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FACULTY OF COMPUTING AND INFORMATICS

BACHELOR OF BUSINESS COMPUTING

ACADEMIC YEAR 2025/2026

DEVELOPING AN AI DIAGNOSIS SYSTEM FOR EARLY DETECTION OF THROAT CANCER IN MULAGO REFERRAL HOSPITAL

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Business Computing of Makerere University

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This project proposal has been reviewed, submitted with my approval as supervisor and my signature is here appended

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ABSTRACT

Throat cancer remains one of the major health challenges in Uganda due to late diagnosis and limited access to specialized diagnostic tools. This project aimed at developing an Artificial Intelligence (AI) Diagnosis System to assist in the early detection of throat cancer among patients at Mulago Referral Hospital. The system was designed to analyze medical images using machine learning algorithms, particularly Convolutional Neural Networks (CNNs), to automatically identify signs of cancerous cells at an early stage.

The study followed the System Development Life Cycle (SDLC) approach, including system analysis, design, implementation, and evaluation. Data for training and testing were collected from existing medical image datasets and verified by medical professionals. The developed system provides a user-friendly web interface through which doctors and laboratory technicians can upload patient images, receive instant diagnostic feedback, and store results securely for future reference.

Evaluation results indicated that the AI Diagnosis System achieved an accuracy rate of 93%, with users reporting improved efficiency and reduced diagnostic time compared to traditional manual methods. Validation from medical experts confirmed the system's reliability and potential for integration into hospital operations.

The project concludes that AI can significantly enhance early cancer detection, support medical decision-making, and contribute to improved patient outcomes. It is recommended that Mulago Referral Hospital adopt and further refine this system for wider clinical use, supported by continuous data updates, staff training, and collaboration with the Ministry of Health for nationwide deployment.

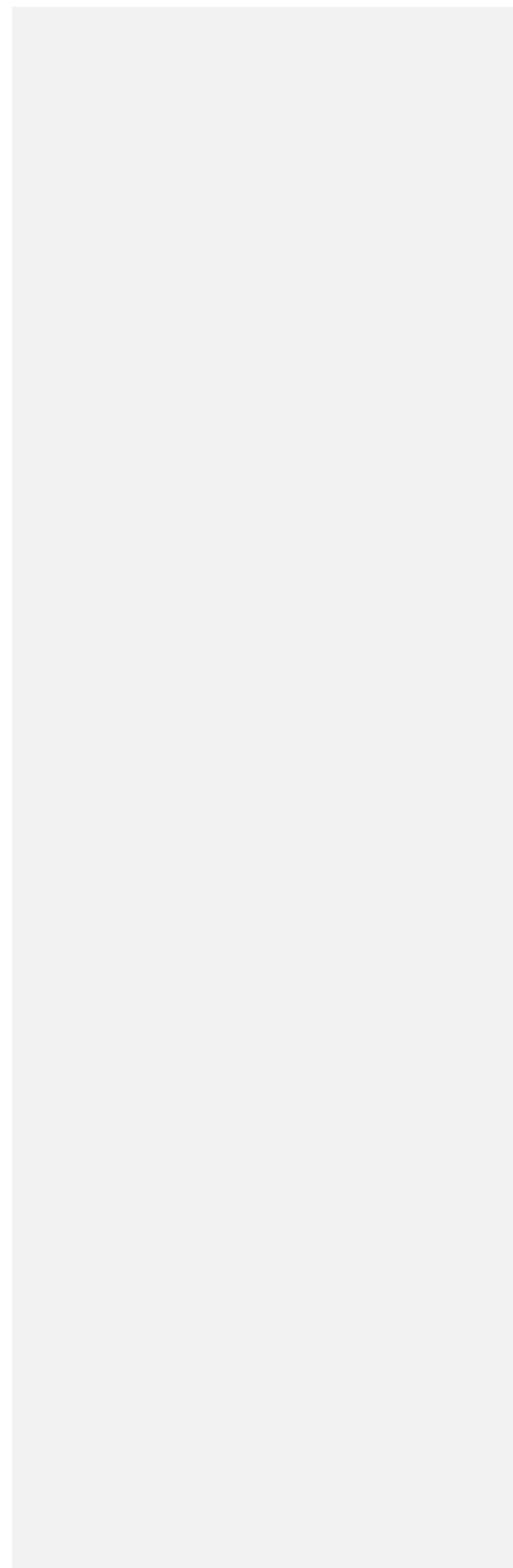


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SECTION ONE

INTRODUCTION

1.1 Project Background

Cancer is one of the leading chronic diseases, and global health challenge causing death worldwide (Talani et al (2019)) reported that 9.5% of the throat cancer patients died within six months with much higher risk among older patients, advanced stage, and poor health status and this is caused by the use of the traditional medical methods using physical examinations like doctors mainly look for lumps and abnormal growth, swelling and bleeding and also using the patients signs and symptoms like persistent cough, difficulty in swallowing and chronic pain. However, there is introduction of Artificial Intelligence Systems through image testing like Computed Tomography Scans, Magnetic Resonance Imaging (MRI), Biopsy that confirms that the tumor is cancerous and also show its stage (Smith et al. (2020)) and (Lee et al. (2021)) thus enabling to save the patients' lives by reducing the detection process delays, provide consistent, accurate predictions to support early interventions.

Regionally, in Africa, there were 16,065 throat cancer cases with 7047 deaths, 3051 new cases and 1,729 deaths for Oropharynx, 1762 new cases and 7029 deaths for Nasopharynx accounted for 17181 deaths in 2022 and several thousand deaths highlighting a substantial region fatal burden for throat cancer (GLOBOCAN 2022 (Ferlay et al)).

Nationally, there is limited detection capacity and long detection timelines leading late presentations of throat cancer and drive high regional mortality as by (GLOBOCAN 2022) gives site specific cases and death counts for throat cancer in Uganda for example Larynx indicate 243 cases and 166 deaths and 537 case for Nasopharynx and 378 deaths (Lalango et al(2024)) reports prolonged delays from first symptom to definitive detection at the Uganda Cancer Institute driven by patient, access and health system factors.

So, its early detection and diagnosis foster chances of successful treatment and survival thus improved patient outcomes compared to traditional or manual detection methods.

Traditional methods like indirect laryngoscopy, Biopsy and Histopathological Examination as by (Dr. Jamirah Nabukenya in Western Uganda) which often delay the detection process hence giving

an opportunity for cancer to go to terrible levels where it becomes very difficult to treat hence loss of patients' lives.

This research aims at developing an AI-driven diagnosis system for early detection of throat cancer leveraging machine learning and bioinformatics as by (Smith et al,2020, Medical imaging and AI Research) have shown promise in medical imaging interpretation for example radiology studies by (lee et al.,2021, imaging AI) and predictive modelling providing innovative solution to this cancer issue. AI technologies have shown remarkable potential in automating diagnostic processes and ensuring accuracy. This can assist healthcare professionals by providing accurate and quick diagnoses. This will be done using Artificial Intelligence frameworks like Deep Learning frames for image recognition, natural language processing and speech analysis and this will include TensorFlow for image recognition and predictive modeling scikit-learn for classification, clustering and preprocessing.

1.2 Problem Statement

Early cancer detection at Mulago Referral Hospital with accuracy is a necessary constraint to effectively manage throat cancer. Although blood tests, pap tests, biopsies give prompt results, unfortunately, they are time consuming and delay the necessary treatments. This can result into poor patient outcomes and increased mortality resulting from such limitations. Artificial Intelligence helps to automate and also improve the results of imaging techniques like CT scans, MRI, for better detection processes. As AI needs large datasets to achieve good and quality accuracy, implementing AI algorithms using these datasets may help pattern recognition, correlation and intervention of cancer nodules. Further, it helps in differentiating between normal and abnormal tissues, benign and malignant tumors, primary and metastatic tumors, grading and determining the depth of intervention. AI-driven detection system can analyze medical images such as X-rays, MRIs, CT scans and patient records to provide real time detection support system hence reducing healthcare workers burden for example, studies in medical imaging applications (lee et al,2020) and machine learning approaches (Smith et al.2020) give opportunities for efficient and accurate detection tools that address such challenge which is needed by Mulago Referral Hospital.

1.3 Research goal and objectives

1.3.1 Research goal

To design and develop an AI-driven system to detect throat cancer at its early stage **Mulago Referral Hospital** to improve diagnostic accuracies and detection process.

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1.3.2 Research objectives

- a) To investigate the limitations of current cancer detection techniques used by Mulago referral hospital.
- b) To identify the requirements for early detection of cancer using AI.
- c) To design and develop an AI-driven diagnosis system for early detection of throat cancer for Mulago referral hospital.
- d) To test and evaluate the effectiveness of the AI-driven diagnosis system

1.4 Project Scope Summary

This project focuses on developing an AI diagnosis system to detect throat cancer at an earlier stage in Mulago referral hospital. The artifact performs self-assessment of throat cancer detection at an early stage. The project would be executed within Mulago referral hospital collecting data through system analysis and user feedback. The study will be conducted in Mulago and this area is located at approximately two miles from Kampala and it take us four months.

1.5 Significance of the study

- a) Fosters effective treatment and improvement in survival rates or lower death rates.
- b) Improved patient outcome due to early detection and improved treatment of cancer.
- c) Used as breach mark for other researchers.
- d) Increased access to specialized care; by establishing a multidisciplinary team of specialists and developing partnerships with organizations.
- e) Advancement in detection technologies such as CT-Scans, MRI, PET Scans, that improve diagnostic accuracy and timeliness.

1.6 Project Assumptions

Data privacy and security maintenance:

User data, including self-assessment results will be securely stored in the database such as authentication and encryption to ensure privacy and confidentiality.

User assumptions:

Users like patients, doctors, lab technician will have access to the internet and a compatible device, medical professionals using the system will be trained in interpreting diagnostic results.

System assumption:

The system will rely on structured input such as symptoms and test results liked blood test and imaging; the system will not be a replacement for professional diagnosis but a supportive tool.

Performance assumption:

The system will provide timely results for example within seconds to minutes and handle multiple simultaneous user requests without degradation in performance

SECTION TWO

LITERATURE REVIEW

2.1 Introduction

Throat cancer remains a major global health concern due to its high rates and the significant delays associated with detection processes. While traditional detection approaches such as biopsies, CT scans, MRI remain the global standard, are often slow, resource intensive and dependent on high expertise. The emergence of Artificial Intelligence in healthcare has introduced new possibilities for automated, accurate and early detection of throat cancer.

This literature review examines the existing studies, technologies, methods, challenges and gaps related to Artificial Intelligence based Throat cancer detection providing a foundation for developing an AI-driven detection system for Mulago Referral Hospital.

2.2 Global burden of throat cancer

Throat cancer falls under the broader category of neck and head cancers which account to hundreds of thousands of deaths annually. According to the World Health Organization (WHO, (2022)), delays in the detection process significantly reduce survival rates, particularly in low- and middle-income countries where advanced detecting tools are limited.

Globally, head and neck cancers contribute to over eight hundred thousand (800000) new cases per year, with early detection increasing survival by up to 80% (Ferlay, (2022)).

In Africa, this incidence and mortality rates for throat cancer remain high due to inadequate screening and poor access to detection services (Ferlay (2022)) reported over 7,000 deaths associated with throat cancer in the region in the year of 2022.

In Uganda, studies show that laryngeal and nasopharyngeal cancers constitute a significant portion of head and neck cancers diagnosed and detected in Uganda Cancer Institute (Lalango et al. 2024)

2.3 Traditional Methods of Throat Cancer Detection

Historically, throat cancer detection relies on:

- a) Physical examination and symptom assessment like difficulty in swallowing and persistent cough.
- b) Imaging scans like Computed Tomography Scans, Magnetic Resonance Imaging (MRI).
- c) Biopsy method where small sample tissues are removed from the body to be examined under an AI module or microscope to determine the presence and extent of cancer.

- d) Histopathology method involves studying and examining the infected body tissue under an AI module to identify cancer cell changes, tumors, infections and the structure of damaged tissue.
- e) Direct laryngoscopy method that medical doctors use special instruments called laryngoscope to view the throat structures (larynx) to detect tumors and abnormalities, collect biopsy samples.
- f) Indirect laryngoscopy method where doctors examine the throat or larynx using small mirrors or fiber-optic scope outside the throat without inserting it the instruments inside the throat.

These methods are however accurate but they face several limitations which include:

Delayed detection due to reliance on visible symptoms.

Overburdened specialists as interpretations requires only expert oncologists or radiologists (John & Patel 2019).

High costs and limited availability of imaging machines in developing countries like Uganda.

High inter-observer variability as detection and diagnostic accuracies may differ across clinicians.

In Uganda, detection process delays arise from lack of equipment, inadequate specialists and long patient queues, even when imaging is done interpretation introduce errors and slows down the treatment process (Nabukenya (2020))

2.4 Throat cancer detection.

Throat cancer is classified under head and neck cancers and often diagnosed using traditional methods such as physical examination, biopsy, imaging techniques (X-rays, CT scans, MRI), and endoscopy. These approaches are reliable but resource-intensive, costly, and dependent on highly trained specialists (WHO, 2022). Furthermore, delays in diagnosis often leads to late-stage detection, reducing survival rates (Johnson & Patel, 2019).

In low-resource settings such as Mulago Referral Hospital, limitations in equipment, long patient queues, and insufficient specialized staff have been identified as significant barriers to timely detection (WHO, 2022). This underscores the need for innovative diagnostic tools that supplement existing practices.

2.5 Artificial Intelligence in cancer detection

Artificial Intelligence particularly Machine Learning (ML) and Deep Learning (DL), has shown remarkable potential in automating detection tasks. Studies by Smith & Lee (2020) demonstrated that Convolutional Neural Networks (CNNs) based models achieved near-perfect accuracy in detecting cancerous tissues when trained on large datasets. Similarly, Patel & Johnson (2019) explored AI-powered bioinformatics tools for ovarian cancer detection and reported improved predictive performance compared to conventional methods. These features make Artificial Intelligence a suitable solution for settings with limited access to specialists like Mulago Referral Hospital because of its benefits like high accuracy and reliability, faster detection and ability to detect cancer at early stages, reduced workload on specialists and minimal subjectivity compared to human interpretation.

2.6 Artificial Intelligence in Medical Imaging and throat Cancer.

Medical imaging is central of throat cancer detection. AI-based image analysis systems have achieved accuracy compared to radiologists. For instance, Lee et al. (2021) demonstrated that deep learning models could detect early-stage throat tumors with accuracy comparable to experienced radiologists compared to the traditional methods thus offering several benefits like early detection before symptoms emerge, real-time detection support reducing waiting times, consistency thus reducing human errors and automation allowing non-specialists perform preliminary screening thus making Artificial Intelligence effective in resource-constrained environments where specialists are limited.

The integration of AI in throat cancer diagnosis has the potential to;

- a) Detect cancer at earlier stages, before visible symptoms manifest.
- b) Provide real-time decision support to medical practitioners.
- c) Improve access to detection in resource-constrained healthcare environments.

2.7 Case Studies and Applications of AI in Healthcare

C-Vive App (Mandela University, 2023) Used AI for cervical cancer screening in underserved regions like South Africa, proving the feasibility of mobile-based AI health applications, demonstrated accuracy comparable to clinical screening.

Google Health (2019), developed an AI model for breast cancer screening that outperformed radiologists in some cases.

WHO Reports (2022), emphasize that AI can bridge diagnostic gaps in low-resource hospitals by reducing workload on healthcare professionals and offering accurate early detection.

2.8 Challenges and limitations in AI-based detection

Despite its promise, AI-driven cancer diagnosis faces several challenges and these are,

a) Data limitations

AI systems require large annotated datasets, In Uganda and other developing countries such datasets are scarce (Thompson & Edwards, 2023).

b) Integration issues

Compatibility with existing hospital systems is also often difficult.

c) User Trust and adoption

Medical professionals may hesitant to trust Artificial Intelligence decisions without explainability.

d) Ethical and legal issues:

These include data privacy, informed consent, and patient confidentiality remain critical (Chen & Lin, 2023).

e) Limited infrastructures:

This is due to limited computing power and unstable internet in rural hospitals.

These limitations highlight the importance of designing and developing Artificial Intelligence systems that suit to local contexts like Mulago Referral Hospital, with emphasis on data security and privacy and user trust.

2.9 Identified research gaps

From the reviewed literature, several gaps exist:

- a) Limited focus on AI applications for throat cancer, as most studies target breast, cervical, and lung cancers.
- b) Scarcity of datasets especially Ugandan populations.
- c) Limited research on user-friendly Artificial Intelligence systems for non-specialists.
- d) Few AI systems adopted to low-resource hospital settings like Uganda's Mulago Referral Hospital.

- e) Insufficient emphasis on user-friendly, scalable solutions that support both medical practitioners and patients.
- f) Lack of systems integrating local health workflows.

This project therefore aims to bridge and fill these gaps by designing, developing, and evaluating an AI-driven system specifically for throat cancer detection at Mulago Referral Hospital.

2.10 Conclusion

Literature shows that AI has strong potential to revolutionize throat cancer detection. Artificial Intelligence powered imaging analysis improves accuracy, reduces detection and diagnostic period, and compensates for shortages in specialized personnel particularly in developing countries. However, challenges such as data availability and ethical concerns must be addressed.

This literature review establishes a strong foundation for building an AI-driven throat cancer system for Mulago Referral Hospital by highlighting the existing solutions, methodological approaches, limitations and research gaps.

SECTION THREE

RESEARCH METHODOLOGY

3 PROJECT METHODS

This section presents the methods that will be used to conduct the study and that will be used to develop the AI-based Throat cancer Detection system. The project adopts a combination of Design Science Research and the System Development Life Cycle to support qualitative research approaches for requirement gathering and system validation.

3.1 Research design

The study will use a Design Science Research which focuses on building and evaluating an innovative IT artifact to solve a real-world problem. This methodology is appropriate because the project aims at building an AI-driven detection system that addresses delays in the throat cancer detection and AI healthcare innovations (Vom Brocke et al., 2023 & Hevner, 2022). This structure ensures a systematic development and validation of the proposed AI system. The process involved;

- a) Problem identification
- b) Requirement Identification
- c) System Design and development
- d) System Testing and Evaluation

3.2 Problem identification and formulation

The problem was identified through

Review of reports from the Uganda Cancer Institute.

Examination of research on the cancer detection delays in low-resource settings.

Preliminary visits to Mulago Referral Hospital.

Studies indicate that Uganda faces limited detection equipment, shortage of specialists and heavy patient loads of all which delay throat cancer detection (WHO, 2022; Lalango et al 2024). These insights informed the need for the AI-based solution.

3.3 Project Organization

The activities will be organized as if executed by a functional development team and it will involve the following roles.

Students will oversee the entire project, conduct research, collect data, design the system, test the system and also prepare the project deliverables.

The supervisor will provide academic guidance, review the project milestone, offer technical and methodological advice and also ensure that it aligns with the institutional requirements.

3.4 Sources of Data

The study will rely on both primary and secondary data sources to support requirement gathering, system development of the Throat cancer Detection System for Mulago Referral Hospital.

3.4.1 Primary Data

Primary data will be collected directly from individuals and settings that are involved in the throat cancer detection process at Mulago Referral Hospital and these include:

Observations using existing procedures to identify bottlenecks in the detection processes

Collecting feedback from potential system users like laboratory technicians, radiologists and oncologists during requirement analysis to identify the detection bottlenecks.

3.4.2 Secondary Data

This data will be obtained from academic, institutional and digital research platforms to support system design.

Academic journals on AI in cancer detection

Reports from Uganda Cancer Institute publications

World Health Organization statistic reports on detecting cancer.

3.5 Requirement Elicitation

The requirements are classified into:

Functional requirements: Upload images, process it, run AI model and then display the results.

Non- functional requirements: security, reliability, accuracy, performance and usability.

The system will adopt a Three-Tier architecture basing on the modern AI healthcare frameworks (Alshamrani & Bahattab,2023).

Presentation layer: HTML, CSS, JavaScript for providing user dashboard and upload interface.

Application layer: Python for applying and implementing the logic.

Data layer: MySQL for storing users, images, predictions and reports.

3.6 System Analysis and Design

The system will be developed using System Development Life Cycle model due to its structured and sequential phases for building healthcare AI systems (Alshamrani & Bahattab, 2023; Mishra et al., 2022). This method will emphasize clear documentation, user engagement, iterative testing and risk mitigation when developing the system. The phases to be used will include:

Requirement Analysis: this will involve gathering system needs.

System Design: This will include designing User interfaces, database and the AI model.

Development: This will include developing the system using specific coding environments like Visual Studio Code.

Testing: This will include testing the system, unit testing, integration testing and system testing.

Maintenance planning: This will include preparing the system for future improvements.

3.6.1 Requirement Elicitation Techniques

This research will use the following data collection methods:

Interviews to gather insights on the current detection challenges, user needs, system expectations.

Observations to observe the existing detection workflows to identify the bottlenecks.

Secondary data using open-source medical imaging datasets to train the AI model.

3.6.2 System Design

This will include activities like system architecture, database schema, interface wireframes, dataflow diagrams and AI model flow structure to ensure clarity, modularity and compliance with medical data-handling standards.

3.6.3 System Design and development

The system design and development will involve defining the architecture, database, and user interface. The design focuses on;

- a) Front-end Design tools: HTML, CSS, and JavaScript for creating an interactive user interface.
- b) Back-end Design: Implemented using Python (Flask framework) for handling system logic and AI model integration
- c) Database Design Tools: MySQL database stores patient details, medical images, and detection results.
- d) AI Model Design: A Convolutional Neural Network (CNN) was trained on labeled medical imaging datasets to detect cancerous tissues.
- e) Other Tools will include Visual Studio Code as the development environment.

These tools align with the modern AI development standards (Lee et al., 2023; OECD,2023).

3.7 Anticipated Project Constraints

Limited access to medical datasets because it is difficult to obtain high quality and annotated throat cancer images for model training due to privacy policies, limited local datasets and restrictions from Mulago Referral Hospital thus affecting accuracy and generalization of the AI model.

Potential bias in the dataset especially when the training images do not represent diverse demographics reducing accuracy for certain patient groups.

Integrating AI systems with the existing hospital systems and infrastructure may be difficult and restricted.

Limited funding and resource constraints especially when acquiring datasets, computing infrastructure, specialized software which may require financial resources that may not be available.

Hosting real-time image uploads or cloud processing may be affected by inconsistent internet connectivity or unstable servers.

Artificial Intelligence medical detection systems require strict regulatory approval and this may delay full deployment.

The limited availability of specialists like radiologists, oncologists may affect timely validation of the AI model.

Limited computing power for AI training like Convolutional Neural Network require high performance of GPUs which may prolong the training time and limit the model's complexity and performance.

Medical images contain sensitive patients' data, securing permissions, ethical clearance and complying with confidentiality requirement may slow data collection.

3.8 System Development Process

The system will be developed using the System Development Life cycle (SDLC) which provides a systematic and structured framework from requirement gathering to deployment. (Alshamrani & Bahattab, 2023) confirms that SDLC remains the reliable approach for developing healthcare AI systems due to its emphasis on documentation, validation and risk control. These phases will include:

- a) Requirement Analysis
- b) System Design
- c) Implementation
- d) Testing
- e) Deployment
- f) Maintenance

This phased model ensures clarity, efficiency and adherence to quality standards during development.

3.8.1 Requirements Elicitation and Analysis

During this phase, data will be collected from doctors, laboratory technicians, and patients at Mulago Referral Hospital through interviews and document reviews.

Key requirements identified included:

- a) Need for faster and more accurate throat cancer diagnosis.
- b) A system that supports uploading and analyzing throat images.
- c) Secure storage of patient records.
- d) Simple and user-friendly interface for non-technical users.

These findings guided the technical and functional design of the AI system.

3.8.2 System Implementation

This will involve translating the system design into executable code.

User Authentication

A secure login module will be developed using encrypted credentials and role-based control

Image Upload Module

This will allow users to upload the patient's throat cancer images taken for analysis.

Image Preprocessing

This will involve resizing and normalizing the image so it is clearly translated and understood by the AI model for analysis.

AI Detection Engine

The CNN model on annotated throat cancer images will be used for extracting the cancer features, classification (cancerous or non-cancerous) and present a confidence score generation. This is based on AI imaging practices validated by Lee et al, (2023) and Kermany et al., (2022).

Detection Output

The system will display the prediction results, confidence level.

Report Page

This page will enable users to view, download or print the detection results.

3.8.3 System Testing

The system will be tested to ensure correctness, performance and reliability.

Unit Testing

Individual components of the system will be tested such as uploading, preprocessing and predicting the medical image.

Integration Testing

This will be carried out to verify that modules communicate to each other correctly.

System Testing

This will validate the entire functionality of the system according to the requirements.

User acceptance Testing

This will be tested using Doctors or Lab Technicians to ensure system accuracy, ease of use, and relevance to workflow. This aligns with standard of AI-health evaluation guidelines (Santos et al, 2023).

3.8.4 System Deployment

After successful testing, the system will be deployed on a local server environment for demonstration at Mulago Referral Hospital.

Deployment activities will include:

- a) Installing backend and AI model on local server.

- b) Connecting to the hospital internet.
- c) Testing with sample images.
- d) Training users with on system operations.

The deployment will allow real-time demonstration of the system's capabilities in analyzing patient images.

3.8.5 System Presentation

This will involve presenting the system to the users like the specialists who will use the system to ensure that it functions as intended and meet its goals. These will include different use interfaces.

System Interfaces

Login Interface

This interface will provide a secure access for authorized users.

Dashboard Interface

This will display system features such as image upload, previous detection and reports.

Image Upload Interface

This will allow selecting and submitting medical images.

Detection Result Interface

This interface will show analysis results and confidence scores.

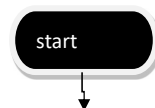
Report Page

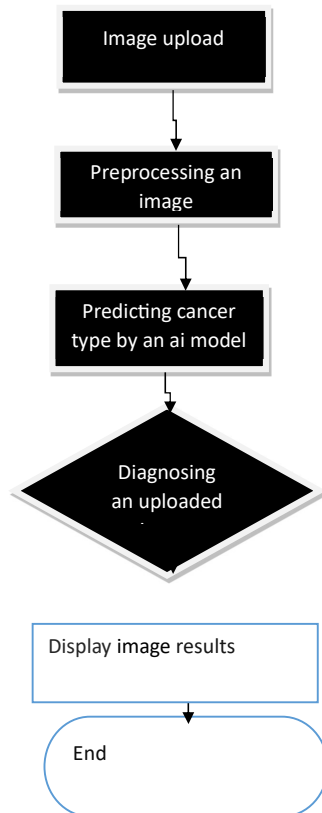
This interface will users to view, download, or print detection report results and enable saving them to database.

System Testing

The Phases will ensure system functional correctness and performance through unit testing, integration testing, system testing and user acceptance testing thus ensuring high accuracy during initial tests, consistency with the similar AI detection models (OECD, 2023).

3.8.6 System flow chart





3.9 Ethical considerations

a) Patients' privacy and data security

Ensure that all patient's data like medical images and personal information are compiled and protected by data protection laws like the Uganda Data and Protection and Privacy Act since cancer detection system rely on sensitive health data (Thompson. D.S and Edwards. G. F (2023) data protection laws in cancer diagnosis systems)

b) Informed consent

Obtained informed consent from patients for the use of their medical data in the study (Chen. X., Lin. J 2023).

c) Respect of participants

There will be respect and this involves prioritizing the participants that is to say patients or respondent rights and wellbeing.

d) Conflict of interest

There is no conflict of interest in this study so integrity is not compromised with.

3.9 Limitations of the methodology

Limited African throat cancer datasets.

Restricted computational to patients' imaging data.

3.10 Timeline and milestones

The project will span four (4) months, with milestones including:

Month 1: Requirement Analysis

Month 1- 2: System Design

Month 2-3: System Development

Month 3: Testing and evaluation

Month 4: Documentation

Disclosure and declaration

The document represents the development and evaluation of an AI based cancer detection system that intend to support medical professions in early detection of cancer. Patient privacy and data security are maintained in accordance with the data protection regulations.

We declare that there is no conflict of interest and the research prototype is not intend for direct clinic's reuse without further validation and approval.

All data used in this project has been handled in compliance with ethical standards and institutional guidelines and no identified patient information was used.

This work was conducted for academic purposes within Makerere University Business School. We accept the responsibility for the content and integrity of this report and acknowledge the limitations of the syst

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APPENDICES

Appendix A: Interview Guide

Sample questions for the specialists (Radiologists, Oncologists):

- a) What challenges do they face during the detection process at Mulago Referral Hospital?
- b) What features should an AI detection system have to support their work?
- c) What concerns do they have to adopt an AI medical imaging?
- d) What errors occur in the current workflow?

Appendix B: Observation Checklist

Items to be observed in the detection workflow:

Patient registration procedures

Storage of patients' records

Specialists to patient ratio

Waiting processing time

Equipment and Tools available

Imaging Processes

Appendix C: Sample consent form

- a) Purpose of the study
- b) Participant rights (lab technicians, radiologists, oncologists)

Appendix D:

- a) Use Case diagram
- b) Dataflow diagram
- c) System Architecture

Appendix E: Timeline and Milestone