Enhancing Radiology Workflows: Semi-automated Cervical Cancer Reporting at the Cancer Diseases Hospital in Zambia

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Introduction

In Zambia, the scarcity of radiologists has resulted in significant delays in cancer treatment, with patients waiting up to three months for their first treatment after diagnosis. Specifically, there are less than 15 radiologists in the public sector [1]. One of the primary contributing factors to this delay is the turnaround time, which refers to the period between a radiologist receiving images and sending back a report [2]. Research shows that cancer continues to be one of the leading causes of death worldwide [3]. Cervical cancer in Zambia is the most popular form of cancer, accounting for 41.1% in females and 23.8% in overall cases nationwide. Additionally, among the various forms of cancer, cervical cancer is ranked first as causing the most deaths in Zambia at 23.4% [4].

Methodology

Project Objectives:

I. To demonstrate the understanding of the cervical cancer staging workflow.
II. To design and implement a software that assists radiologists as they interpret images and generate reports.
III. To evaluate the effectiveness and usefulness of the implementation.

Key Features:

- Metadata Extractor
- Report Document Generation
- Pretrained Machine Learning Model: LLaMa 3 (8B) by Meta AI

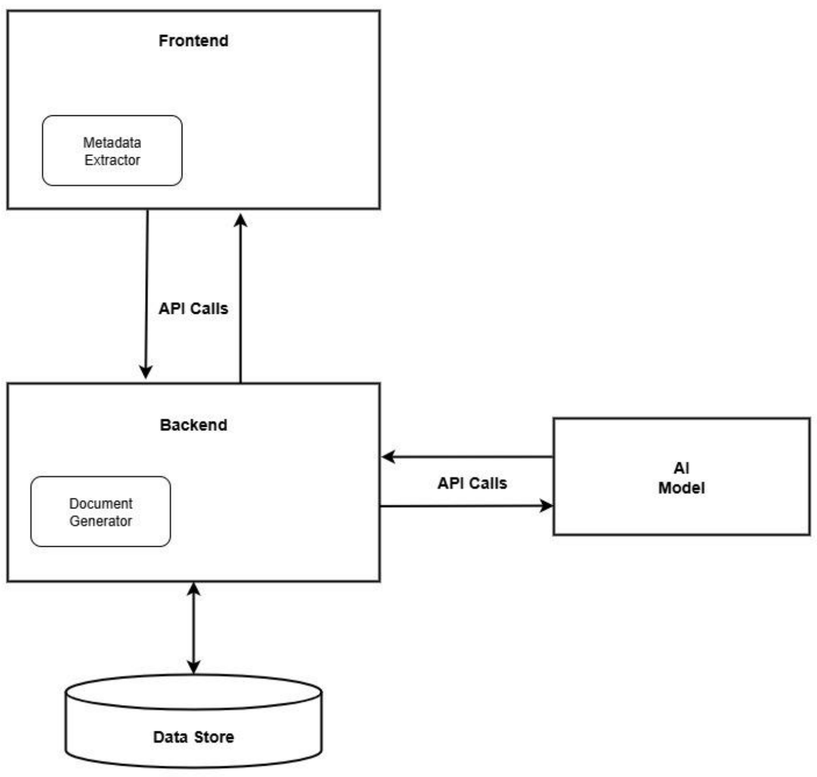

Figure 1. Architectural Diagram

Results

Based on the identified challenges, a semi-automated reporting system was designed and implemented using a web-based architecture with React and Express. Although the AI model was not yet trained during this phase, the functional prototype demonstrated that, by automating metadata extraction and standardizing report generation, the system reduces manual documentation time, a key contributor to reporting delays.

Evaluation

Usability was measured using controlled observation and the Technology Acceptance Model (TAM) among three radiologists at CDH-UTH.

Evaluation Statement	Mean Score	Interpretation
The system interface is intuitive and easy to navigate	4.7	Strongly Agree
The checklist and FIGO stage selection process is clear and well-structured	4.7	Strongly Agree
The app responds quickly and reliably	4.3	Agree
I feel confident using the app without additional help	4	Agree
The app integrates well with my workflow	5	Strongly Agree
The system reduces manual data entry effort	5	Strongly Agree
I would consider using this system regularly if fully implemented	4.7	Strongly Agree

Conclusion and Future Work

In this study we proposed a method to reduce the turnaround time for cervical cancer reporting, we measure the usability of the software among the radiologists at CDH-UTH. Their positive attitude towards the piece of software proved to be useful, though the delayed ethical approval hindered a more in-depth quantitative analysis of the software. Planned future-work includes fine tuning the M3D-LaMed for image-text retrieval, report generation, and segmentation once ethical approval has been granted.

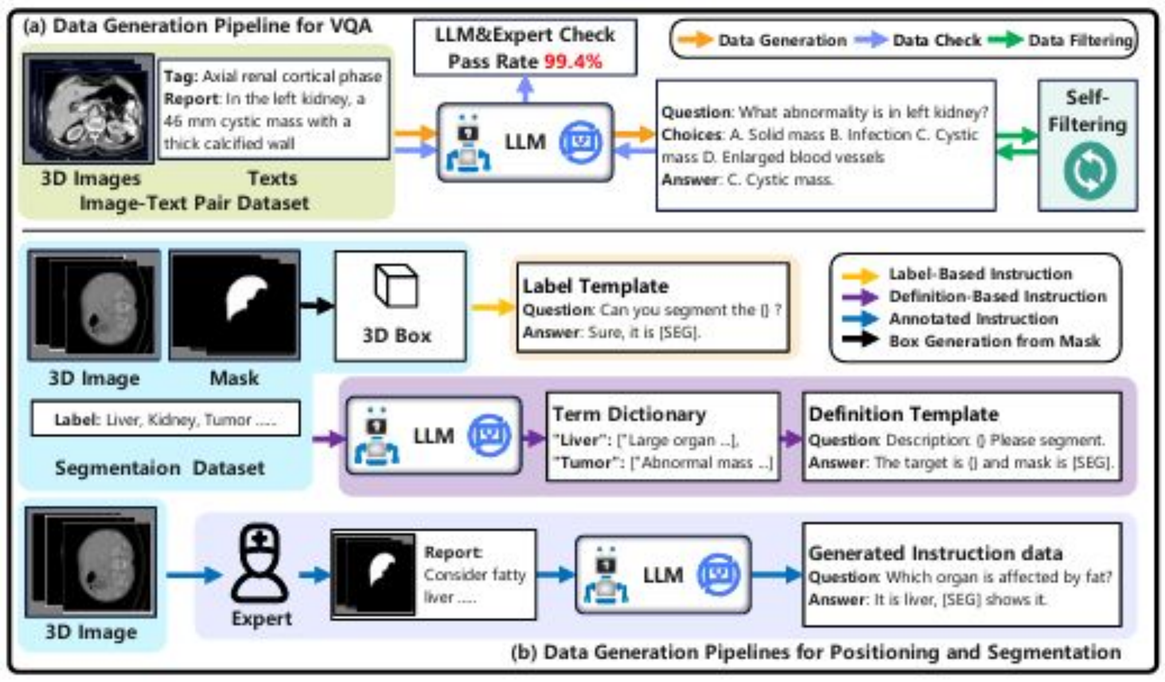

Figure 2. Proposed future model architecture based on M3D-LaMed

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