声明：我已知悉学校对于考试纪律的严肃规定，将秉持诚实守信宗旨，严守考试纪律，不作弊，不剽窃；若有违反学校考试纪律的行为，自愿接受学校严肃处理。

2018-2019 学年第二学期 COMP130137.01 《模式识别与机器学习》课程项目 xxxx(项目名称)

学号：xxxxxx , 姓名：xxxxxx，贡献: xx%，签名：

Abstract

本期末作业为项目实践形式，每人一组。最终需要提交两部分内容：（1）项目代码和（2）项目报告。项目代码和报告电子版需 6 月 28 日前提交到 ftp://10.141.200.50:2121 (用户名：prml，密码：prml)，用学号建立自己的目录，并上传到自己的目录中。纸质版报告需签名后在 6 月 29 日前提交给助教。
请勿直接在本文档上修改，点左上角“Menu”，然后“Copy Project”。

1 项目要求

选择下面任一项目进行实现。

1.1 RNN 速度改进

改进 LSTM 或 GRU 模型，提高模型并行化能力。

1.1.1 参考文献

1. Quasi-Recurrent Neural Networks
https://openreview.net/forum?id=H1zJ-v5xl
2. Simple Recurrent Units for Highly Parallelizable Recurrence
https://arxiv.org/abs/1709.02755
3. Phased LSTM: Accelerating Recurrent Network
4. Skip RNN: Learning to Skip State Updates in Recurrent Neural Networks
https://openreview.net/forum?id=HkwVAXyCW
5. Yu et al., Learning to Skim Text, ACL 2017
6. Neural Speed Reading via Skim-RNN
https://openreview.net/forum?id=Sy-dQG-Rb
7. Variable Computation in Recurrent Neural Networks
https://arxiv.org/abs/1611.06188

1.2 Few-shot Learning for Text Classification

Consider a supervised learning task T , FSL deals with a data set $D = \{D_{train}, D_{test}\}$ consisting of training set $D_{train} = \{(x^{(i)}, y^{(i)})\}_{i=1}^{I}$ where I is small and test set $D_{test} = \{x_{test}\}$. Usually,

people consider the N-way-K-shot classification task where D_{train} contains $I = KN$ examples from N classes each with K examples.

Dataset: https://github.com/Gorov/DiverseFewShot_Amazon

1.2.1 参考文献

1. Learning to Compare: Relation Network for Few-Shot Learning
   https://arxiv.org/pdf/1711.06025v2.pdf
2. A CLOSER LOOK AT FEW-SHOT CLASSIFICATION
   https://openreview.net/pdf?id=HkxLXnAcFQ
3. Advances in few-shot learning: a guided tour
   https://towardsdatascience.com/advances-in-few-shot-learning-a-guided-tour-36bc10a68b77
4. Generalizing from a Few Examples: A Survey on Few-Shot Learning
   https://arxiv.org/pdf/1904.05046.pdf
5. Advances in few-shot learning: reproducing results in PyTorch
   https://towardsdatascience.com/advances-in-few-shot-learning-reproducing-results-in-pytorch-aba70dee541
6. Few-Shot Text Classification with Induction Network
   https://arxiv.org/pdf/1902.10482.pdf

2 实现要求

项目实现需基于开源项目 fastNLP（https://github.com/fastnlp/fastNLP）进行。如果目前的 fastNLP 功能不足以实现某个算法，可以随便修改。之后也欢迎为 fastNLP 贡献 PR。具体要求如下：

1. 程序正确性，可顺利运行；
2. 加分项：为 fastNLP 提 PR，并通过单元测试。
   (a) GIT 操作及 PR 操作：https://github.com/fastnlp/fastNLP/wiki/怎样使用Git进行开发
   (b) 代码规范参考：https://github.com/fastnlp/fastNLP/wiki/fastNLP-代码规范
   (c) 单元测试说明：https://github.com/fastnlp/fastNLP/wiki/fastNLP测试说明

3 项目报告

项目报告作为判断项目质量和工作量的主要依据，请务必详细在报告中描述项目的主要亮点。中英文均可，不少于 5 页。报告包含以下内容：

1. 问题描述、动机
2. 方法和技术
3. 实验设计
4. 结果分析
5. 相关工作对比、分析

4 报告的格式信息

项目报告采用 NeurIPS 会议论文格式，具体信息如下：

The style files for NeurIPS and other conference information are available on the World Wide Web at

http://www.neurips.cc/

The file `neurips_2018.pdf` contains these instructions and illustrates the various formatting requirements your NeurIPS paper must satisfy.

The formatting instructions contained in these style files are summarized in Sections 5, 6, and 7 below.

5 General formatting instructions

The text must be confined within a rectangle 5.5 inches (33 picas) wide and 9 inches (54 picas) long. The left margin is 1.5 inch (9 picas). Use 10 point type with a vertical spacing (leading) of 11 points. Times New Roman is the preferred typeface throughout, and will be selected for you by default. Paragraphs are separated by ½ line space (5.5 points), with no indentation.

Please pay special attention to the instructions in Section 7 regarding figures, tables, acknowledgments, and references.

6 Headings: first level

All headings should be lower case (except for first word and proper nouns), flush left, and bold.

First-level headings should be in 12-point type.

6.1 Headings: second level

Second-level headings should be in 10-point type.

6.1.1 Headings: third level

Third-level headings should be in 10-point type.

Paragraphs There is also a `\paragraph` command available, which sets the heading in bold, flush left, and inline with the text, with the heading followed by 1 em of space.

7 Citations, figures, tables, references

These instructions apply to everyone.

7.1 Citations within the text

The `natbib` package will be loaded for you by default. Citations may be author/year or numeric, as long as you maintain internal consistency. As to the format of the references themselves, any style is acceptable as long as it is used consistently.

The documentation for `natbib` may be found at

http://mirrors.ctan.org/macros/latex/contrib/natbib/natnotes.pdf

Of note is the command `\citet`, which produces citations appropriate for use in inline text. For example,

```
\citet{adams1995hitchhiker} investigated\dots
```

produces

Collobert and Weston [2008] investigated…

If you wish to load the `natbib` package with options, you may add the following before loading the `neurips_2018` package:

```
\PassOptionsToPackage{options}{natbib}
```

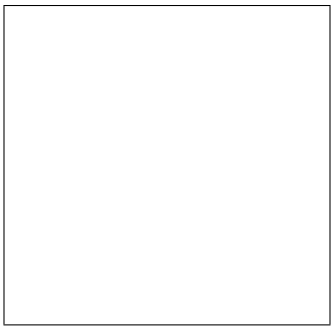

Figure 1: Sample figure caption.

If `natbib` clashes with another package you load, you can add the optional argument `nonatbib` when loading the style file:

```
\usepackage[nonatbib]{neurips_2018}
```

7.2 Footnotes

Footnotes should be used sparingly. If you do require a footnote, indicate footnotes with a number[1] in the text. Place the footnotes at the bottom of the page on which they appear. Precede the footnote with a horizontal rule of 2 inches (12 picas).

Note that footnotes are properly typeset *after* punctuation marks.[2]

7.3 Figures

All artwork must be neat, clean, and legible. Lines should be dark enough for purposes of reproduction. The figure number and caption always appear after the figure. Place one line space before the figure caption and one line space after the figure. The figure caption should be lower case (except for first word and proper nouns); figures are numbered consecutively.

You may use color figures. However, it is best for the figure captions and the paper body to be legible if the paper is printed in either black/white or in color.

7.4 Tables

All tables must be centered, neat, clean and legible. The table number and title always appear before the table. See Table 1.

Place one line space before the table title, one line space after the table title, and one line space after the table. The table title must be lower case (except for first word and proper nouns); tables are numbered consecutively.

Note that publication-quality tables *do not contain vertical rules.* We strongly suggest the use of the `booktabs` package, which allows for typesetting high-quality, professional tables:

https://www.ctan.org/pkg/booktabs

This package was used to typeset Table 1.

8 Final instructions

Do not change any aspects of the formatting parameters in the style files. In particular, do not modify the width or length of the rectangle the text should fit into, and do not change font sizes (except perhaps in the **References** section; see below). Please note that pages should be numbered.

[1] Sample of the first footnote.

[2] As in this example.

Table 1: Sample table title

	Part	
Name	Description	Size (μm)
Dendrite	Input terminal	$\sim$100
Axon	Output terminal	$\sim$10
Soma	Cell body	up to 10^6

References

Ronan Collobert and Jason Weston. A unified architecture for natural language processing: deep neural networks with multitask learning. In *Machine Learning, Proceedings of the Twenty-Fifth International Conference (ICML 2008), Helsinki, Finland, June 5-9, 2008*, pages 160–167, 2008. doi: 10.1145/1390156.1390177. URL http://doi.acm.org/10.1145/1390156.1390177.