A replication study of transformer-based TabPFN for assessing the applicability of neural-network based solutions in tabular classification.

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Abstract

Abstracts must be able to stand alone and so cannot contain citations to the paper's references, equations, etc. An abstract must consist of a single paragraph and be concise. Because of online formatting, abstracts must appear as plain as possible. Three to six keywords must be included. Each keyword should not exceed three words.

Keywords: keyword1, keyword2, keyword3, keyword4, keyword5, keyword6.

1. Introduction

Your introduction goes here! Simply start writing your document and use the Recompile button to view the updated PDF preview. Examples of commonly used commands and features are listed below to help you get started. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

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2. Example for First Level Head - Section Head

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

2.1 How to create sections and subsections

Simply use the section and subsection commands, as in this example document! With Overleaf, all the formatting and numbering is handled automatically according to the template you've chosen. If you're using the Visual Editor, you can also create new sections and subsections via the buttons in the editor toolbar.

2.2 This is an example for second level head - subsection head

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

¹https://data.gov.uk/

²Example of footnote text.

2.2.1 This is an example for third level head - subsubsection head

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

This is an example for fourth level head - paragraph head

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

3. Example for First Level Head

3.1 This is an example for second level head - subsection head

3.1.1 This is an example for third level head - subsubsection head

Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Donec odio elit, dictum in, hendrerit sit amet, egestas sed, leo. Praesent feugiat sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetuer at, consectetuer sed, eleifend ac, lectus. Nulla facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

This is an example for fourth level head - paragraph head

Morbi luctus, wisi viverra faucibus pretium, nibh est placerat odio, nec commodo wisi enim eget quam. Quisque libero justo, consectetuer a, feugiat vitae, porttitor eu, libero. Suspendisse sed mauris vitae elit sollicitudin malesuada. Maecenas ultricies eros sit amet ante. Ut venenatis velit. Maecenas sed mi eget dui varius euismod. Phasellus aliquet volutpat odio. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Pellentesque sit amet pede ac sem eleifend consectetuer. Nullam

elementum, urna vel imperdiet sodales, elit ipsum pharetra ligula, ac pretium ante justo 95 a nulla. Curabitur tristique arcu eu metus. Vestibulum lectus. Proin mauris. Proin eu 96 nunc eu urna hendrerit faucibus. Aliquam auctor, pede consequat laoreet varius, eros 97 tellus scelerisque quam, pellentesque hendrerit ipsum dolor sed augue. Nulla nec lacus. 98

4. How to Include Equations

Equations in LaTeX can either be inline or set as display equations. For inline equations use the \$...\$ commands. Eg: the equation $H\psi = E\psi$ is written via the command 101 \$\text{\$\text{H} \psi = E \psi\$}.

For display equations (with auto generated equation numbers) one can use the equation or equarray environments:

$$\|\tilde{X}(k)\|^{2} \le \frac{\sum_{i=1}^{p} \|\tilde{Y}_{i}(k)\|^{2} + \sum_{j=1}^{q} \|\tilde{Z}_{j}(k)\|^{2}}{p+q},$$
(1)

99

where 105

$$D_{\mu} = \partial_{\mu} - ig \frac{\lambda^{a}}{2} A^{a}_{\mu}$$

$$F^{a}_{\mu\nu} = \partial_{\mu} A^{a}_{\nu} - \partial_{\nu} A^{a}_{\mu} + g f^{abc} A^{b}_{\mu} A^{a}_{\nu}$$

$$(2)$$

Notice the use of \nonumber in the align environment at the end of each line, except 106 the last, so as not to produce equation numbers on lines where no equation numbers 107 are required. The \label{} command should only be used at the last line of an align 108 environment where \nonumber is not used.

$$Y_{\infty} = \left(\frac{m}{\text{GeV}}\right)^{-3} \left[1 + \frac{3\ln(m/\text{GeV})}{15} + \frac{\ln(c_2/5)}{15} \right]$$
(3)

The class file also supports the use of \mathbf{R} , \mathbf{R} and \mathbf{R} respectively 111

Equations must be provided as editable text, either in a Word or LaTeX source file. 112 They should be numbered consecutively through the manuscript as shown in Equations 113??, ?? and ??. In APA style, when discussing numbered equations in the text, write out 114 the word "Equation" and give the number. For example, you would write "see Equation 115??." Use no punctuation after the equation if it appears at the end of a sentence; however, 116 it is permissible (and may even be necessary) to place some form of punctuation after it 117 (a comma or semi-colon, for example) if it appears in the middle of the sentence and is 118 followed by text. In any case, maintain the coherence of all sentences with equations in 119 them.

125

Use the table and tabular environments for basic tables — see Tables ?? and ??, for 122 example. Table ?? is an sample figure including table footnotes. For more information, 123 please see this help article on tables.

Table 1: Sample table with footnotes

column 1	column 2	column 3	column 4
row 1	data 1	data 2 data 5^1	data 3
row 2 row 3	data 4 data 7	data 8	$ data 6 \\ data 9^2 $

Source: This is an example of table footnote. This is an example of table footnote.

Table 2: Example of a lengthy table which is set to full textwidth.

	Element 1 ¹		Element 2 ²			
Project	Energy	$\sigma_{ m calc}$	$\sigma_{ m expt}$	Energy	$\sigma_{ m calc}$	$\sigma_{ m expt}$
Element 3	990 A	1168	1547 ± 12	780 A	1166	1239 ± 100
Element 4	500 A	961	922 ± 10	900 A	1268	1092 ± 40

Note: This is an example of table footnote this is an example of table footnote this is an example of table footnote this is an example of table footnote.

6. How to Include Figures

First you have to upload the image file from your computer using the upload link in the 126 file-tree menu. Then use the includegraphics command to include it in your document. 127 Use the figure environment and the caption command to add a number and a caption 128 to your figure. See the code for Figure ?? in this section for an example. As shown in 129 Figures ?? and ??, the images should be single-page documents.

Note that your figure will automatically be placed in the most appropriate place for 131 it, given the surrounding text and taking into account other figures or tables that may 132 be close by. You can find out more about adding images to your documents in this help 133 article on including images on Overleaf.

¹ Example for a first table footnote.

² Example for a second table footnote.

¹ Example for a first table footnote.

² Example for a second table footnote.

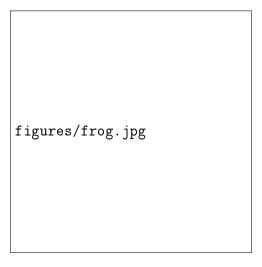


Figure 1: This frog was uploaded via the file-tree menu.

6.1 More information about figures

As per display LATEX standards one has to use eps images for latex compilation and 136 pdf/jpg/png images for pdflatex compilation. This is one of the major differences 137 between latex and pdflatex. The images should be single-page documents. The command 138 for inserting images for latex and pdflatex can be generalized. The package used to 139 insert images in latex/pdflatex is the graphicx package. Figures can be inserted via the 140 normal figure environment as shown in the below example:

135

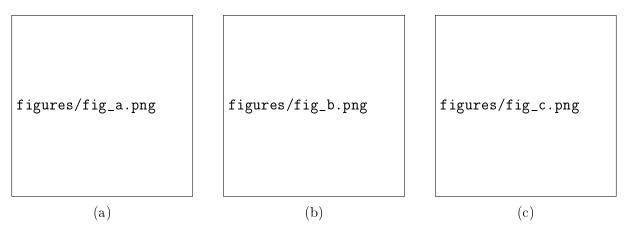


Figure 2: Overall caption for the three figures: (a) caption for figure a, (b) caption for figure b, and (c) caption for figure c.

7. How to Include Algorithms, Program Codes, and 147 Listings

Packages algorithm, algorithmicx, and algorithms algorithms algorithms algorithms in latex. For this, one has to use the below format:

```
\begin{algorithm}
\caption{<alg-caption>}\label{<alg-label>}

\begin{algorithmic}[1]
. . .
\end{algorithmic}

\end{algorithmic}

\end{algorithm}
```

You may need to refer to the above-listed package documentation for more details 157 before setting an algorithm environment. To set program codes, one has to use the 158 program package. We need to use the \begin{program} . . . \end{program} environment 159 to set program codes.

```
Algorithm 1 Calculate y = x^n
```

```
Require: n \ge 0 \lor x \ne 0
Ensure: y = x^n
 1: y \Leftarrow 1
 2: if n < 0 then
          X \Leftarrow 1/x
 4:
          N \Leftarrow -n
 5: else
          X \Leftarrow x
 6:
          N \Leftarrow n
 8: end if
    while N \neq 0 do
10:
          if N is even then
              X \Leftarrow X \times X
11:
              N \Leftarrow N/2
12:
13:
          else[N \text{ is odd}]
              y \Leftarrow y \times X
14:
              N \Leftarrow N - 1
15:
16:
          end if
17: end while
```

Similarly, for listings, one has to use the listings package. To set environments 161 similar to the verbatim environment, the \begin{lstlisting} ... \end{lstlisting} 162 environment is used . Refer to the lstlisting package documentation for more details 163 on this.

```
for i:=maxint to 0 do
begin
{ do nothing }
end;
Write('Case_insensitive_');
Write('Pascal_keywords.');
```

8. How to Include Lists

List in LATEX can be of three types: numbered, bulleted, and unnumbered. The "enumerate" 167 environment produces a numbered list, the "itemize" environment produces a bulleted list, 168 and the "unlist" environment produces an unnumbered list. In each environment, a new 169 entry is added via the \item command.

166

183

186

- 1. This is the 1st item
- 2. Enumerate creates numbered lists, itemize creates bulleted lists, and unnumerate creates unnumbered lists.
 - a. Second level numbered list. Enumerate creates numbered lists, itemize creates bulleted lists, and description creates unnumbered lists.
 - b. Second level numbered list. Enumerate creates numbered lists, itemize creates
 bulleted lists, and description creates unnumbered lists.
 - (i) Third level numbered list. Enumerate creates numbered lists, itemize 178 creates bulleted lists, and description creates unnumbered lists. 179
 - (ii) Third level numbered list. Enumerate creates numbered lists.
 - c. Second level numbered list. Enumerate creates numbered lists, itemize creates bulleted lists, and description creates unnumbered lists.
- 3. Numbered lists continue.

Lists in LATEX can be of three types: enumerate, itemize, and description. In each 184 environment, a new entry is added via the \item command.

- First level bulleted list. This is the 1st item
- First level bulleted list. Itemize creates bulleted lists, and description creates 187 unnumbered lists.
 - Second level dashed list. Itemize creates bulleted lists, and description creates unnumbered lists.

unnumbered lists.	191
• First level bulleted list. Bullet lists continue.	193
Example for unnumbered list items:	194
Sample unnumberd list text. Sample unnumberd list text. Sample unnumberd list text. Sample unnumberd list text.	195 196
Sample unnumberd list text. Sample unnumberd list text. Sample unnumberd list text.	197
Sample unnumberd list text. Sample unnumberd list text. Sample unnumberd list text. Sample unnumberd list text.	198 199

9. How to Add Citations and a References List

You can simply upload a .bib file containing your BibTeX entries, created with a tool 201 such as JabRef. You can then cite entries from it, like this: greenwade93. Just remember 202 to specify a bibliography style, as well as the filename of the .bib. You can find a video 203 tutorial here to learn more about BibTeX.

Here is an example citation when you want an author name like collins 2011a to appear 205 in the text. And here's how to do a parenthetic citation, when you want to mention a 206 reference at the end of a sentence or part of a sentence collins 2013. It is possible to cite 207 multiple references at the same time collins 2011b, collins 2016, lunn 2007a, lunn 2007b, ross 2006 shannon 194

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If you have an upgraded account, you can also import your Mendeley or Zotero library 209 directly as a .bib file, via the upload menu in the file-tree.

9.1 Citation in text

Please ensure that every reference cited in the text is also present in the reference list 212 (and vice versa). Citations in the text should follow the referencing style used by the 213 American Psychological Association. You are referred to the Publication Manual of the 214 American Psychological Association (APA), Seventh Edition, ISBN 978-1-4338-3215-4, 215 copies of which may be ordered online. References in the Abstract should be avoided, 216 but if essential, then cite the author(s) and year(s). Unpublished results and personal 217 communications are not recommended in the reference list but may be mentioned in the 218 text. If these references are included in the reference list, they should follow the standard 219 reference style of the journal and should include a substitution of the publication date 220 with either 'Unpublished results' or 'Personal communication'. The citation of a reference 221 as 'in press' implies that the item has been accepted for publication.

An APA in-text citation includes only three items: the last name(s) of the author(s), 223 the year the source was published, and sometimes the page or location of the information. 224

More than one reference from the same author(s) in the same year must be identified by	225
the letters 'a', 'b', 'c', etc., placed after the year of publication. The following paragraph	226
shows examples of APA style of citations.	227
Here is an example citation when you want an author name like collins 2011a to appear	228
in the text. And here's how to do a parenthetic citation when you want to mention a	229
reference at the end of a sentence or part of a sentence collins 2013. It is possible to cite	230
$multiple\ references\ at\ the\ same\ time\ collins 2011b, collins 2016, lunn 2007a, lunn 2007b, ross 2006a, lunn 2006a, lunn$	6 <mark>,≋h</mark> annon194
The followings are examples for : rahman2019centroidb, krizhevsky201	l 2 imagenet,
$horvath 2018dna,\ and\ lecun 2015deep,\ zhang 2018fine,\ ravi 2016deep.\ Another\ example\ for$	233
$\verb : bahdanau 2014 neural, imboden 2018 cardiores piratory, motiian 2017 unified to the control of the contro$	damurphy201
9.2 References	235
The Reference Section, also called the Reference List or Cited Works List, is a list of the	236
full-text details of the in-text citations that have been used in the main text. It includes	237
information such as the name of the author(s), the year the source was published, the full	238
title of the source, and the URL or page range. The Reference Section allows the reader to	239
find the text easily and can be considered as the long-hand format of the in-text citation.	240
It is found at the end of the piece of writing. The works in a reference section should be	241
arranged first alphabetically and then further sorted chronologically if necessary.	242
9.2.1 Web references	243
As a minimum, the full URL should be given and the date when the reference was last	244
accessed. Any further information, if known (DOI, author names, dates, reference to a	245
source publication, etc.), should also be given. Web references can be listed separately	246
(e.g., after the reference list) under a different heading if desired or can be included in the	247
${\it reference\ list.}\ \ {\it With\ standard\ numerical\ .bst\ files,\ only\ numerical\ citations\ are\ possible.}$	248
With an author-year .bst file, both numerical and author-year citations are possible.	249
9.2.2 Examples for reference style	250
You can find information about the examples of APA-style references to various sources	251
at the following site:	252
https://apastyle.apa.org/style-grammar-guidelines/references/examples.	253
10. Conclusions	254
Some conclusions here.	255

Conflicts of Interest

Declare conflicts of interest or state "The authors declare no conflict of interest." Authors 257 must identify and declare any personal circumstances or interests that may be perceived 258 as inappropriately influencing the representation or interpretation of reported research 259 results. A detailed definition of conflicts of interest is available at the following site: 260 https://academic.oup.com/journals/pages/authors/preparing_your_manuscript/ 261 ethics#conflict.

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Author Contributions

Must include all authors, identified by initials, for example: "Conceptualization, S.R.. 264 and D.A.; methodology, S.R..; software, S.R..; validation, S.R.., D.A. and K.L.; formal 265 analysis, S.R..; investigation, S.R..; resources, S.R..; data curation, S.R..; writing—original 266 draft preparation, S.R..; writing—review and editing, S.R..; visualization, S.R..; supervision 267 S.R..; project administration, S.R..; funding acquisition, D.A." Individual contributions 268 are specified according to NISO Credit (Contributor Roles Taxonomy) described at the 269 following site: https://credit.niso.org/.

Acknowledgments

The authors thank the anonymous reviewers for their valuable suggestions. This work is 272 supported in part by funds from the National Science Foundation (NSF: # 1636933 and 273 # 1920920).

A. Some Notation

Suspendisse vitae elit. Aliquam arcu neque, ornare in, ullamcorper quis, commodo eu, 276 libero. Fusce sagittis erat at erat tristique mollis. Maecenas sapien libero, molestie et, 277 lobortis in, sodales eget, dui. Morbi ultrices rutrum lorem. Nam elementum ullamcorper 278 leo. Morbi dui. Aliquam sagittis. Nunc placerat. Pellentesque tristique sodales est. 279 Maecenas imperdiet lacinia velit. Cras non urna. Morbi eros pede, suscipit ac, varius 280 vel, egestas non, eros. Praesent malesuada, diam id pretium elementum, eros sem dictum 281 tortor, vel consectetuer odio sem sed wisi.

A.1 Appendix subsection title here

As shown in Equation ??, the section number is inserted in the equation number. Sed 284 feugiat. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus 285 mus. Ut pellentesque augue sed urna. Vestibulum diam eros, fringilla et, consectetuer eu, 286

nonummy id, sapien. Nullam at lectus. In sagittis ultrices mauris. Curabitur malesuada 287 erat sit amet massa. Fusce blandit. Aliquam erat volutpat. Aliquam euismod. Aenean 288 vel lectus. Nunc imperdiet justo nec dolor.

$$Y_{\infty} = \left(\frac{m}{\text{GeV}}\right)^{-3} \left[1 + \frac{3\ln(m/\text{GeV})}{15} + \frac{\ln(c_2/5)}{15}\right]$$
 (A1)

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299

A.2 Appendix subsection title here

As shown in Table ??, the section number is inserted in the table number. Etiam euismod. 291 Fusce facilisis lacinia dui. Suspendisse potenti. In mi erat, cursus id, nonummy sed, 292 ullamcorper eget, sapien. Praesent pretium, magna in eleifend egestas, pede pede pretium 293 lorem, quis consectetuer tortor sapien facilisis magna. Mauris quis magna varius nulla 294 scelerisque imperdiet. Aliquam non quam. Aliquam porttitor quam a lacus. Praesent 295 vel arcu ut tortor cursus volutpat. In vitae pede quis diam bibendum placerat. Fusce 296 elementum convallis neque. Sed dolor orci, scelerisque ac, dapibus nec, ultricies ut, mi. 297 Duis nec dui quis leo sagittis commodo.

Table A1: Sample table with three parts and five columns

column 1	column 2	column 3	column 4	column 5
row 1	$\mathrm{data}\ 0$	data 1	data 2	data 3
row 2	$\mathrm{data}\ 4$	data 5	data 6	data 7
row 3	data 8	data 9	data 10	data 11

B. Some More Notation

As shown in Figure ??, the section number is inserted in the figure number. Aliquam 300 lectus. Vivamus leo. Quisque ornare tellus ullamcorper nulla. Mauris porttitor pharetra 301 tortor. Sed fringilla justo sed mauris. Mauris tellus. Sed non leo. Nullam elementum, 302 magna in cursus sodales, augue est scelerisque sapien, venenatis congue nulla arcu et pede. 303 Ut suscipit enim vel sapien. Donec congue. Maecenas urna mi, suscipit in, placerat ut, 304 vestibulum ut, massa. Fusce ultrices nulla et nisl. 305

Figure B1: This is an example of the appendix figure.

B.1 Appendix subsection title here

Etiam ac leo a risus tristique nonummy. Donec dignissim tincidunt nulla. Vestibulum 307 rhoncus molestie odio. Sed lobortis, justo et pretium lobortis, mauris turpis condimentum 308 augue, nec ultricies nibh arcu pretium enim. Nunc purus neque, placerat id, imperdiet 309 sed, pellentesque nec, nisl. Vestibulum imperdiet neque non sem accumsan laoreet. In 310 hac habitasse platea dictumst. Etiam condimentum facilisis libero. Suspendisse in elit 311 quis nisl aliquam dapibus. Pellentesque auctor sapien. Sed egestas sapien nec lectus. 312 Pellentesque vel dui vel neque bibendum viverra. Aliquam porttitor nisl nec pede. Proin 313 mattis libero vel turpis. Donec rutrum mauris et libero. Proin euismod porta felis. Nam 314 lobortis, metus quis elementum commodo, nunc lectus elementum mauris, eget vulputate 315 ligula tellus eu neque. Vivamus eu dolor.

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