The US Department of Energy publishes incident report documents to record events that went wrong in previous laboratory projects to prevent them from being repeated. However, Argonne National Laboratory found it challenging to use these records effectively due to the sheer volume of data. To solve this, Argonne created a machine learning workflow to efficiently match incident reports with project documents, utilizing multiple models to quantify the similarity between documents. Our aim this quarter is to improve the matching process through feature engineering.

A significant bottleneck in the process was the reliance on human-generated summaries of incident reports, which varied in quality and consistency, hindering the effectiveness of the matching algorithm. In response, this quarter's focus has been introducing an AI-driven approach for generating incident report summaries, using a large language model from Meta, Llama 2, to ensure reliable summaries.

The matching process involves 6 different Natural Language Processing (NLP) algorithms. We found that using Llama 2 summaries in the matching process with project documents offers little improvement over using human written summaries. However, using a combination of both Llama 2 generated and human written summaries offer the greatest improvement in similarity scores.

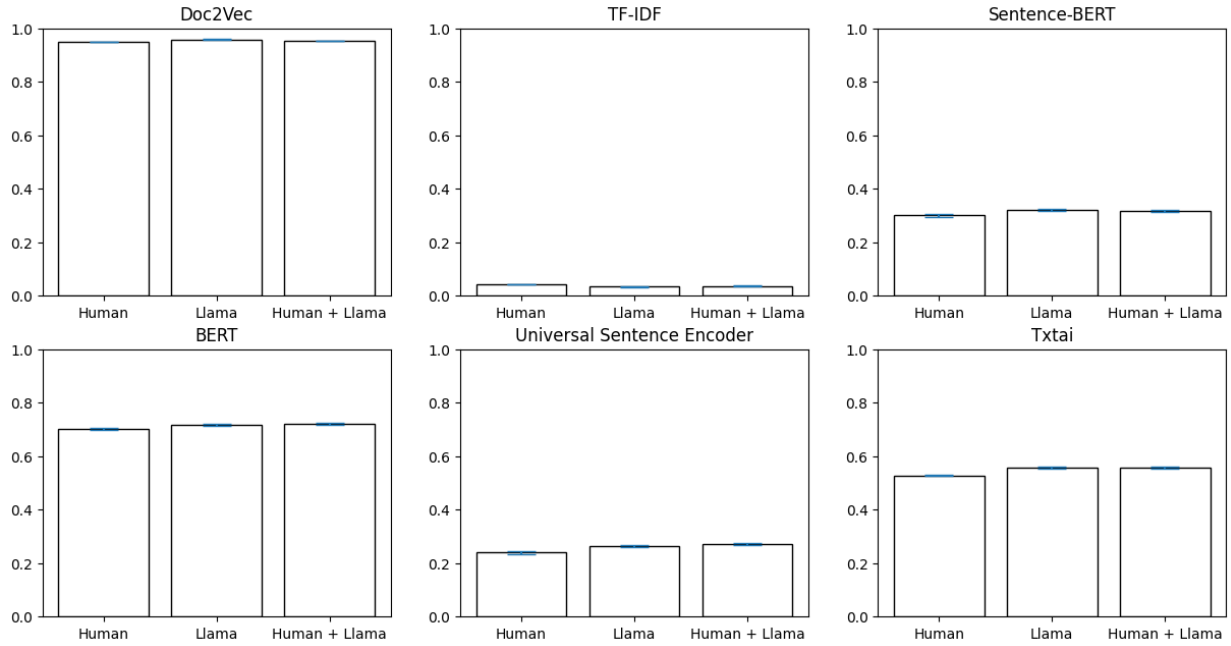

Figure 1: Similarity Scores between Incident Report Summaries and Project Documents by NLP Algorithm