Justification for Financial Support for Using Large Language Models (LLM)

Description of the Project:

Social media platforms have emerged as crucial sources of information where individuals exchange medical opinions and shape their attitudes toward diseases, including COVID-19 and human papillomavirus (HPV) [1] . HPV is the most prevalent sexually transmitted infection in the United States, with an estimated 6.2 million new infections annually among individuals aged 14 to 44 years [2]. The COVID-19 pandemic has profoundly impacted various facets of human life [3].

In this study, we aim to leverage Large Language Models (LLMs) to identify misinformation related to COVID-19 and HPV on social media platforms such as Twitter and Facebook. Our objective is to categorize the types of misinformation and provide users with accurate information, thereby promoting better public health awareness and improving quality of life. The project's method is illustrated in Figure 1.
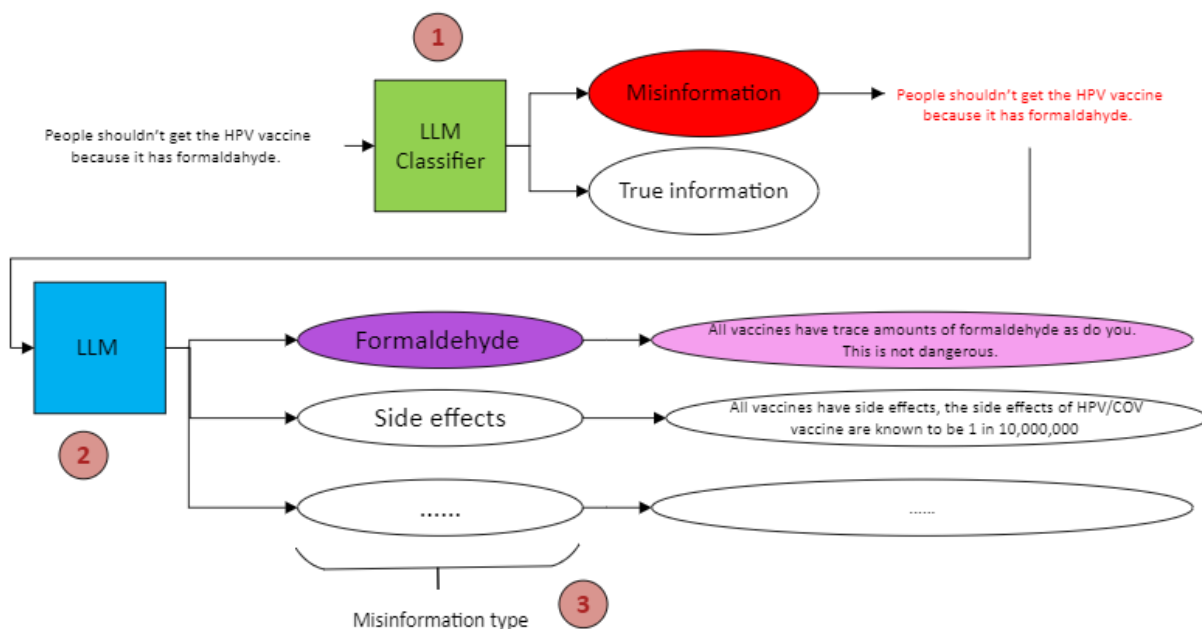

Figure 1- Overview of the entire project process. LLM stands for Large Language Models. The red-circled numbers 1, 2, and 3 indicate the parts of the process utilizing LLMs.

How LLMs Are Critical Piece of This Project:

Since this project involves working with text data, we require Large Language Models (LLMs) such as GPT-4 for data analysis. As illustrated in Figure 1, LLMs are essential in three parts of the project. In the first part, LLMs classify each document as either misinformation or true information. In the second part, an LLM identifies the type of misinformation. In the third part, we utilize two LLMs: one to determine topics and another to automatically generate meaningful descriptions for each topic.

Estimation of the needed budget:

We plan to use four datasets, including COVID-19 Fake News [4], FNIR [5], CoAID [6], and IFCN [7]. The cost of using GPT-4 is $15 per 1 million output tokens and $5 per 1 million input tokens. Each of the four datasets contains 2 million tokens, and we will use 4 LLMs. Therefore, the estimated cost for this project is calculated as follows:

$$2^M \times \left(\frac{\$5}{1^M} + \frac{\$15}{1^M} \times 2 \right) \times 4 \times 35 \approx \$10,000$$

References:

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