Design Rules from English with NLP

CMPUT 401 - Group 2

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Intro

- This project is designed for Building Information Modeling (BIM)

- Our project sponsor Christoph Sydora created a Design Rule Language (DRL) for simplifying building design codes.

- Sydora's DRL requires an understanding of mathematics/logic to some extent.

- Our task was to remove the knowledge barrier for users unfamiliar with the DRL by allowing them to write rules in natural language
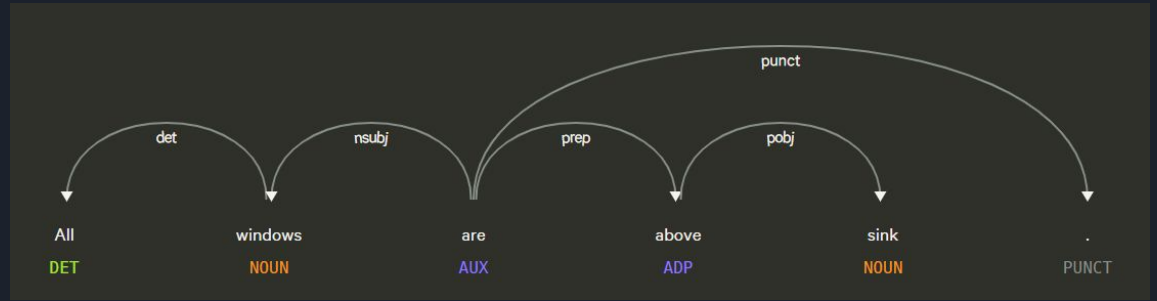
Live Demo

Architecture

- Architectural choices were made with a few considerations in mind:
    - **Frontend**: SPA, needed something easy to modify in real time
    - **Backend**: NLP research is in Python, want to be compatible, but don't need a ton of features

- **Frontend**: React
    - Expansive documentation and real-world practical use.
    - Certain other libraries like DraftJS help with certain key functionality
- **Backend**: Flask
    - Minimal, fast, ideal with SPA with few endpoints
    - Use a mix of standard HTTP API endpoint with Socket.io for faster bidirectional communication
- **Deployment**: Static Nginx Server and Flask-Gunicorn

SpaCy

- Python NLP library

- Parse meaning from the sentence using dependency tree

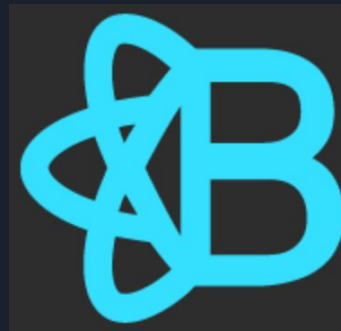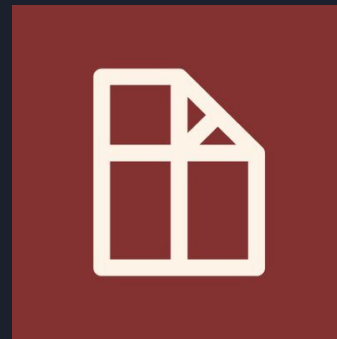- Tokenization, lemmatization, parts of speech, stop words

Other Technologies

Draft-js: React library with a rich-text editor component. Allows in-line text coloring.

React-bootstrap: Library used for UI components such as buttons, accordion menus, and overlays.

fuzzywuzzy: Python library that provides more robust comparison of strings. Used for identifying key words and making suggestions for unknown words.

Key Challenges

- Complexity of natural language processing

- Striking a balance between flexibility and correctness within time constraints

- Highlighting key words in real time

What We've Learned

- Active Group Communication
  - Frequent group calls
  - Discussion in Slack

- Perseverance
  - NLP is hard, we came in with little experience
  - Learning from failure

- Open-mindedness
  - Willing to take input from others

Thanks for listening!