Working with Math environments in texor

by Abhishek Ulayil

Abstract This is a small sample article to demonstrate usage of texor to convert math environments.

1 Introduction

Math typesetting has always been LaTeX's highlight feature, making it a de facto choice among academicians and researchers globally. However, as we proceed to our humble web interfaces, math is hard to describe traditionally. There have been advancements in JavaScript libraries to better Typeset and present math in web pages but not all LaTeX commands/math functions are available.

MathJax

The **texor** package uses Mathjax version 3 to enhance the visual look of the math content in HTML.

The core of the MathJax project is the development of its state-of-the-art, open source, JavaScript platform for display of mathematics. The key design goals are (Mathjax authors , 2021):

- High-quality display of mathematics notation in all browsers.
- No special browser setup required.
- Support for LaTeX, MathML, and other equation markup directly in the HTML source.
- An extensible, modular design with a rich API for easy integration into web applications.
- Support for accessibility, copy and paste, and other rich functionality.
- Interoperability with other applications and math-aware search.
- Support for equation conversion outside a browser (e.g., preprocessing on a server).

Pandoc Handling, extensions

As **texor** calls **rmarkdown** to render the Rmarkdwon file into HTML, the `rjtools::rjournal_web_article` template by default uses MathJax as the math engine. Also we specify the Mathjax version in the metadata of the generated Rmarkdown file.

2 Inline math

One can define Inline Math in LaTeX using commands `\(..\)` or `$..$`. It is also possible to use inline math within captions and

Command	Math
`\(\mu = (0,0,0)^\top \)`	$\mu = (0,0,0)^\top$
`$\mu = (0,0,0)^\top $`	$\mu = (0,0,0)^\top$

Table 1: InlineMath syntax and its output side by side

3 Display Math

Display Math refers to equations, almost all LaTeX equations can be rendered by MathJax.

```
\begin{align}
f(x) = \frac{1}{\sigma\sqrt{2\pi}}
  \exp\left( -\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^{\!2}\,\right)
  \label{eq:1}
\end{align}
```

This will render as 1.

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left(-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right) \tag{1}$$

4 Equation Numbering

In LaTeX your equations get numbered automatically unless you are using `\[..\]` to describe math. Equation numbering works a bit differently in **bookdown** (the base of RJ web article format) where it is mandatory to have a `(\#eq:xx)` which is described in more detail in (Yihui , 2023).

The **texor** package eases authors from manually adding `(\#eq:xx)` to equations in Rmarkdown by using pandoc Lua filter to convert existing `\label{..}` in the equations to `(\#eq:xx)` during conversion. Equation 2 shows such a use case of equation being numbered by its label in Rmakrdown as well as LaTeX.

$$S_{T,s}(z_t) = X^\top K^*_{b,t} X(Z - z_t)^s \tag{2}$$

Equation labels must start with the prefix `eq:` in bookdown. All labels in bookdown must only contain alphanumeric characters, `:`, `-`, and/or `/` as suggested in (Yihui , 2023).

5 Unsupported LaTeX Commands

Altough MathJax does a good job of supporting most LaTeX math functions, some functions do not work like `\bm` `\boldmath`, instead use `\mathbb`. Also avoid custom math commands MathJaX will never be able to parse it. The reason being MathJax renders math case by case and custom commands will already be removed by pandoc during the conversion, hence MathJax will not be aware of such redefinations.

6 Summary

In summary the **texor** package with the help of pandoc and MathJax supports:

- some common math environments.
- Equation Numbering

Bibliography

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Abhishek Ulayil
Student, Institute of Actuaries of India
Mumbai, India
ORCiD: 0009-0000-6935-8690