
Formatting instructions for NIPS 2018

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Abstract

1 The growing tourism industry demands that tourists be provided with immedi-
2 ate information about the places they visit. To address this issue we provide a
3 framework which aims to detect and correctly recognize a landmark from images
4 taken by tourists. We test our model on the google landmark recognition challenge
5 hosted on kaggle. In the google landmark recognition challenge hosted on kaggle.
6 Unlike previous challenges, this task requires classification of 15k classes. We
7 demonstrate the efficacy of our models by training it on the given set of images
8 with ground truth and testing it on unlabelled dataset. We obtain xyz score on the
9 kaggle leader board on the testing set.

10 1 Introduction

11 Neural networks have made a lot of progress in recent years owing to the presence of multiple
12 image classification dataset like ?,?,cifar1000. Many architectures have been designed to specifically
13 address these problems. Networks such as VGG16 ? and AlexNet ? have set the premise for more
14 research. In this project we compare the performance of traditional networks such as the VGG-16
15 with that of more sophisticated designs such as customized DenseNets adopted from the works of ?
16 and demonstrate that a customized DenseNet works better. We further utilize the concept of ensemble
17 learning, by using a multi-pathway Neural network where one of the inputs use clustering information
18 of all the images, and a third branch which is pretrained on the image net dataset. These along with
19 the features extracted form the raw images demonstrate the best performance obtaining a score of
20 xyz on the Kaggle leaderboard.

21 1.1 Method

22 A neural network based classifier such as the VGG-16 is normally used when it comes to image
23 classification. The standard VGG-16 architecture Figurefig1 consists of multiple convolution
24 blocks of same filter size followed by a pooling layer to downsample the image by half along both
25 the axis.The first two blocks contain two convolution layers each with filters of size 64 and 128
26 respectively followed by pooling layers. The third, fourth and fifth branches contain three layers of
27 filters of size 256, 512, and 512. Following this the original VGG paper consists of fully connected
28 layers.

29 In order to reduce the number of parameter in the above architecture, we replace the fully connected
30 layers with convolution layers of filter size (1x1). This has two improvement; firstly it reduces the
31 number of parameter drastically since convolution layers share parameters. Secondly the utilization
32 of convolution layers ensure that the spacial relation of the pixels are taken into account during the
33 classification.

34 We also investigate deeper networks, namely a 36 layer

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.

1.2 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 2, 3, and 4 below.

2 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.

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

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

Please pay special attention to the instructions in Section 4 regarding figures, tables, acknowledgments, and references.

82 **3 Headings: first level**

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

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

85 **3.1 Headings: second level**

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

87 **3.1.1 Headings: third level**

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

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

91 **4 Citations, figures, tables, references**

92 These instructions apply to everyone.

93 **4.1 Citations within the text**

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

97 The documentation for `natbib` may be found at

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

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

101 `\citet{hasselmo}` investigated\dots

102 produces

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

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

106 `\PassOptionsToPackage{options}{natbib}`

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

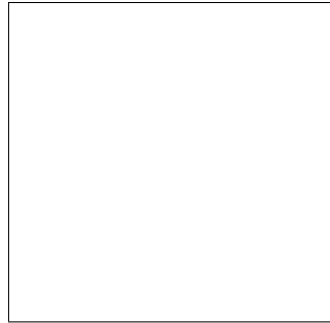
109 `\usepackage[nonatbib]{nips_2018}`

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

114 **4.2 Footnotes**

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

¹Sample of the first footnote.



[width=0.8]/fig/vgg16_{baseline}.png

Figure 1: VGG-16 Basic

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

119 4.3 Figures

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

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

126 4.4 Tables

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

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

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

134 <https://www.ctan.org/pkg/booktabs>

135 This package was used to typeset Table ??.

136 5 Final instructions

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

140 6 Preparing PDF files

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

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

- 144 • You should directly generate PDF files using `pdflatex`.

²As in this example.

- You can check which fonts a PDF file uses. In Acrobat Reader, select the menu Files>Document Properties>Fonts and select Show All Fonts. You can also use the program `pdffonts` 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.

6.1 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.

References

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

[1] Alexander, J.A. & Mozer, M.C. (1995) Template-based algorithms for connectionist rule extraction. In G. Tesauro, D.S. Touretzky and T.K. Leen (eds.), *Advances in Neural Information Processing Systems 7*, pp. 609–616. Cambridge, MA: MIT Press.

[2] Bower, J.M. & Beeman, D. (1995) *The Book of GENESIS: Exploring Realistic Neural Models with the GEneral NEural Simulation System*. New York: TELOS/Springer-Verlag.

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