
Relational Reasoning on Text-Based Question Answering Task

Anonymous Author(s)

Affiliation

Address

email

1 Introduction

1. Introduction to explain our interest in relational reasoning on QA task.
2. Brief introduction to bAbI dataset
3. What are the current methods in text-based QA task.
4. Replication of the RN network with slight modifications: using universal sentence encoder (USE) instead of LSTMs to do sentence embedding and (if have time) adding attention to the network, since the relation obtained by $g_{\theta}(o_i, o_j, q)$ are weighted equally before feeding it into the f_{ϕ} .

Santoro et al. [3] Bottou [1] Weston et al. [4] Cer et al. [2]

2 Related Work

KIV

3 Model

1. Overview of the original RN model, comment on the strength and weaknesses
2. Modifications to the RN model that will help improve the accuracy of the task. Motivations for the modifications.
3. (Optional) A paragraph on USE?
4. How long we take to train our model and the train/test accuracy, loss values etc. Use original RN paper as a guideline of what numbers to show.

4 Results

Example of results: Our model succeeded on 18/20 tasks. Notably, it succeeded on the basic induction task (2.1% total error), which proved difficult for the Sparse DNC (54%), DNC (55.1%), and EntNet (52.1%). Also, our model did not catastrophically fail in any of the tasks: for the 2 tasks that it failed (the “two supporting facts”, and “three supporting facts” tasks), it missed the 95% threshold by 3.1% and 11.5%, respectively. We also note that the model we evaluated was chosen based on overall performance on a withheld validation set, using a single seed. That is, we did not run multiple replicas with the best hyperparameter settings (as was done in other models, such as the Sparse DNC, which demonstrated performance fluctuations with a standard deviation of more than ± 3 tasks passed for the best choice of hyperparameters).

29 5 Discussion and Conclusions

30 References

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6 Submission of papers to NIPS 2018

NIPS requires electronic submissions. The electronic submission site is

<https://cmt.research.microsoft.com/NIPS2018/>

Please read the instructions below carefully and follow them faithfully.

6.1 Style

Papers to be submitted to NIPS 2018 must be prepared according to the instructions presented here. Papers may only be up to eight pages long, including figures. Additional pages *containing only acknowledgments and/or cited references* are allowed. Papers that exceed eight pages of content (ignoring references) will not be reviewed, or in any other way considered for presentation at the conference.

The margins in 2018 are the same as since 2007, which allow for $\sim 15\%$ more words in the paper compared to earlier years.

Authors are required to use the NIPS L^AT_EX style files obtainable at the NIPS website as indicated below. Please make sure you use the current files and not previous versions. Tweaking the style files may be grounds for rejection.

6.2 Retrieval of style files

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

<http://www.nips.cc/>

The file `nips_2018.pdf` contains these instructions and illustrates the various formatting requirements your NIPS paper must satisfy.

The only supported style file for NIPS 2018 is `nips_2018.sty`, rewritten for L^AT_EX 2_ε. **Previous style files for L^AT_EX 2.09, Microsoft Word, and RTF are no longer supported!**

The L^AT_EX style file contains three optional arguments: `final`, which creates a camera-ready copy, `preprint`, which creates a preprint for submission to, e.g., arXiv, and `nonatbib`, which will not load the `natbib` package for you in case of package clash.

New preprint option for 2018 If you wish to post a preprint of your work online, e.g., on arXiv, using the NIPS style, please use the `preprint` option. This will create a nonanonymized version of your work with the text “Preprint. Work in progress.” in the footer. This version may be distributed as you see fit. Please **do not** use the `final` option, which should **only** be used for papers accepted to NIPS.

At submission time, please omit the `final` and `preprint` options. This will anonymize your submission and add line numbers to aid review. Please *do not* refer to these line numbers in your paper as they will be removed during generation of camera-ready copies.

The file `nips_2018.tex` may be used as a “shell” for writing your paper. All you have to do is replace the author, title, abstract, and text of the paper with your own.

The formatting instructions contained in these style files are summarized in Sections 7, 8, and 9 below.

7 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 $\frac{1}{2}$ line space (5.5 points), with no indentation.

85 The paper title should be 17 point, initial caps/lower case, bold, centered between two horizontal
86 rules. The top rule should be 4 points thick and the bottom rule should be 1 point thick. Allow ¼ inch
87 space above and below the title to rules. All pages should start at 1 inch (6 picas) from the top of the
88 page.

89 For the final version, authors' names are set in boldface, and each name is centered above the
90 corresponding address. The lead author's name is to be listed first (left-most), and the co-authors'
91 names (if different address) are set to follow. If there is only one co-author, list both author and
92 co-author side by side.

93 Please pay special attention to the instructions in Section 9 regarding figures, tables, acknowledgments,
94 and references.

95 **8 Headings: first level**

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

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

98 **8.1 Headings: second level**

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

100 **8.1.1 Headings: third level**

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

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

104 **9 Citations, figures, tables, references**

105 These instructions apply to everyone.

106 **9.1 Citations within the text**

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

110 The documentation for `natbib` may be found at

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

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

114 `\citet{hasselmo}` investigated\dots

115 produces

116 Hasselmo, et al. (1995) investigated...

117 If you wish to load the `natbib` package with options, you may add the following before loading the
118 `nips_2018` package:

119 `\PassOptionsToPackage{options}{natbib}`

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

122 `\usepackage[nonatbib]{nips_2018}`

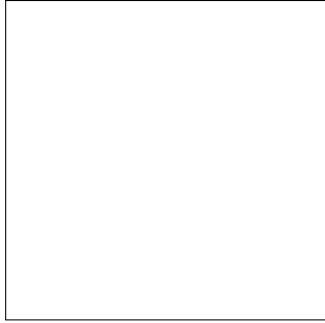


Figure 1: Sample figure caption.

123 As submission is double blind, refer to your own published work in the third person. That is, use “In
124 the previous work of Jones et al. [4],” not “In our previous work [4].” If you cite your other papers
125 that are not widely available (e.g., a journal paper under review), use anonymous author names in the
126 citation, e.g., an author of the form “A. Anonymous.”

127 9.2 Footnotes

128 Footnotes should be used sparingly. If you do require a footnote, indicate footnotes with a number¹
129 in the text. Place the footnotes at the bottom of the page on which they appear. Precede the footnote
130 with a horizontal rule of 2 inches (12 picas).

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

132 9.3 Figures

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

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

139 9.4 Tables

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

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

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

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

148 This package was used to typeset Table 1.

149 10 Final instructions

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

¹Sample of the first footnote.

²As in this example.

Table 1: Sample table title

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

11 Preparing PDF files

Please prepare submission files with paper size “US Letter,” and not, for example, “A4.”

Fonts were the main cause of problems in the past years. Your PDF file must only contain Type 1 or Embedded TrueType fonts. Here are a few instructions to achieve this.

- You should directly generate PDF files using `pdflatex`.
- You can check which fonts a PDF files uses. In Acrobat Reader, select the menu Files>Document Properties>Fonts and select Show All Fonts. You can also use the program `pdf fonts` which comes with `xpdf` and is available out-of-the-box on most Linux machines.
- The IEEE has recommendations for generating PDF files whose fonts are also acceptable for NIPS. Please see <http://www.emfield.org/icuwb2010/downloads/IEEE-PDF-SpecV32.pdf>
- `xfig` "patterned" shapes are implemented with bitmap fonts. Use "solid" shapes instead.
- The `\bbold` package almost always uses bitmap fonts. You should use the equivalent AMS Fonts:

```
\usepackage{amsfonts}
```

followed by, e.g., `\mathbb{R}`, `\mathbb{N}`, or `\mathbb{C}` for \mathbb{R} , \mathbb{N} or \mathbb{C} . You can also use the following workaround for reals, natural and complex:

```
\newcommand{\RR}{I\!\!R} %real numbers
\newcommand{\Nat}{I\!\!N} %natural numbers
\newcommand{\CC}{I\!\!C} %complex numbers
```

Note that `amsfonts` is automatically loaded by the `amssymb` package.

If your file contains type 3 fonts or non embedded TrueType fonts, we will ask you to fix it.

11.1 Margins in L^AT_EX

Most of the margin problems come from figures positioned by hand using `\special` or other commands. We suggest using the command `\includegraphics` from the `graphicx` package. Always specify the figure width as a multiple of the line width as in the example below:

```
\usepackage[pdftex]{graphicx} ...
\includegraphics[width=0.8\linewidth]{myfile.pdf}
```

See Section 4.4 in the `graphics` bundle documentation (<http://mirrors.ctan.org/macros/latex/required/graphics/grfguide.pdf>)

A number of width problems arise when L^AT_EX cannot properly hyphenate a line. Please give LaTeX hyphenation hints using the `\-` command when necessary.

Acknowledgments

Use unnumbered third level headings for the acknowledgments. All acknowledgments go at the end of the paper. Do not include acknowledgments in the anonymized submission, only in the final paper.

188 **References**

189 References follow the acknowledgments. Use unnumbered first-level heading for the references. Any
190 choice of citation style is acceptable as long as you are consistent. It is permissible to reduce the font
191 size to small (9 point) when listing the references. **Remember that you can use more than eight**
192 **pages as long as the additional pages contain only cited references.**

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- 198 [3] Hasselmo, M.E., Schnell, E. & Barkai, E. (1995) Dynamics of learning and recall at excitatory recurrent
199 synapses and cholinergic modulation in rat hippocampal region CA3. *Journal of Neuroscience* **15**(7):5249-5262.