Machine Learning HW15
Meta Learning

ML TAs
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Outline

- Task Description
- Data Format
- Grading
- Submission
- Regulations
- Contact

Task: Few-shot Classification

The Omniglot dataset

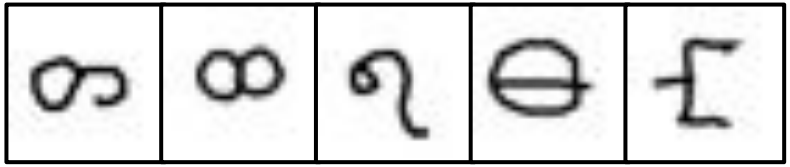
Task: Few-shot Classification

The Omniglot dataset

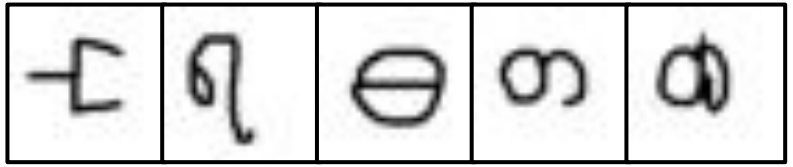
- background set: 30 alphabets
- evaluation set: 20 alphabets

Problem setup: **5-way 1-shot classification**

Support set



Query set

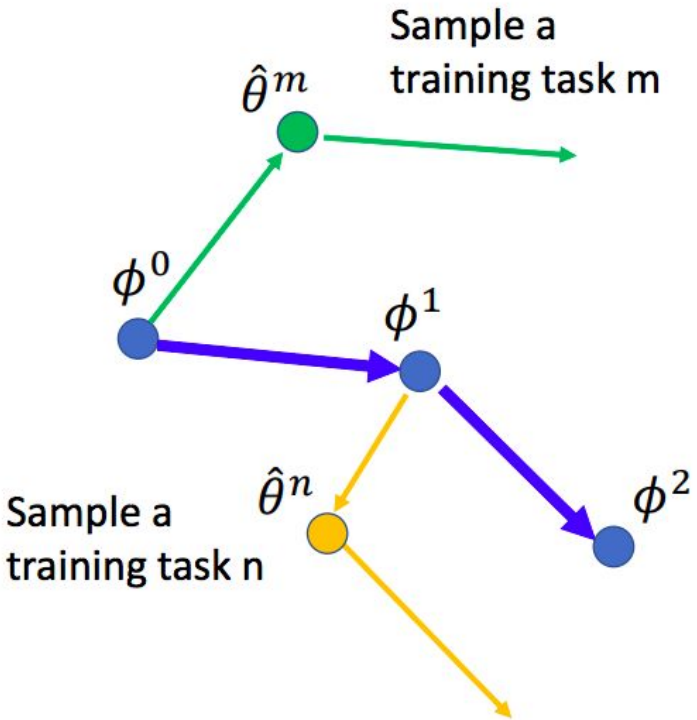


Task: Few-shot Classification

Training MAML on Omniglot classification task.

Testing set
(Query set)

Training set
(Support set)

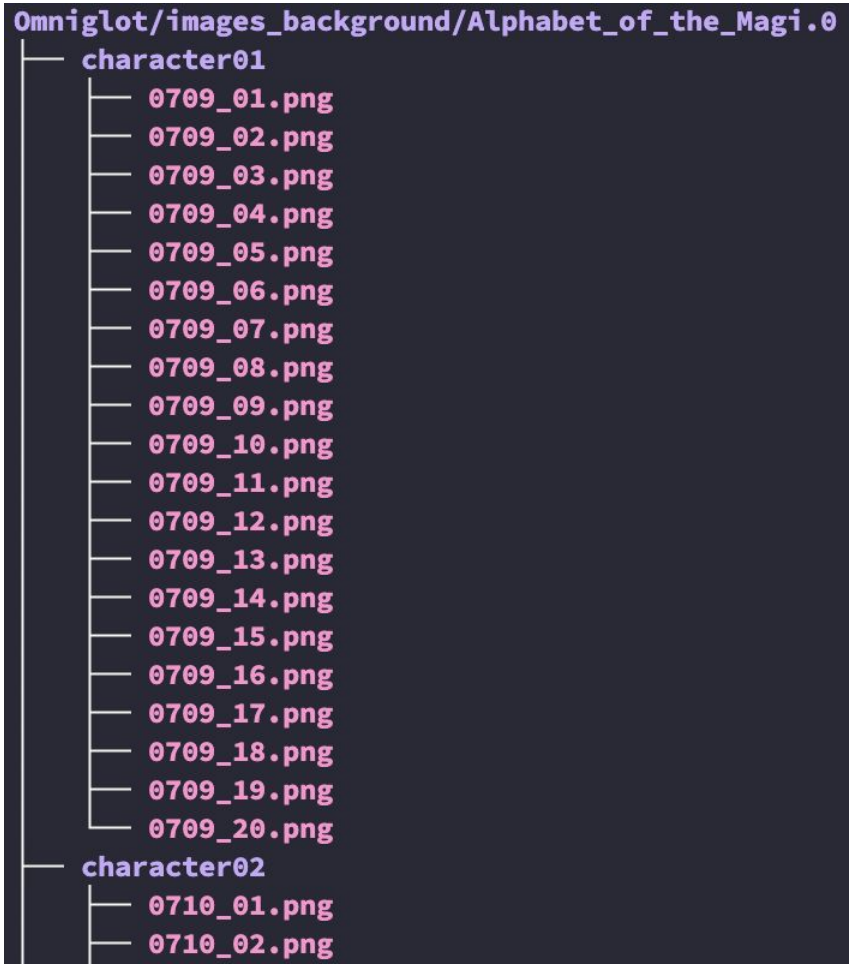


Data Format

Training / validation set:

30 alphabets

- multiple characters in one alphabet
- 20 images for one character



Data Format

Testing set:

640 support and query pairs

- 5 support images
- 5 query images

```
Omniglot-test/support/0000
├── image_0.png
├── image_1.png
├── image_2.png
├── image_3.png
└── image_4.png
Omniglot-test/support/0001
├── image_0.png
├── image_1.png
├── image_2.png
├── image_3.png
└── image_4.png
Omniglot-test/query/0000
├── image_0.png
├── image_1.png
├── image_2.png
├── image_3.png
└── image_4.png
Omniglot-test/query/0001
├── image_0.png
├── image_1.png
├── image_2.png
├── image_3.png
└── image_4.png
```

Guidance - Simple Baseline

Simple transfer learning model (implemented in sample code)

training

- normal classification training on randomly chose five tasks

validation / testing

- finetune on the five support images, and do inference on query images

Guidance - Medium / Strong Baseline

Finish the TODO blocks for meta learning inner & outer loop (in sample code)

Medium baseline

- FO-MAML

Strong baseline

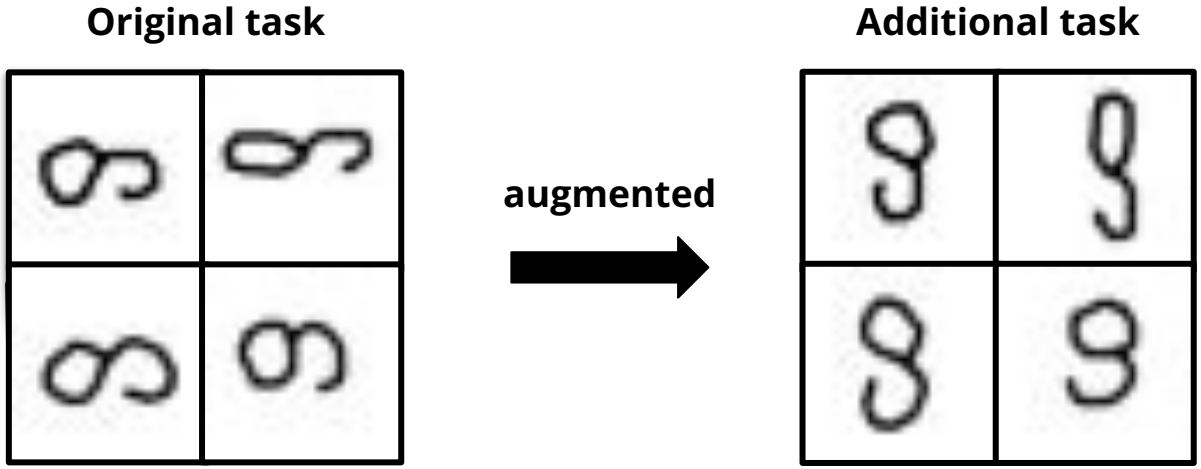
- MAML / ANIL

- Original MAML: slides p.12 - p.18 & p. 21 - p. 26
- First-order approximation MAML (FO-MAML): slides p. 24 - 27
- Reptile: slides p. 29 - p. 31
- MAML tips: How to train your MAML?
- ANIL: Feature reuse

Guidance - Boss Baseline

Task augmentation (with meta learning)

- What is a reasonable way to create new task?



Grading - Baseline Guide 1/3

- Simple baseline (acc ~ 0.6)
  - Transfer learning (sample code)
- Medium baseline (acc ~ 0.7)
  - Meta learning (FO-MAML)
- Strong baseline (acc ~ 0.9)
  - Meta learning (MAML)
- Boss baseline (acc ~ 0.95)
  - Meta learning (MAML) + task augmentation

Grading - Baselines 2/3

Simple baseline (public)	+0.5 pt
Simple baseline (private)	+0.5 pt
Medium baseline (public)	+0.5 pt
Medium baseline (private)	+0.5 pt
Strong baseline (public)	+0.5 pt
Strong baseline (private)	+0.5 pt
Boss baseline (public)	+0.5 pt
Boss baseline (private)	+0.5 pt
Report	+4 pts
Code submission	+2 pts

Total: **10** pts

Grading - Bonus

If your **ranking in private set is top 3**, you can choose to share a report to NTU COOL and get extra 0.5 pts.

About the report (report template)

- Your name and student_ID
- Methods you used in code
- Reference
- In 200 words
- Deadline is **a week after code submission (7/8)**
- Please upload to NTU COOL's discussion of HW15

Report questions (4%)

Part 1: Number of Tasks

- According to your best meta-learning result, plot the **relation between dev accuracy and the number of tasks**. Include at least three different experiment in the figure. (1pt)
- A one sentence description of what you observe from the above figure. (1pt)

Report questions (4%)

Part 2: Inner Update Steps

- According to your best meta-learning result, plot the **relation between dev accuracy and the inner update step <u>at inference</u>** (noted that you should not change the inner update step at training, it should be the same with your best meta-learning result throughout the experiment). Include at least three different experiment in the figure. (1pt)
- A one sentence description of what you observe from the above figure. (1pt)

Links

- Colab
- Kaggle
- Report (On Gradescope)

Submission - Deadlines 1/6

- Kaggle, Report (GradeScope), Code Submission (NTU COOL)

2022 7/1 23:59 (UTC+8)

No late submission!
Submit early!

Submission - NTU COOL 5/6

- **NTU COOL**
  - Compress your code into

    <student ID>_hwX.zip

    *** e.g. b06901020_hw15.zip**

    *** X is the homework number**

  - We can only see your last submission.
  - Do not submit your model or dataset.
  - If your code is not reasonable, your semester grade x 0.9.

Regulations 1/2

- You should NOT plagiarize, if you use any other resource, you should cite it in the reference. (*)
- You should NOT modify your prediction files manually.
- Do NOT share codes or prediction files with any living creatures.
- Do NOT use any approaches to submit your results more than 5 times a day.
- **Do NOT search or use additional data.**
- **You are allowed to use pre-trained models on any image datasets.**
- Your **final grade x 0.9** if you violate any of the above rules.
- Prof. Lee & TAs preserve the rights to change the rules & grades.

(*) Academic Ethics Guidelines for Researchers by the Ministry of Science and Technology

If you have any question...

- NTU COOL (recommended)
  - HW15 discussion board
- Kaggle discussion
- Email
  - mlta-2022-spring@googlegroups.com
  - The title should begin with "**[hw15]**"

Post-test Questionnaire (後測問卷)

教育部後測問卷

學生心得問卷