Cat Cat Cat

Yuhan Zheng
Nanjing University of Posts and Telecommunications
Nanjing, China
942280271@qq.com

***Abstract*—Cat is world. Cat is god. Cat is world. Cat is god. Cat is world. Cat is god. Cat is world. Cat is god. Cat is world. Cat is god. Cat is world. Cat is god.**

***Index Terms*—Article submission, IEEE, IEEEtran, journal, LaTeX, paper, template, typesetting.**

I. Introduction

THIS file is intended to serve as a "sample article file" for IEEE journal papers produced under LaTeX using IEEEtran.cls version 1.8b and later. The most common elements are covered in the simplified and updated instructions in "New_IEEEtran_how-to.pdf". For less common elements you can refer back to the original "IEEEtran_HOWTO.pdf". It is assumed that the reader has a basic working knowledge of LaTeX. Those who are new to LaTeX are encouraged to read Tobias Oetiker's "The Not So Short Introduction to LaTeX," available at: http://tug.ctan.org/info/lshort/english/lshort.pdf which provides an overview of working with LaTeX.

II. The Design, Intent, and Limitations of the Templates

The templates are intended to **approximate the final look and page length of the articles/papers**. **They are NOT intended to be the final produced work that is displayed in print or on IEEEXplore®**. They will help to give the authors an approximation of the number of pages that will be in the final version. The structure of the LaTeX files, as designed, enable easy conversion to XML for the composition systems used by the IEEE. The XML files are used to produce the final print/IEEEXplore pdf and then converted to HTML for IEEEXplore.

III. Where to Get LaTeX Help — User Groups

The following online groups are helpful to beginning and experienced LaTeX users. A search through their archives can provide many answers to common questions.

http://www.latex-community.org/
https://tex.stackexchange.com/

IV. Other Resources

See [1]–[5] for resources on formatting math into text and additional help in working with LaTeX.

This paper was produced by the IEEE Publication Technology Group. They are in Piscataway, NJ.

Manuscript received April 19, 2021; revised August 16, 2021.

V. Text

For some of the remainer of this sample we will use dummy text to fill out paragraphs rather than use live text that may violate a copyright.

Itam, que ipiti sum dem velit la sum et dionet quatibus apitet voloritet audam, qui aliciant voloreicid quaspe volorem ut maximusandit faccum conemporerum aut ellatur, nobis arcimus. Fugit odi ut pliquia incitium latum que cusapere perit molupta eaquaeria quod ut optatem poreiur? Quiaerr ovitior suntiant litio bearciur?

Onseque sequaes rectur autate minullore nusae nestiberum, sum voluptatio. Et ratem sequiam quaspername nos rem repudandae volum consequis nos eium aut as molupta tectum ulparumquam ut maximillesti consequas quas inctia cum volectinusa porrum unt eius cusaest exeritatur? Nias es enist fugit pa vollum reium essusam nist et pa aceaqui quo elibusdandis deligendus que nullaci lloreri bla que sa coreriam explacc atiumquos simolorpore, non prehendunt lam que occum [6] si aut aut maximus eliaeruntia dia sequiamenime natem sendae ipidemp orehend uciisi omnienetus most verum, ommolendi omnimus, est, veni aut ipsa volendelist mo conserum volores estisciis recessi nveles ut poressitatur sitiis ex endi diti volum dolupta aut aut odi as eatquo cullabo remquis toreptum et des accus dolende pores sequas dolores tinust quas expel moditae ne sum quiatis nis endipie nihilis etum fugiae audi dia quiasit quibus. Ibus el et quatemo luptatque doluptaest et pe volent rem ipidusa eribus utem venimolorae dera qui acea quam etur aceruptat. Gias anis doluptaspic tem et aliquis alique inctiuntiur?

Sedigent, si aligend elibuscid ut et ium volo tem eictore pellore ritatus ut ut ullatus in con con pere nos ab ium di tem aliqui od magnit repta volectur suntio. Nam isquiante doluptis essit, ut eos suntionsecto debitiur sum ea ipitiis adipit, oditiore, a dolorerempos aut harum ius, atquat.

Rum rem ditinti sciendunti volupiciendi sequiae nonsect oreniatur, volores sition ressimil inus solut ea volum harumqui to see(**??**) mint aut quat eos explis ad quodi debis deliqui aspel earcius.

$$l_t(\mathbf{x}) = \langle \nabla f_t(\mathbf{x}_t), \mathbf{x} - \mathbf{x}_t \rangle \tag{1}$$

Alis nime volorempera perferi sitio denim repudae pre ducilit atatet volecte ssimillorae dolore, ut pel ipsa nonsequiam in re nus maiost et que dolor sunt eturita tibusanis eatent a aut et dio blaudit reptibu scipitem liquia consequodi od unto ipsae. Et enitia vel et experferum quiat harum sa

0000–0000/00$00.00 © 2021 IEEE

Fig. 1. Simulation results for the network.

TABLE I
SUMMARY OF THE HYPERPARAMETERS OF THE USER REQUESTS

Name of hyperparameters	Value
Exponential distribution mean value for reading time generation	50ms
mean value for file size generation	10
variance value for file size generation	1
upper limit	5 megabytes
packet size k_1	1.2
packet size k_2	20
packet size k_3	250 bytes
reading time k_1	1.1
reading time k_2	2.5
reading time k_3	12.5 bytes

net faccae dolut voloria nem. Bus ut labo. Ita eum repraer rovitia samendit aut et volupta tecupti busant omni quiae porro que nossimodic temquis anto blacita conse nis am, que ereperum eumquam quaescil imenisci quae magnimos recus ilibeaque cum etum iliate prae parumquatemo blaceaquiam quundia dit apienditem rerit re eici quaes eos sinvers pelecabo. Namendignis as exerupit aut magnim ium illabor roratecte plic tem res apiscipsam et vernat untur a deliquaest que non cus eat ea dolupiducim fugiam volum hil ius dolo eaquis sitis aut landesto quo corerest et auditaquas ditae voloribus, qui optaspis exero cusa am, ut plibus.

VI. SOME COMMON ELEMENTS

A. Sections and Subsections

Enumeration of section headings is desirable, but not required. When numbered, please be consistent throughout the article, that is, all headings and all levels of section headings in the article should be enumerated. Primary headings are designated with Roman numerals, secondary with capital letters, tertiary with Arabic numbers; and quaternary with lowercase letters. Reference and Acknowledgment headings are unlike all other section headings in text. They are never enumerated. They are simply primary headings without labels, regardless of whether the other headings in the article are enumerated.

B. Citations to the Bibliography

The coding for the citations is made with the LaTeX `\cite` command. This will display as: see [1].

For multiple citations code as follows: `\cite{ref1,ref2,ref3}` which will produce [1]–[3]. For reference ranges that are not consecutive code as `\cite{ref1,ref2,ref3,ref9}` which will produce [1]–[3], [9]

C. Figures

Fig. 1 is an example of a floating figure using the graphicx package. Note that `\label` must occur AFTER (or within) `\caption`. For figures, `\caption` should occur after the `\includegraphics`.

Fig. 2(a) and 2(b) is an example of a double column floating figure using two subfigures. (The subfig.sty package must be loaded for this to work.) The subfigure `\label` commands are set within each subfloat command, and the `\label` for the overall figure must come after `\caption`. `\hfil` is used as a separator to get equal spacing. The combined width of all the parts of the figure should do not exceed the text width or a line break will occur.

Note that often IEEE papers with multi-part figures do not place the labels within the image itself (using the optional argument to `\subfloat[]`), but instead will reference/describe all of them (a), (b), etc., within the main caption. Be aware that for subfig.sty to generate the (a), (b), etc., subfigure labels, the optional argument to `\subfloat` must be present. If a subcaption is not desired, leave its contents blank, e.g.,`\subfloat[]`.

VII. TABLES

Note that, for IEEE-style tables, the `\caption` command should come BEFORE the table. Table captions use title case. Articles (a, an, the), coordinating conjunctions (and, but, for, or, nor), and most short prepositions are lowercase unless they are the first or last word. Table text will default to `\footnotesize` as the IEEE normally uses this smaller font for tables. The `\label` must come after `\caption` as always.

VIII. ALGORITHMS

Algorithms should be numbered and include a short title. They are set off from the text with rules above and below the title and after the last line.

Algorithm 1 Weighted Tanimoto ELM.

TRAIN($\mathbf{XT}$)
  select randomly $W \subset \mathbf{X}$
  $N_{\mathbf{t}} \leftarrow |\{i : \mathbf{t}_i = \mathbf{t}\}|$ **for** $\mathbf{t} = -1, +1$
  $B_i \leftarrow \sqrt{\text{MAX}(N_{-1}, N_{+1})/N_{\mathbf{t}_i}}$ **for** $i = 1, ..., N$
  $\hat{\mathbf{H}} \leftarrow B \cdot (\mathbf{X}^T\mathbf{W})/(\not\#\mathbf{X} + \not\#\mathbf{W} - \mathbf{X}^T\mathbf{W})$
  $\beta \leftarrow \left(I/C + \hat{\mathbf{H}}^T\hat{\mathbf{H}}\right)^{-1} (\hat{\mathbf{H}}^T B \cdot \mathbf{T})$
  return $\mathbf{W}, \beta$

PREDICT($\mathbf{X}$)
  $\mathbf{H} \leftarrow (\mathbf{X}^T\mathbf{W})/(\not\#\mathbf{X} + \not\#\mathbf{W} - \mathbf{X}^T\mathbf{W})$
  return SIGN($\mathbf{H}\beta$)

Algorithm 2 Data - Driven Classification and Prediction.

for $k = 1$ **to** K **do**
  while $t \leq T$ **do**
    Given previous DTT user request $r_u^{\mathrm{DTT}}(t)$ and predict future user request $r_u^{\mathrm{DTT}}(t+1)$ using LSTM.
    Given time sequence t_{oc} and predict $\lambda(t)$ using 1D CNN
    Given $\lambda(t)$ from previous Step and predict $\lambda(t+1)$ using LSTM
    Update state variable $\mathcal{S}(t_m)$ for TRPO
  end while
end for

Que sunt eum lam eos si dic to estist, culluptium quid qui nestrum nobis reiumquiatur minimus minctem. Ro moluptat fuga. Itatquiam ut laborpo rersped exceres vollandi repudaerem. Ulparci sunt, qui doluptaquis sumquia ndestiu sapient iorepella sunti veribus. Ro moluptat fuga. Itatquiam ut laborpo rersped exceres vollandi repudaerem.

IX. Mathematical Typography and Why It Matters

Typographical conventions for mathematical formulas have been developed to **provide uniformity and clarity of presentation across mathematical texts**. This enables the readers of those texts to both understand the author's ideas and to grasp new concepts quickly. While software such as LaTeX and MathType® can produce aesthetically pleasing math when used properly, it is also very easy to misuse the software, potentially resulting in incorrect math display.

IEEE aims to provide authors with the proper guidance on mathematical typesetting style and assist them in writing the best possible article. As such, IEEE has assembled a set of examples of good and bad mathematical typesetting [1]–[5].

Further examples can be found at http://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE-Math-Typesetting-Guide-for-LaTeX-Users.pdf

A. Display Equations

The simple display equation example shown below uses the "equation" environment. To number the equations, use the `\label` macro to create an identifier for the equation. LaTeX will automatically number the equation for you.

$$\sum_{t=1}^{T} \ell_t - \ell_t^i = O\left(\sqrt{\sum_{t=1}^{T} \left(\ell_t - \ell_t^i\right)^2}\right) \tag{2}$$

B. Equation Numbering

Consecutive Numbering: Equations within an article are numbered consecutively from the beginning of the article to the end, i.e., (1), (2), (3), (4), (5), etc. Do not use roman numerals or section numbers for equation numbering.

Appendix Equations: The continuation of consecutively numbered equations is best in the Appendix, but numbering as (A1), (A2), etc., is permissible.

Hyphens and Periods: Hyphens and periods should not be used in equation numbers, i.e., use (1a) rather than (1-a) and (2a) rather than (2.a) for subequations. This should be consistent throughout the article.

C. Multi-Line Equations and Alignment

Here we show several examples of multi-line equations and proper alignments.

A single equation that must break over multiple lines due to length with no specific alignment.

$$\begin{multline}\text{The first line of this example}\\ \text{The second line of this example}\\ \text{The third line of this example}\end{multline} \tag{3}$$

is coded as:

```
\begin{multline}
\text{The first line of this example}\\
\text{The second line of this example}\\
\text{The third line of this example}
\end{multline}
```

A single equation with multiple lines aligned at the = signs

$$a = c + d \tag{4}$$
$$b = e + f \tag{5}$$

is coded as:

```
\begin{align}
a &= c+d \\
b &= e+f
\end{align}
```

The `align` environment can align on multiple points as shown in the following example:

$$x = y \qquad X = Y \qquad a = bc \tag{6}$$
$$x' = y' \qquad X' = Y' \qquad a' = bz \tag{7}$$

is coded as:

```
\begin{align}
x &= y & X & =Y & a &=bc\\
x' &= y' & X' &=Y' &a' &=bz
\end{align}
```

D. Subnumbering

The amsmath package provides a `subequations` environment to facilitate subnumbering. An example:

$$f = g \tag{8a}$$
$$f' = g' \tag{8b}$$
$$\mathcal{L}f = \mathcal{L}g \tag{8c}$$

is coded as:

```
\begin{subequations}\label{eq:2}
\begin{align}
f&=g \label{eq:2A}\\
```

```
f' &=g' \label{eq:2B}\\
\mathcal{L}f &= \mathcal{L}g \label{eq:2c}
\end{align}
\end{subequations}
```

E. Matrices

There are several useful matrix environments that can save you some keystrokes. See the example coding below and the output.

A simple matrix:

$$\begin{matrix} 0 & 1 \\ 1 & 0 \end{matrix} \tag{9}$$

is coded as:

```
\begin{equation}
\begin{matrix}  0 &  1 \\
1 &  0 \end{matrix}
\end{equation}
```

A matrix with parenthesis

$$\begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix} \tag{10}$$

is coded as:

```
\begin{equation}
\begin{pmatrix} 0 & -i \\
 i &  0 \end{pmatrix}
\end{equation}
```

A matrix with square brackets

$$\mathbf{M} = \begin{bmatrix} 1-\varphi_1 & \varphi_1 \\ \varphi_2 & 1-\varphi_2 \end{bmatrix} \tag{11}$$

is coded as:

```
\begin{equation}
\mathbf{M} = \begin{bmatrix} 1 - \varphi_1 & \varphi_1 \\
\varphi_2 & 1 - \varphi_2 \end{bmatrix}
\end{equation}
```

F. Arrays

The `array` environment allows you some options for matrix-like equations. You will have to manually key the fences, but there are other options for alignment of the columns and for setting horizontal and vertical rules. The argument to `array` controls alignment and placement of vertical rules.

A simple array

$$\left(\begin{array}{cccc} a+b+c & uv & x-y & 27 \\ a+b & u+v & z & 134 \end{array} \right) \tag{12}$$

is coded as:

```
\begin{equation}
\left(
\begin{array}{cccc}
a+b+c & uv & x-y & 27\\
a+b & u+v & z & 134
\end{array} \right)
\end{equation}
```

A slight variation on this to better align the numbers in the last column

$$\left(\begin{array}{cccc} a+b+c & uv & x-y & 27 \\ a+b & u+v & z & 134 \end{array} \right) \tag{13}$$

is coded as:

```
\begin{equation}
\left(
\begin{array}{cccr}
a+b+c & uv & x-y & 27\\
a+b & u+v & z & 134
\end{array} \right)
\end{equation}
```

An array with vertical and horizontal rules

$$\left(\begin{array}{c|c|c|c} a+b+c & uv & x-y & 27 \\ \hline a+b & u+v & z & 134 \end{array} \right) \tag{14}$$

is coded as:

```
\begin{equation}
\left(
\begin{array}{c|c|c|r}
a+b+c & uv & x-y & 27\\
a+b & u+v & z & 134
\end{array} \right)
\end{equation}
```

Note the argument now has the pipe "|" included to indicate the placement of the vertical rules.

G. Cases Structures

Many times cases can be miscoded using the wrong environment, i.e., `array`. Using the `cases` environment will save keystrokes (from not having to type the `\left\lbrace`) and automatically provide the correct column alignment.

$$z_m(t) = \begin{cases} 1, & \text{if } \beta_m(t) \\ 0, & \text{otherwise.} \end{cases}$$

Note that the "&" is used to mark the tabular alignment. This is important to get proper column alignment. Do not use `\quad` or other fixed spaces to try and align the columns. Also, note the use of the `\text` macro for text elements such as "if" and "otherwise."

H. Function Formatting in Equations

Often, there is an easy way to properly format most common functions. Use of the `\` in front of the function name will in most cases, provide the correct formatting. When this does not work, the following example provides a solution using the `\text` macro:

$$d_R^{KM} = \arg\min_{d_i^{KM}} \{d_1^{KM}, \ldots, d_6^{KM}\}.$$

I. Text Acronyms Inside Equations

This example shows where the acronym "MSE" is coded using `\text{}` to match how it appears in the text.

$$\text{MSE} = \frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2$$

X. Conclusion

The conclusion goes here.

Acknowledgments

This should be a simple paragraph before the References to thank those individuals and institutions who have supported your work on this article.

XI. References Section

You can use a bibliography generated by BibTeX as a .bbl file. BibTeX documentation can be easily obtained at: http://mirror.ctan.org/biblio/bibtex/contrib/doc/ The IEEEtran BibTeX style support page is: http://www.michaelshell.org/tex/ieeetran/bibtex/

XII. Simple References

You can manually copy in the resultant .bbl file and set second argument of `\begin` to the number of references (used to reserve space for the reference number labels box).

References

[1] *Mathematics Into Type*. American Mathematical Society. [Online]. Available: https://www.ams.org/arc/styleguide/mit-2.pdf

[2] T. W. Chaundy, P. R. Barrett and C. Batey, *The Printing of Mathematics*. London, U.K., Oxford Univ. Press, 1954.

[3] F. Mittelbach and M. Goossens, *The LaTeXCompanion*, 2nd ed. Boston, MA, USA: Pearson, 2004.

[4] G. Grätzer, *More Math Into LaTeX*, New York, NY, USA: Springer, 2007.

[5] M. Letourneau and J. W. Sharp, *AMS-StyleGuide-online.pdf,* American Mathematical Society, Providence, RI, USA, [Online]. Available: http://www.ams.org/arc/styleguide/index.html

[6] H. Sira-Ramirez, "On the sliding mode control of nonlinear systems," *Syst. Control Lett.*, vol. 19, pp. 303–312, 1992.

[7] A. Levant, "Exact differentiation of signals with unbounded higher derivatives," in *Proc. 45th IEEE Conf. Decis. Control*, San Diego, CA, USA, 2006, pp. 5585–5590. DOI: 10.1109/CDC.2006.377165.

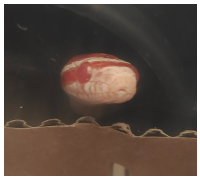
[8] M. Fliess, C. Join, and H. Sira-Ramirez, "Non-linear estimation is easy," *Int. J. Model., Ident. Control*, vol. 4, no. 1, pp. 12–27, 2008.

[9] R. Ortega, A. Astolfi, G. Bastin, and H. Rodriguez, "Stabilization of food-chain systems using a port-controlled Hamiltonian description," in *Proc. Amer. Control Conf.*, Chicago, IL, USA, 2000, pp. 2245–2249.

XIII. Biography Section

If you have an EPS/PDF photo (graphicx package needed), extra braces are needed around the contents of the optional argument to biography to prevent the LaTeX parser from getting confused when it sees the complicated `\includegraphics` command within an optional argument. (You can create your own custom macro containing the `\includegraphics` command to make things simpler here.)

If you include a photo:



Dr. Snake Smith S s s s. S s s s. S s s s S s s s. S s s s s s s s? S s s s s s... S s s s s s...

If you will not include a photo:

John Doe Use `\begin{IEEEbiographynophoto}` and the author name as the argument followed by the biography text.