per class for training and 100 images per class for testing
    - Novel (20 classes): 500 images per class for training
      - While providing sufficient labeled data, you need to **randomly pick few examples** during the training stage to simulate the few-shot setting
  - Test (*task2-test-dataset.tar.gz*):
    - **2K unlabeled** images for **Novel** classes

Classes

beaver, dolphin, otter, seal, whale
aquarium fish, flatfish, ray, shark, trout
orchids, poppies, roses, sunflowers, tulips
bottles, bowls, cans, cups, plates
apples, mushrooms, oranges, pears, sweet peppers
clock, computer keyboard, lamp, telephone, television
bed, chair, couch, table, wardrobe
bee, beetle, butterfly, caterpillar, cockroach
bear, leopard, lion, tiger, wolf
bridge, castle, house, road, skyscraper
cloud, forest, mountain, plain, sea
camel, cattle, chimpanzee, elephant, kangaroo
fox, porcupine, possum, raccoon, skunk
crab, lobster, snail, spider, worm
baby, boy, girl, man, woman
crocodile, dinosaur, lizard, snake, turtle
hamster, mouse, rabbit, shrew, squirrel
maple, oak, palm, pine, willow
bicycle, bus, motorcycle, pickup truck, train
lawn-mower, rocket, streetcar, tank, tractor

Settings

- Task 1: Small Data Supervised Learning
  - Use **simplified** training / testing split (200 labeled / 1000 unlabeled per class)
  - Train/design a model which beats MS classification accuracy on unlabeled 10000 testing data.
- Task 2: One-shot / Few-shot Learning
  - We split all the classes (100) into two groups:
    - Base classes (80): **500** training examples **with** labels per class
    - Novel classes (20): **1, 5, or 10** training examples (randomly picked from 500) **with** labels and testing examples **without** labels
  - Do **not** use any pretrained models! Only leverage knowledge learned from given supervised data!
  - Perform 1-shot / 5-shot / 10-shot testing on the 2000 testing **unlabeled novel class** data (Only 5-shot baseline is on Kaggle, you also have to pass baselines for 1-shot and 10-shot)

Kaggle Pages & Policies

Kaggle pages are for downloading dataset & self-evaluation!

Task 1: https://www.kaggle.com/t/979f5fee9706486a8f61738ce3c76a73

Task 2: https://www.kaggle.com/t/eebb0cdcbce4453b841e5e2744a8d633

- Team Name: leaderStudentID_TeamName (e.g. r05901001_乂煞氣小耕乂)
- Maximum Daily Submission: 10
- Sample Submission:
  - Please refer to the .csv file in kaggle contest page
- Deadline: 2018/7/1 23:59 (late submission will be available if you like to get more experiment result for presentation)

Submission Format

- Please refer to *sample.csv* (task1) and *sample_submission.csv* (task2)
- Note that the first line should be identical to *image_id, predicted_label*

Baselines

Task 1:

- MS classification accuracy on 10000 testing **unlabeled** data : 79.9%

Task 2:

- 1-shot / 5-shot / 10-shot testing on the 2000 testing **unlabeled novel class** data
- Strong baseline is the state-of-the-art method, so it is just for your reference!

Setting	One-shot	Five-shot	Ten-shot
Simple baseline (10%)	~~21.25%~~ 20%	~~49%~~ 46.5%	~~55.8%~~ 52.3%

Additional References for Task 1

1. How transferable are features in deep neural networks? (Yosinski et al., NIPS'14)
    - https://arxiv.org/pdf/1411.1792.pdf
2. Label Efficient Learning of Transferable Representations across Domains and Tasks (Luo et al., NIPS'17)
    - https://arxiv.org/pdf/1712.00123.pdf

References for Task 2

1. Siamese Neural Networks for One-shot Image Recognition (Koch et al., ICML' 15 workshop)
   - https://www.cs.cmu.edu/~rsalakhu/papers/oneshot1.pdf
2. Low-shot Visual Recognition by Shrinking and Hallucinating Features (Hariharan et al., ICCV'17)
   - https://arxiv.org/pdf/1606.02819.pdf
3. Learning to Compare: Relation Network for Few-Shot Learning (Sung et al., CVPR'18)
   - https://arxiv.org/pdf/1711.06025.pdf

Evaluation Methods

- Final 35% + **Bonus 5%**
  - Code / Kaggle 15%: Kaggle is for reference, accuracy will be evaluated by TAs
    - Task 1: Microsoft Custom Vision AI baseline 5%
    - Task 2: TA baseline 10%
  - Method & Presentation 20% + **Bonus 5%**
    - Novelty + completeness of experiments (e.g., comparisons to baseline and recent models, ablation studies, etc.) 10% + **Bonus 5%**
    - Presentation (Oral + Poster) 10%
  - For both tasks, you need to upload your code to github and provide **readme** file, so that TAs will be able to **reproduce** your results!
  - If TAs cannot reproduce your results, 0 points will be given.

Intra-group evaluation will be performed as well!

Github Upload Policy

- **DLCV2018SPRING/final** on your teamleader's GitHub repository should include the following files:
  - README.md (how to reproduce your experiment result)
  - Your Python files (train.py and others)
  - Your model files (can be loaded by your Python file)
  - Other script (including model downloading scipts and others)
- **Do NOT upload the dataset!**
- If TAs cannot reproduce your results due to format error, etc., no credits will be given on the corresponding task!

Allowed Packages (Last Modified: 6/13 12:50 p.m.)

- Python 3.6
- Tensorflow 1.6
- Pytorch 0.4.0
- Keras 2.1.5
- numpy 1.14.2
- pandas 0.22.0
- scikit-image 0.14.0
- Pillow 5.1
- scipy 1.1.0
- opencv-python 3.4.1.15
- Ask for TAs permission if your team need to import package that hadn't been listed on this slide; the allowed package will be updated on both FB group and challenge slide.

TAs

- Yu-Ying Yeh (葉鈺濚)
- Yu-Jhe Li (李宇哲)
- Alex Liu (劉浩然)
- Jia-Wei Yan (顏嘉緯)
- Chi-Hsin Lo (羅啟心)