
Formatting Instructions For NeurIPS 2020

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Abstract

1 We will explore using Vector Quantized Variational Autoencoder (VQ-VAE) to
2 generate discrete representations for faces in traditional Japanese paintings. While
3 Autoencoders typically learn continuous latent representations for data, the recent
4 success of VQ-VAE demonstrates the advantages of discrete latent variables. While
5 continuous representations are flexible, many real world attributes are better defined
6 discretely, and some current state of the art network architectures, like transformers,
7 only work on discrete data. In this project, we will experiment with VQ-VAEs on
8 a novel dataset and design experiments to test the advantages and disadvantages
9 of this approach. VQ-VAEs have been paired with the transformer architecture
10 which, while scalable, can require a lot of compute, so we will experiment with
11 making the method more compute efficient. A successful project will demonstrate
12 the strengths and weaknesses of VQ-VAEs over traditional VAEs.

13 1 Submission of papers to NeurIPS 2020

14 NeurIPS requires electronic submissions. The electronic submission site is

15 <https://cmt3.research.microsoft.com/NeurIPS2020/>

16 Please read the instructions below carefully and follow them faithfully.

17 1.1 Style

18 Papers to be submitted to NeurIPS 2020 must be prepared according to the instructions presented
19 here. Papers may only be up to eight pages long, including figures. Additional pages *containing only*
20 *a section on the broader impact, acknowledgments and/or cited references* are allowed. Papers that
21 exceed eight pages of content will not be reviewed, or in any other way considered for presentation at
22 the conference.

23 The margins in 2020 are the same as those in 2007, which allow for ~15% more words in the paper
24 compared to earlier years.

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

28 1.2 Retrieval of style files

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

30 <http://www.neurips.cc/>

31 The file `neurips_2020.pdf` contains these instructions and illustrates the various formatting re-
32 quirements your NeurIPS paper must satisfy.

33 The only supported style file for NeurIPS 2020 is `neurips_2020.sty`, rewritten for L^AT_EX 2_ε.
34 **Previous style files for L^AT_EX 2.09, Microsoft Word, and RTF are no longer supported!**

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

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

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

46 The file `neurips_2020.tex` may be used as a “shell” for writing your paper. All you have to do is
47 replace the author, title, abstract, and text of the paper with your own.

48 The formatting instructions contained in these style files are summarized in Sections 2, 3, and 4
49 below.

50 2 General formatting instructions

51 The text must be confined within a rectangle 5.5 inches (33 picas) wide and 9 inches (54 picas) long.
52 The left margin is 1.5 inch (9 picas). Use 10 point type with a vertical spacing (leading) of 11 points.
53 Times New Roman is the preferred typeface throughout, and will be selected for you by default.
54 Paragraphs are separated by 1/2 line space (5.5 points), with no indentation.

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

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

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

65 3 Headings: first level

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

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

68 3.1 Headings: second level

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

70 3.1.1 Headings: third level

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

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

74 4 Citations, figures, tables, references

75 These instructions apply to everyone.

76 4.1 Citations within the text

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

80 The documentation for `natbib` may be found at

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

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

84 `\citet{hasselmo}` investigated\dotso

85 produces

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

87 If you wish to load the `natbib` package with options, you may add the following before loading the
88 `neurips_2020` package:

89 `\PassOptionsToPackage{options}{natbib}`

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

92 `\usepackage[nonatbib]{neurips_2020}`

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

97 4.2 Footnotes

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

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

102 4.3 Figures

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

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

109 4.4 Tables

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

¹Sample of the first footnote.

²As in this example.



Figure 1: Sample figure caption.

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

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.

5 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.

6 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 NeurIPS. 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:

137 `\usepackage{amsfonts}`
 138 followed by, e.g., `\mathbb{R}`, `\mathbb{N}`, or `\mathbb{C}` for \mathbb{R} , \mathbb{N} or \mathbb{C} . You can also
 139 use the following workaround for reals, natural and complex:
 140 `\newcommand{\RR}{I\!\!R} %real numbers`
 141 `\newcommand{\Nat}{I\!\!N} %natural numbers`
 142 `\newcommand{\CC}{I\!\!C} %complex numbers`
 143 Note that `amsfonts` is automatically loaded by the `amssymb` package.
 144 If your file contains type 3 fonts or non embedded TrueType fonts, we will ask you to fix it.

145 6.1 Margins in L^AT_EX

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

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

151 See Section 4.4 in the graphics bundle documentation ([http://mirrors.ctan.org/macros/](http://mirrors.ctan.org/macros/latex/required/graphics/grfguide.pdf)
 152 [latex/required/graphics/grfguide.pdf](http://mirrors.ctan.org/macros/latex/required/graphics/grfguide.pdf))

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

155 Broader Impact

156 Authors are required to include a statement of the broader impact of their work, including its ethical
 157 aspects and future societal consequences. Authors should discuss both positive and negative outcomes,
 158 if any. For instance, authors should discuss a) who may benefit from this research, b) who may be
 159 put at disadvantage from this research, c) what are the consequences of failure of the system, and d)
 160 whether the task/method leverages biases in the data. If authors believe this is not applicable to them,
 161 authors can simply state this.

162 Use unnumbered first level headings for this section, which should go at the end of the paper. **Note**
 163 **that this section does not count towards the eight pages of content that are allowed.**

164 References

165 References follow the acknowledgments. Use unnumbered first-level heading for the references. Any
 166 choice of citation style is acceptable as long as you are consistent. It is permissible to reduce the
 167 font size to `small` (9 point) when listing the references. **Note that the Reference section does not**
 168 **count towards the eight pages of content that are allowed.**

169 [1] Alexander, J.A. & Mozer, M.C. (1995) Template-based algorithms for connectionist rule extraction. In
 170 G. Tesauro, D.S. Touretzky and T.K. Leen (eds.), *Advances in Neural Information Processing Systems 7*, pp.
 171 609–616. Cambridge, MA: MIT Press.

172 [2] Bower, J.M. & Beeman, D. (1995) *The Book of GENESIS: Exploring Realistic Neural Models with the*
 173 *GENeral NEural Simulation System*. New York: TELOS/Springer–Verlag.

174 [3] Hasselmo, M.E., Schnell, E. & Barkai, E. (1995) Dynamics of learning and recall at excitatory recurrent
 175 synapses and cholinergic modulation in rat hippocampal region CA3. *Journal of Neuroscience* **15**(7):5249-5262.