



Equipe MediCIS

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Research Internship: Generation of Generic Surgical Process Model with Large Language Models

Localization: Laboratoire Traitement du Signal et de l'Image (LTSI), MediCIS Team, Université de Rennes, Rennes, France

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Context

In recent years, there has been an unprecedented surge of interest and excitement surrounding Large Language Models (LLMs) in the field of artificial intelligence. LLMs have various applications, such as natural language understanding and content generation (used in chatbots like ChatGPT). They have also been applied in healthcare, where LLMs assist in diagnosing diseases, comprehending complex medical texts, and even predicting potential outbreaks by analyzing extensive healthcare data [1,2].

We aim to study the use of LLMs in the context of robotic-assisted hysterectomies to represent the surgical practice. Through a collaboration with a prominent company specializing in surgical robots and the Obstetrical Surgery Department of Rennes University Hospital, we have gained access to a substantial and rare dataset comprising over 80 annotated hysterectomies.

In a previous study, we used LLM to extract procedural and non-procedural information from surgical reports. Then we studied the capability of different LLMs to determine which part of the surgery the phrase referred to. We have obtained promising results on a limited database of 100 procedural phrases.

Objective of the internship

The objective of this work is to retrain an LLM with the procedural phrases of surgical reports to generate the generic surgical process model (gSPM). The gSPM will be compared to the ones created with other methodologies. To accomplish this goal, the internship will be divided into four steps:

- Extraction from surgical reports of procedural, non-procedural, event and control phrases;
- Retrain LLM via few-shot learning so that the model knows the relationship between phrases and surgical times;
- Creation of the gSPM via the LLM;
- Compare the results with gSPM created with others methods.

Profile researched

The candidate must have knowledge in deep learning, data analysis, computer science and programming (python).

Duration: 5 to 6 months

Salary or allowance: Standard internship allowances

- [1] Singhal, K., Azizi, S., Tu, T. *et al.* Large language models encode clinical knowledge. *Nature* **620**, 172–180 (2023). <https://doi.org/10.1038/s41586-023-06291-2>
- [2] Bombieri, M., Rospocher, M., Ponzetto, S.P. *et al.* Surgicberta: a pre-trained language model for procedural surgical language. *Int J Data Sci Anal* (2023). <https://doi.org/10.1007/s41060-023-00433-5>