Simplification Metrics for Medical Jargon

The primary metric used in the project is the Flesch-Kincaid Grade Level Test (FKGL). For a project with a shortened timeline, this formula is a good choice because the equation is easy to understand and simple to implement. The simplicity of the equation also means that trade offs happen to make the equation easy.

Advantages
- FKGL is well-known, easy to understand and implement
- Provides a single metric that can be used to easily compare texts

Disadvantages
- FKGL is so simple that it does not take into account features such as the text's semantic complexity
- FKGL gives scoring advantages to shorter sentences and shorter words, regardless of their meaning or significance

Limitations
- FKGL does not capture semantic complexity or the specialized knowledge required to understand medical terms.
- Texts can be restructured to improve scores without simplifying complex medical terminology.
- Does not account for the specific context or meaning of medical terms, leading to potentially misleading simplifications.
- Does not account for semantic faithfulness between the original text and simplified text.
- Does not account for readability of the page, including things like font, spacing, colors, or layout.

Examples of Gaming Readability Metrics

Original: "Hypercholesterolemia is associated with an increased risk of cardiovascular disease."
FKGL: 23.7
Simplified: "High cholesterol is linked to heart disease." FKGL: 6
The simplified text loses the specificity needed in medical contexts.

Original: "The patient was diagnosed with atrial fibrillation, a type of arrhythmia." FKGL: 13.5
Simplified: "The patient has an irregular heartbeat." FKGLL 8
The simplified version might not convey the precise medical condition.

Embedding-Based Text Similarity for Simplification

Semantic Understanding: Utilize embeddings (e.g., Word2Vec, GloVe, BERT) to capture the semantic similarity between the original and simplified medical texts.
Semantic Faithfulness Metrics: Develop metrics that compare the embeddings of the original and simplified texts to ensure they retain the same meaning. Consider using SummaC (Summary Consistency) and QAFactEval.

Human-In-The-Loop: Include humans to validate the simplified texts for accuracy and comprehensibility.

Benefits of Embedding-Based Approach
Embedding-based approaches offer several advantages for text simplification, especially in specialized fields like medicine. They can capture the nuanced meanings of medical terms, leading to more accurate and useful simplifications.Embeddings (hopefully) ensure contextual accuracy and retention of the precise medical meaning during simplification. These metrics focus on the underlying meaning rather than surface features, making them more resilient to manipulation and harder to game.

Liam Cripwell, Joël Legrand, & Claire Gardent. (2024). Evaluating Document Simplification: On the Importance of Separately Assessing Simplicity and Meaning Preservation. *LREC-COLING 2024 3rd Workshop on Tools and Resources for People with REAding DIfficulties (READI 2024) Workshop Proceedings*.