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Abstract

This is the abstract for this article. If you are making your code available, *do not link to it in the abstract since many indexing services will automatically remove or redact the link*. Instead, we are requiring every paper to have an initial statement on data and code availability right after the abstract.

Not Human Subject Research, then for the camera-ready version of the paper, you must provide IRB information (and at the time of submission for review, you can say that this IRB information will be provided if the paper is accepted). If your research does not require IRB approval, then you must state this to be the case.

Data and Code Availability This initial paragraph is **mandatory**. Briefly state what data you use (including citations if appropriate) and whether the data are available to other researchers.¹ If you are not sharing code, you must explicitly state that you are not making your code available. If you are making your code available, then at the time of submission for review, please include your code as supplemental material or as a code repository link; in either case, your code must be anonymized. If your paper is accepted, then you should de-anonymize your code for the camera-ready version of the paper. *If you do not include this data and code availability statement for your paper, or you provide code that is not anonymized at the time of submission, then your paper will be desk-rejected*. Your experiments later could refer to this initial data and code availability statement if it is helpful (e.g., to avoid restating what data you use).

1. Introduction

This is a sample article that uses the `jmlr` class. Please follow the guidelines in this sample document as it can help to reduce complications when combining the articles into a book. Please avoid using obsolete commands, such as `\rm`, and obsolete packages, such as `epsfig`.² Some packages that are known to cause problems for the production editing process are checked for by the `jmlr` class and will generate an error. (If you want to know more about the production editing process, have a look at the video tutorials for the production editors at <http://www.dickimaw-books.com/software/makejmlrbookgui/videos/>.)

Please also ensure that your document will compile with PDF^ATEX. If you have an error message that's puzzling you, first check for it at the UK TUG FAQ <https://texfaq.org/FAQ-man-latex>. If that doesn't help, create a minimal working example (see <https://www.dickimaw-books.com/latex/minexample/>) and post to somewhere like TEX on StackExchange (<http://tex.stackexchange.com/>) or the L^AT_EX Community Forum (<http://www.latex-community.org/forum/>).

Institutional Review Board (IRB) This initial paragraph is **mandatory**. If your research requires IRB approval or has been designated by your IRB as

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1. An example data availability statement: This paper uses the MIMIC-III dataset (Johnson et al., 2016b), which is available on the PhysioNet repository (Johnson et al., 2016a).

2. See <http://www.ctan.org/pkg/l2tabu>

61 NOTE:

62 This is an numbered theorem-like environment that
63 was defined in this document's preamble.

64 1.1. Sub-sections

65 Sub-sections are produced using `\subsection`.

66 1.1.1. SUB-SUB-SECTIONS

67 Sub-sub-sections are produced using
68 `\subsubsection`.

69 **Sub-sub-sub-sections** Sub-sub-sub-sections are
70 produced using `\paragraph`. These are unnumbered
71 with a running head.

72 **Sub-sub-sub-sub-sections** Sub-sub-sub-sub-
73 sections are produced using `\subparagraph`. These
74 are unnumbered with a running head.

75 2. Cross-Referencing

76 Always use `\label` and `\ref` (or one of the com-
77 mands described below) when cross-referencing.
78 For example, the next section is Section 3 but you
79 can also refer to it using Section 3. The `jmlr` class
80 provides some convenient cross-referencing com-
81 mands: `\sectionref`, `\equationref`, `\tableref`,
82 `\figureref`, `\algorithmref`, `\theoremref`,
83 `\lemmaref`, `\remarkref`, `\corollaryref`,
84 `\definitionref`, `\conjectureref`, `\axiomref`,
85 `\exempleref` and `\appendixref`. The argument of
86 these commands may either be a single label or a
87 comma-separated list of labels. Examples:

88 Referencing sections: Section 3 or Sections 1 and 3
89 or Sections 1, 3, 5.1 and 5.2.

90 Referencing equations: Equation (1) or Equa-
91 tions (1) and (3) or Equations (1), (2), (3) and (4).

92 Referencing tables: Table 1 or Tables 1 and 2 or
93 Tables 1, 2 and 3.

94 Referencing figures: Figure 1 or Figures 1 and 2 or
95 Figures 1, 2 and 3 or Figures 3(a) and 3(b).

96 Referencing algorithms: Algorithm 1 or Algo-
97 rithms 1 and 2 or Algorithms 1, 2 and 3.

98 Referencing theorem-like environments: Theorem 1,
99 Lemma 2, Remark 3, Corollary 4, Definition 5,
100 Conjecture 6, Axiom 7 and Example 1.

101 Referencing appendices: Appendix A or Appen-
102 dices A and B.

3. Equations

The `jmlr` class loads the `amsmath` package, so you can
use any of the commands and environments defined
there. (See the `amsmath` documentation for further
details.³)

Unnumbered single-lined equations should be dis-
played using `[` and `]`. For example:

$$E = mc^2$$

or you can use the `displaymath` environment:

$$E = mc^2$$

Numbered single-line equations should be displayed
using the `equation` environment. For example:

$$\cos^2 \theta + \sin^2 \theta \equiv 1 \quad (1)$$

This can be referenced using `\label` and
`\equationref`. For example, Equation (1).

Multi-lined numbered equations should be dis-
played using the `align` environment.⁴ For example:

$$f(x) = x^2 + x \quad (2)$$

$$f'(x) = 2x + 1 \quad (3)$$

Unnumbered multi-lined equations can be displayed
using the `align*` environment. For example:

$$\begin{aligned} f(x) &= (x + 1)(x - 1) \\ &= x^2 - 1 \end{aligned}$$

If you want to mix numbered with unnumbered lines
use the `align` environment and suppress unwanted
line numbers with `\nonumber`. For example:

$$\begin{aligned} y &= x^2 + 3x - 2x + 1 \\ &= x^2 + x + 1 \end{aligned} \quad (4)$$

An equation that is too long to fit on a single line
can be displayed using the `split` environment. Text
can be embedded in an equation using `\text` or
`\intertext` (as used in Theorem 1). See the `ams-
math` documentation for further details.

3. Either `texdoc amsmath` or <http://www.ctan.org/pkg/amsmath>

4. For reasons why you shouldn't use the obsolete `eqnarray`
environment, see Lars Madsen, *Avoid eqnarray!* TUGboat
33(1):21–25, 2012.

127 **3.1. Operator Names**

128 Predefined operator names are listed in Ta-
 129 ble 1. For additional operators, either use
 130 `\operatorname`, for example $\operatorname{var}(X)$ or declare it
 131 with `\DeclareMathOperator`, for example

```
132 \DeclareMathOperator{\var}{var}
```

133 and then use this new command. If you want
 134 limits that go above and below the operator (like
 135 `\sum`) use the starred versions (`\operatorname*` or
 136 `\DeclareMathOperator*`).

137 **4. Vectors and Sets**

138 Vectors should be typeset using `\vec`. For example
 139 \mathbf{x} . (The original version of `\vec` can also be accessed
 140 using `\orgvec`, for example \vec{x} .) The `jmlr` class also
 141 provides `\set` to typeset a set. For example \mathcal{S} .

142 **5. Floats**

143 Floats, such as figures, tables and algorithms, are
 144 moving objects and are supposed to float to the near-
 145 est convenient location. Please don't force them to
 146 go in a particular place. In general it's best to use
 147 the `htbp` specifier and don't put the figure or table in
 148 the middle of a paragraph (that is make sure there's
 149 a paragraph break above and below the float). Floats
 150 are supposed to have a little extra space above and
 151 below them to make them stand out from the rest of
 152 the text. This extra spacing is put in automatically
 153 and shouldn't need modifying.

154 If your article will later be reprinted in the Chal-
 155 lenges for Machine Learning, please be aware that
 156 the CiML books use a different paper size, so if you
 157 want to resize any images use a scale relative to the
 158 line width (`\linewidth`), text width (`\textwidth`)
 159 or text height (`\textheight`).

160 To ensure consistency, please *don't* try changing
 161 the format of the caption by doing something like:

```
162 \caption{\textit{A Sample Caption.}}
```

163 or

```
164 \caption{\em A Sample Caption.}
```

165 You can, of course, change the font for individual
 166 words or phrases, for example:

```
167 \caption{A Sample Caption With Some  

  168 \emph{Emphasized Words}.}
```

169 **5.1. Tables**

170 Tables should go in the `table` environment. Within
 171 this environment use `\floatconts` (defined by `jmlr`)
 172 to set the caption correctly and center the table con-
 173 tents. The location of the caption depends on the
 174 `tablecaption` setting in the document class options.

175 If you want horizontal rules you can use the
 176 `booktabs` package which provides the commands
 177 `\toprule`, `\midrule` and `\bottomrule`. For exam-
 178 ple, see Table 3.

179 If you really want vertical lines as well, you can't
 180 use the `booktabs` commands as there'll be some un-
 181 wanted gaps. Instead you can use L^AT_EX's `\hline`,
 182 but the rows may appear a bit cramped. You can add
 183 extra space above or below a row using `\abovestru`
 184 and `\belowstrut`. For example, see Table 4. How-
 185 ever, you might want to read the `booktabs` documen-
 186 tation regarding the use of vertical lines.

187 If you want to align numbers on their decimal
 188 point, you can use the `siunitx` package. For exam-
 189 ple, see Table 5. For further details see the `siunitx`
 190 documentation⁵.

191 If the table is too wide, you can adjust the inter-
 192 column spacing by changing the value of `\tabcolsep`.
 193 For example:

```
\setlength{\tabcolsep}{3pt}
```

194 If the table is very wide but not very long, you can
 195 use the `sidewaystable` environment defined in the
 196 `rotating` package (so use `\usepackage{rotating}`).
 197 If the table is too long to fit on a page, you can use
 198 the `longtable` environment defined in the `longtable`
 199 package (so use `\usepackage{longtable}`).
 200

201 **5.2. Figures**

202 Figures should go in the `figure` environment. Within
 203 this environment, use `\floatconts` to correctly po-
 204 sition the caption and center the image. Use
 205 `\includegraphics` for external graphics files but
 206 omit the file extension. Do not use `\epsfig` or
 207 `\psfig`. If you want to scale the image, it's better
 208 to use a fraction of the line width rather than an
 209 explicit length. For example, see Figure 1.

210 If your image is made up of L^AT_EX code (for ex-
 211 ample, commands provided by the `pgf` package) you
 212 can include it using `\includeteximage` (defined by
 213 the `jmlr` class). This can be scaled and rotated in the

5. Either `texdoc siunitx` or <http://www.ctan.org/pkg/siunitx>

Table 1: Predefined Operator Names (taken from amsmath documentation)

<code>\arccos</code>	arccos	<code>\deg</code>	deg	<code>\lg</code>	lg	<code>\projlim</code>	projlim
<code>\arcsin</code>	arcsin	<code>\det</code>	det	<code>\lim</code>	lim	<code>\sec</code>	sec
<code>\arctan</code>	arctan	<code>\dim</code>	dim	<code>\liminf</code>	liminf	<code>\sin</code>	sin
<code>\arg</code>	arg	<code>\exp</code>	exp	<code>\limsup</code>	limsup	<code>\sinh</code>	sinh
<code>\cos</code>	cos	<code>\gcd</code>	gcd	<code>\ln</code>	ln	<code>\sup</code>	sup
<code>\cosh</code>	cosh	<code>\hom</code>	hom	<code>\log</code>	log	<code>\tan</code>	tan
<code>\cot</code>	cot	<code>\inf</code>	inf	<code>\max</code>	max	<code>\tanh</code>	tanh
<code>\coth</code>	coth	<code>\injlim</code>	injlim	<code>\min</code>	min		
<code>\csc</code>	csc	<code>\ker</code>	ker	<code>\Pr</code>	Pr		
		<code>\varlimsup</code>	$\overline{\lim}$	<code>\varinjlim</code>	\varinjlim		
		<code>\varliminf</code>	$\underline{\lim}$	<code>\varprojlim</code>	\varprojlim		

Table 2: An Example Table

Dataset	Result
Data1	0.12345
Data2	0.67890
Data3	0.54321
Data4	0.09876

Table 5: A Table With Numbers Aligned on the Decimal Point

Dataset	Result
Data1	0.12345
Data2	10.6789
Data3	50.543
Data4	200.09876

Table 3: A Table With Horizontal Lines

Dataset	Result
Data1	0.12345
Data2	0.67890
Data3	0.54321
Data4	0.09876

same way as `\includegraphics`. For example, see [Figure 2](#). 214
215

Table 4: A Table With Horizontal and Vertical Lines

Dataset	Result
Data1	0.12345
Data2	0.67890
Data3	0.54321
Data4	0.09876

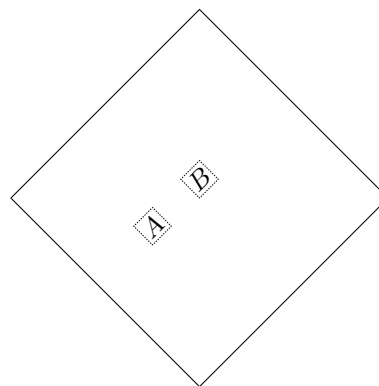


Figure 2: Image Created Using L^AT_EX Code



Figure 1: Example Image

If the figure is too wide to fit on the page, you can use the `sidewaysfigure` environment defined in the `rotating` package. 216
217
218

219 Don't use `\graphicspath`.⁶ If the im-
 220 ages are contained in a subdirectory, specify
 221 this when you include the image, for example
 222 `\includegraphics{figures/mypic}`.

223 5.2.1. SUB-FIGURES

224 Sub-figures can be created using `\subfigure`, which
 225 is defined by the `jmlr` class. The optional argument
 226 allows you to provide a subcaption. The label should
 227 be placed in the mandatory argument of `\subfigure`.
 228 You can reference the entire figure, for example Fig-
 229 ure 3, or you can reference part of the figure using
 230 `\figureref`, for example Figure 3(a). Alternatively
 231 you can reference the subfigure using `\subfigref`, for
 232 example (a) and (b) in Figure 3.

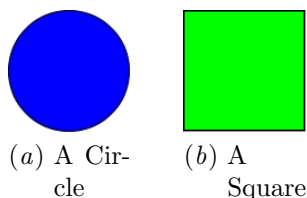


Figure 3: An Example With Sub-Figures.

233 By default, the sub-figures are aligned on the base-
 234 line. This can be changed using the second optional
 235 argument of `\subfigure`. This may be `t` (top), `c`
 236 (centered) or `b` (bottom). For example, the subfig-
 237 ures (a) and (b) in Figure 4 both have `[c]` as the
 238 second optional argument.

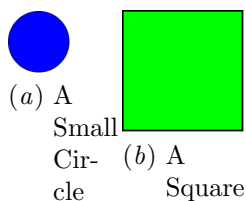


Figure 4: Another Example With Sub-Figures.

239 5.3. Sub-Tables

240 There is an analogous command `\subtable` for sub-
 241 tables. It has the same syntax as `\subfigure` de-

6. This is specific to the `jmlr` class, not a general recommen-
 dation. The main file that generates the proceedings or
 the CiML book is typically in a different directory to the
 imported articles, so it modifies the graphics path when it
 imports an article.

scribed above. You can reference the table using
`\tableref`, for example Table 6 or you can refer-
 ence part of the table, for example Table 6(a).
 Alternatively you can reference the subtable using
`\subtabref`, for example (a) and (b) in Table 6.

Table 6: An Example With Sub-Tables

(a)		(b)	
A	B	C	D
1	2	3	4
		5	6

By default, the sub-tables are aligned on the top.
 This can be changed using the second optional argu-
 ment of `\subtable`. This may be `t` (top), `c` (cen-
 tered) or `b` (bottom). For example, the sub-tables
 (a) and (b) in Table 7 both have `[c]` as the second
 optional argument.

Table 7: Another Example With Sub-Tables

(a)		(b)	
A	B	C	D
1	2	3	4
		5	6

253 5.4. Algorithms

Enumerated textual algorithms can be displayed us-
 ing the `algorithm` environment. Within this envi-
 ronment, use `\caption` to set the caption and you
 can use an `enumerate` or nested `enumerate` environ-
 ments. For example, see Algorithm 1. Note that
 algorithms float like figures and tables.

Algorithm 1: The Gauss-Seidel Algorithm

1. For $k = 1$ to maximum number of iterations

(a) For $i = 1$ to n

i. $x_i^{(k)} = \frac{b_i - \sum_{j=1}^{i-1} a_{ij}x_j^{(k)} - \sum_{j=i+1}^n a_{ij}x_j^{(k-1)}}{a_{ii}}$

ii. If $\|\mathbf{x}^{(k)} - \mathbf{x}^{(k-1)}\| < \epsilon$, where ϵ is a
 specified stopping criteria, stop.

If you'd rather have the same numbering through-
 out the algorithm but still want the convenient in-
 dentation of nested `enumerate` environments, you can

263 use the `enumerate*` environment provided by the `jmlr`
 264 class. For example, see Algorithm 2.

Algorithm 2: Moore's Shortest Path

Given a connected graph G , where the length of each edge is 1:

1. Set the label of vertex s to 0
 2. Set $i = 0$
 3. Locate all unlabelled vertices adjacent to a vertex labelled i and label them $i + 1$
 4. If vertex t has been labelled,
 - the shortest path can be found by back-tracking, and the length is given by the label of t .
 - otherwise
 - increment i and return to step 3
-

265 Pseudo code can be displayed using the
 266 `algorithm2e` environment. This is defined by
 267 the `algorithm2e` package (which is automatically
 268 loaded) so check the `algorithm2e` documentation for
 269 further details.⁷ For an example, see Algorithm 3.

Algorithm 3: Computing Net Activation

Input: $x_1, \dots, x_n, w_1, \dots, w_n$

Output: y , the net activation

```

 $y \leftarrow 0;$ 
for  $i \leftarrow 1$  to  $n$  do
  |  $y \leftarrow y + w_i * x_i;$ 
end

```

270 6. Description Lists

271 The `jmlr` class also provides a description-like environ-
 272 ment called `altdescription`. This has an argument
 273 that should be the widest label in the list. Compare:

274 **add** A method that adds two variables.

275 **differentiate** A method that differentiates a func-
 276 tion.

277 with

7. Either `texdoc algorithm2e` or <http://www.ctan.org/pkg/algorithm2e>

add A method that adds two variables.

differentiate A method that differentiates a function.

282 7. Theorems, Lemmas etc

283 The following theorem-like environments are prede-
 284 fined by the `jmlr` class: `theorem`, `example`, `lemma`,
 285 `proposition`, `remark`, `corollary`, `definition`,
 286 `conjecture` and `axiom`. You can use the `proof` en-
 287 vironment to display the proof if need be, as in The-
 288 orem 1.

Theorem 1 (Eigenvalue Powers) *If λ is an eigenvalue of B with eigenvector ξ , then λ^n is an eigenvalue of B^n with eigenvector ξ .*

Proof *Let λ be an eigenvalue of B with eigenvector ξ , then*

$$B\xi = \lambda\xi$$

premultiply by B :

$$\begin{aligned}
 BB\xi &= B\lambda\xi \\
 \Rightarrow B^2\xi &= \lambda B\xi \\
 &= \lambda\lambda\xi && \text{since } B\xi = \lambda\xi \\
 &= \lambda^2\xi
 \end{aligned}$$

Therefore true for $n = 2$. Now assume true for $n = k$:

$$B^k\xi = \lambda^k\xi$$

premultiply by B :

$$\begin{aligned}
 BB^k\xi &= B\lambda^k\xi \\
 \Rightarrow B^{k+1}\xi &= \lambda^k B\xi \\
 &= \lambda^k\lambda\xi && \text{since } B\xi = \lambda\xi \\
 &= \lambda^{k+1}\xi
 \end{aligned}$$

Therefore true for $n = k + 1$. Therefore, by induction, true for all n . ■

Lemma 2 (A Sample Lemma) *This is a lemma.*

Remark 3 (A Sample Remark) *This is a re- mark.*

Corollary 4 (A Sample Corollary) *This is a corollary.*

304 **Definition 5 (A Sample Definition)** *This is a* comma-separated list, for example [Guyon and Elisseeff \(2003\)](#); [Guyon et al. \(2007\)](#).
 305 *definition.*

306 **Conjecture 6 (A Sample Conjecture)** *This is* These commands have optional arguments and
 307 *a conjecture.* have a starred version. See the `natbib` documenta-
 308 *tion* for further details.⁹

308 **Axiom 7 (A Sample Axiom)** *This is an axiom.* The bibliography is displayed using
 309 `\bibliography`.

309 **Example 1 (An Example)** *This is an example.*

310 8. Color vs Grayscale

311 It's helpful if authors supply grayscale versions of
 312 their images in the event that the article is to be
 313 incorporated into a black and white printed book.
 314 With external PDF, PNG or JPG graphic files,
 315 you just need to supply a grayscale version of the
 316 file. For example, if the file is called `myimage.png`,
 317 then the gray version should be `myimage-gray.png`
 318 or `myimage-gray.pdf` or `myimage-gray.jpg`. You
 319 don't need to modify your code. The `jmlr` class checks
 320 for the existence of the grayscale version if it is print
 321 mode (provided you have used `\includegraphics`
 322 and haven't specified the file extension).

323 You can use `\ifprint` to determine which mode
 324 you are in. For example, in Figure 1, the purple el-
 325 lipse represents an input and the yellow ellipse repre-
 326 sents an output. Another example: **important text!**

327 You can use the class option `gray` to see how the
 328 document will appear in gray scale mode. **Colored**
 329 **text** will automatically be converted to gray scale in
 330 print mode.

331 The `jmlr` class loads the `xcolor` package, so you can
 332 also define your own colors. For example: **XYZ**.

333 The `xcolor` class is loaded with the `x11names` op-
 334 tion, so you can use any of the `x11` predefined colors
 335 (listed in the `xcolor` documentation⁸).

336 9. Citations and Bibliography

337 The `jmlr` class automatically loads `natbib` and auto-
 338 matically sets the bibliography style, so you don't
 339 need to use `\bibliographystyle`. This sample file
 340 has the citations defined in the accompanying Bib-
 341 TeX file `chil-sample.bib`. For a parenthetical cita-
 342 tion use `\citep`. For example ([Guyon and Elisseeff,](#)
 343 [2003](#)). For a textual citation use `\citet`. For exam-
 344 ple [Guyon et al. \(2007\)](#). Both commands may take a

345 comma-separated list, for example [Guyon and Elisseeff \(2003\)](#);
 346 [Guyon et al. \(2007\)](#).

347 These commands have optional arguments and
 348 have a starred version. See the `natbib` documenta-
 349 tion for further details.⁹

350 The bibliography is displayed using
 351 `\bibliography`.

352 Acknowledgments

353 Acknowledgments go here *but should only appear in*
 354 *the camera-ready version of the paper if it is ac-*
 355 *cepted.* Acknowledgments do not count toward the
 356 paper page limit.

357 References

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 372 [1038/sdata.2016.35](https://doi.org/10.1038/sdata.2016.35).

373 Appendix A. First Appendix

374 This is the first appendix.

375 Appendix B. Second Appendix

376 This is the second appendix.

8. either `texdoc xcolor` or <http://www.ctan.org/pkg/xcolor>

9. Either `texdoc natbib` or <http://www.ctan.org/pkg/natbib>