Testing MathJax's LaTeX to MathML Capabilities

TeamTwo4Now's Semester Experience with Testing Frameworks

Charles Thiry, James Keels, Hassam Solano-Morel
College of Charleston
Computer Science Department

Background

Testing software is a critical and irreplaceable part of the software life cycle. However, in order to efficiently test a wide range of cases and avoid introducing human error into the testing process, the procedures must be automated. A testing framework provides this environment by defining test cases and expected results, driving the underlying software, running the test, and reporting back the results. This semester our team of three experimented with creating a testing framework for the LaTeX to MathML conversion feature in 'MathJax'.

About MathJax

"The MathJax Consortium is a joint venture of the American Mathematical Society (AMS) and the Society for Industrial and Applied Mathematics (SIAM) to advance mathematical and scientific content on the web. The core of the MathJax project is the development of its state-of-the-art, open source, JavaScript platform for display of mathematics."

-https://www.mathjax.org/#about

Experience

TeamTwo4Now began as a meeting between perfect strangers. The team quickly made acquaintances and assigned roles based on discussed strengths. Originally the team decided to test Ushahidi an HFOSS project. After several weeks of only semi-success in properly working with the software, TeamTwo4Now decided to cut our losses and move on to work with MathJax. Better planning by the whole team and regular Sunday meetings lead to quick success immediately after the transition. As the semester progressed the team struggled with and overcame a variety of technical and scheduling issues.

The Testing Framework

Dependencies

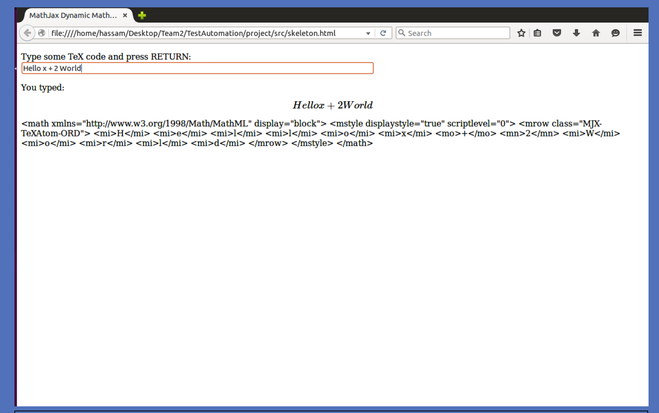
- Python
- Selenium
- Firefox

tc021.txt

```
{"id": "021",
"title" : "Letters matrix, square parenthesis border ",
"req": "Must convert LaTeX code to MathML",
"component":"tex2Jax",
"method":"PreProcess",
"testVal": "\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}",
"oracle": "<mrow><mrow><mo>[</mo><mtable rowspacing='4pt' columnspacing='1em'><mtr>
                    <mtd>
                        <mi>a</mi>
                    </mtd>
                    <mtd>
                        <mi>b</mi>
                    </mtd>
                    <mtd>
                        <mi>c</mi>
                    </mtd>
                </mtr>
                <mtr>
                    <mtd>
                        <mi>d</mi>
                    </mtd>
                    <mtd>
                        <mi>e</mi>
                    </mtd>
                    <mtd>
                        <mi>f</mi>
                    </mtd>
                </mtr>
                <mtr>
                    <mtd>
                        <mi>g</mi>
                    </mtd>
                    <mtd>
                        <mi>h</mi>
                    </mtd>
                    <mtd>
                        <mi>i</mi>
                    </mtd>
                </mtr></mtable><mo>]</mo></mrow></mrow>
"}
```

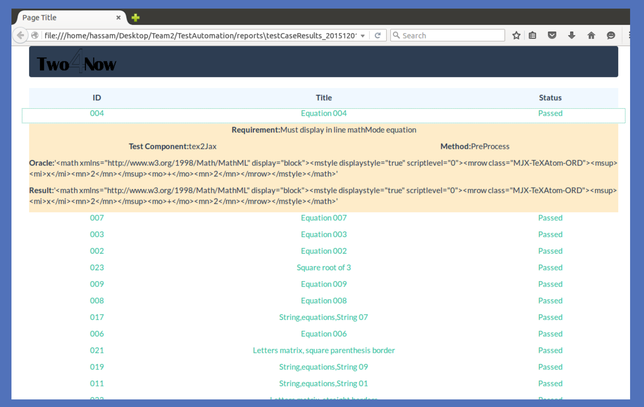
Test cases are .txt files containing JSON data including:

- id
- testValue
- oracle (expected result)



Selenium at work!

Selenium is a browser automation tool used with python to run the underlying MathJax software. Test values are parsed from test case files and used as input. The test conversion is captured and compared to a respective oracle.



Test reports are gathered and displayed in the Firefox web browser via a automatically generated HTML. Clicking on a particular test case result opens a drop down window that displays more specific information about the test, including the retrieved result and its oracle value.

Acknowledgements

Our team would like to thank Dr. Bowring for his guidance throughout the project.