

ARTIFICIAL INTELLIGENCE (AI) METHODS FOR AUTOMATING THE IMPACT TOOL EVIDENCE LIBRARY

Ali Al¹, Gina Vega¹, Kurt Berens¹, David Hilmers³, Chris Zahner², Lynn Boley¹

¹KBR, Inc., Houston, TX.

²University of Texas Medical Branch, Galveston, TX.

³Translational Research Institute for Space Health, Baylor College of Medicine, Houston, TX.

INTRODUCTION:

The development of the Evidence Library for use with the IMPACT (Informing Mission Planning via Analysis of Complex Tradespaces) probability risk assessment tool involved a multilayered, time intensive process of data collection and analysis by subject matter experts from the Exploration Medical Capability (ExMC) Element Clinical and Science Team to produce clinical findings forms (ClIFFs) for 120 medical conditions. Artificial Intelligence Large Language Models (LLMs) can be leveraged to facilitate this process, thus reducing labor and time.

TOPIC:

ClIFFs contain information about medical conditions as they pertain to spaceflight. This includes condition definitions, incidence data, crew task impairment estimates caused by conditions, treatment protocols and references to literature used for gathering condition evidence. Guided by the Evidence Library Methods document [1] and the ClIFF development instructions, a team has leveraged Microsoft Azure AI services and open-source documentation to construct an AI-assisted automated pipeline for ClIFF development. This process is designed to search, retrieve, and evaluate the applicable data, and ultimately generate a completed ClIFF. The LLM evaluates the relevance of each of the source materials to spaceflight, either as direct evidence or as an analog. The model extracts keywords and generates brief summaries to enhance search and retrieval in later stages of ClIFF development. For instance, it can calculate epidemiological statistical data, such as incidence rates and the likelihood of best or worst-case scenarios.

APPLICATION:

Large Language Models (LLMs) can efficiently summarize large amounts of text. Leveraging this technology will automate data retrieval and evidence gathering for medical databases, like the IMPACT tool, by aiding in the labor-intensive process of analyzing large bodies of literature and organizing it into a formatted document like a ClIFF. This added efficiency will enable expeditious expansion of the Evidence Library with additional medical conditions and update previous ClIFFs as new technology becomes available.

[1] Exploration Medical Capability Evidence Library Methods, HRP-48036 Rev B, November 2023.