Sukkur IBA University



**Software Requirement Specification (SRS) For**

**Early Brain Tumor Detection Web Application**

Supervisor:

Assistant Professor Zakriya Jamali

Prepared By: Dilbar Hussain

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# Introduction

# - Purpose of this Document

The purpose of this document for the Final Year Project (FYP) is to provide a Software Requirements Specification (SRS) for a web-based Early Brain Tumor detection. The SRS document outlines the system's scope and defines its boundaries, ensuring that all users have a clear understanding of the project's objectives. It provides a high-level overview of the Early Brain Tumor Detection system, including its goals, features, and functionalities, system architecture, user interface design, testing procedures, project timeline, and deliverance. The purpose of the document is to act as a roadmap for the software development process, ensuring that the end product aligns with the requirements and expectations of the users. It provides a detailed roadmap for implementing the system and forms the basis for designing test cases and validating the software against defined criteria. In the domain of healthcare, strict legal and regulatory requirements must be met. The SRS document details the necessary compliance measures, ensuring that the Early Brain Tumor Detection software aligns with all relevant laws, standards, and regulations. This includes considerations for data privacy, patient consent, and medical data handling. It facilitates effective communication among stakeholders, sets the foundation for development and testing, and ensures compliance with legal and regulatory requirements, all while serving as a point of reference for the project's future evolution and maintenance. The SRS document also provides a clear understanding of the software's purpose and how it will be used, making it an essential reference for the development team and other stakeholders involved in the project. This document serves as a formal communication tool for all users involved in the project, including developers, designers, project managers, medical professionals, and end-users. It helps in aligning the expectations of various stakeholders and acts as a reference point for discussions, feedback, and decision-making throughout the project's lifecycle. As the project helps, this document will serve as a reference for future maintenance, updates, and system expansion. It helps in ensuring that the software remains adaptable to evolving technology and medical advancements.

# - Intended Audience

The intended audience for this Software Requirements Specification (SRS) document is anyone involved in the development, testing, deployment, and maintenance of the web-based Early Brain Tumor Detection. The Software Requirements Specification (SRS) document for Early Brain Tumor Detection is created with the intention of providing to a diverse audience, each with specific needs and interests in the project. For the development team, including software developers, architects, quality assurance engineers, and database administrators, the SRS offers a comprehensive technical roadmap. It outlines the software's requirements and constraints, guiding the development process from design to coding and testing. Project managers and resource planners use the SRS to gain insight into the project's scope, objectives, timelines, and resource allocation needs. It provides the essential foundation for effective project planning and management, while risk managers rely on the document to identify potential issues and create mitigation strategies. Medical professionals, particularly radiologists and physicians, find the SRS valuable as it elucidates the system's capabilities and limitations. It helps them understand the role the software will play in clinical practice and research. Legal and regulatory authorities responsible for healthcare and data privacy regulations use the SRS as a reference to ensure the software complies with the necessary standards and laws. End-users, such as patients and caregivers, indirectly benefit from the SRS. While they may not directly interact with the document, it influences their experience by assuring the software's accuracy, safety, and potential benefits in early brain tumor detection. Furthermore, investors and funding bodies seeking an overview of the project's objectives and potential benefits can refer to the SRS, and technical writers may use it as a reference when creating user manuals or other documentation related to the software.

The Document Convention for this Software Requirements Specification (SRS) document follows a standard format that includes the following sections:

**Introduction:** In the introduction of the project it defines the goals and objectives of the project. Brain tumors are a significant and often life-altering medical challenge, affecting countless individuals worldwide. Detecting brain tumors at an early stage is critical for timely treatment and improved patient outcomes. The development of the Early Brain Tumor Detection software represents a pioneering step in the realm of medical technology. This Software Requirements Specification (SRS) document serves as the foundation for the creation of a cutting-edge software system dedicated to the early diagnosis and monitoring of brain tumors.

The Early Brain Tumor Detection software is envisioned as a powerful tool that leverages advanced technologies, such as medical imaging, artificial intelligence, and data analytics, to assist medical professionals in the timely identification and assessment of brain tumors. With the potential to revolutionize the field of neuro-oncology, this software will not only provide crucial support to radiologists and physicians but also offer invaluable insights to medical researchers. By facilitating early detection and precise monitoring of brain tumors, it can significantly enhance the quality of patient care and contribute to ongoing medical research.

This document outlines the software's scope, objectives, and requirements. It details the features, functionalities, and constraints that will guide the development process. Moreover, it addresses regulatory compliance, risk management, and scalability, ensuring that the Early Brain Tumor Detection software meets the highest standards of patient safety, data privacy, and technological adaptability.

As a collaborative effort between healthcare professionals, software developers, and regulatory authorities, this project underscores the significance of interdisciplinary cooperation in addressing critical healthcare challenges. The success of the Early Brain Tumor Detection software hinges on the collective efforts of various stakeholders, and this SRS document plays a central role in aligning their expectations and goals.

**Scope:** In this section it defines the boundaries of the project, including what is and isn't included. The scope of the Early Brain Tumor Detection Application is meticulously defined to establish the project's boundaries. It encompasses the development of a Application system that primarily focuses on the analysis of medical imaging data, particularly MRI and CT scans, for the accurate detection and characterization of brain tumors in their early stages. The Application facilitates continuous monitoring of tumor growth and changes over time, thereby assisting medical professionals in making informed decisions. It also incorporates an intuitive user interface for ease of interaction and strict data security measures to protect patient information, ensuring compliance with healthcare data privacy regulations. However, it explicitly excludes functions related to treatment planning or direct medical interventions, hardware development, training of medical professionals, and the collection of medical imaging data, as well as making clinical decisions. The Application provides data and analysis to support healthcare professionals but does not conduct in-depth medical research. This clear delineation of inclusions and exclusions ensures that all stakeholders share a common understanding of the Application’s purpose and its inherent limitations.

**Requirements:** Identifies the functional and non-functional requirements of the application, including what the software must do, how it should perform, and any constraints it must meet.

**Use Cases:** Describes the different ways in which users will interact with the application.

**System Architecture:** Outlines the Application architecture and how the different components will interact with one another.

**User Interface Design:** Describes how users will interact with the software, including the graphical user interface (GUI).

**Testing:** Outlines the testing procedures that will be used to ensure the application is working correctly and meeting its requirements.

**Project Timeline:** Provides a timeline for the different phases of the project, including development, testing, and deployment.

**Deliverables:** Specifies what will be delivered at the end of the project, such as source code, documentation, and user manuals.

The document convention includes clear and concise language, and each section is organized in a logical and consistent manner. Additionally, the document includes a table of contents and page numbers to make it easy for readers to navigate and find specific information. The document also uses consistent terminology and notation throughout to ensure clarity and avoid confusion.

# - Project Scope

The project scope for this Software Requirements Specification (SRS) document is to define the requirements and specifications for a web-based Early Brain Tumor detection. The scope of the project includes the development of a user-friendly web application that will allow to all the persons to check early whether they have tumor or not then they take precautions and go to specialists for the treatment, and also they do the things which can decrease the tumor like exercises and food which will be helpful to decrease the tumor and avoid all the things which cause increase the tumor.

The web application will include an authentication, registration, and login system to ensure that only authorized users can access and use the system. The system will provide access to all the people who have their email. The main functions of the web application will be to display the results of the brain tumor, where users can check the early information of the tumor whether the tumor at what stage of the destroying a person.

The project scope does not include the development of any hardware, or network infrastructure. The web application will be developed using standard web development tools, and will be designed to be compatible with modern web browsers.

Overall, the scope of the project is to develop a web-based early brain tumor detection that will provide a convenient and efficient way for person, to report and find the tumor early before it damages all the body cells and effects whole person.

# - Not in Scope

The following items are not in scope for this Application Requirements Specification (SRS):

* + - Development of any hardware, network infrastructure, or third-party software.
    - Integration with any external systems or services not explicitly mentioned in this document.
    - While early detection is crucial, the actual treatment planning and execution may be beyond the scope of a detection project. This involves decisions about surgery, chemotherapy, radiation therapy, etc.
    - Localization or internationalization of the web application.
    - Implementation of any payment or transaction processing functionality.
    - Implementation of any social media or external sharing functionality.
    - Implementation of any data analytics or reporting functionality.
    - User’s communication.

Any of the above items may be considered for future development or implementation, but they are outside the scope of this SRS and will not be included in the current project plan.

# Overall System Description

# - Project Background

In Pakistan it is very hard to detect tumor at early stage, and when brain tumor happens in person even don’t know either He/She have tumor or not, when these diseases become very dangerous, and person is at the end of the death then he take initiative of the treatment. I going to design a project which detects the tumor through the MRI or CT scan images, in today’s challenges no one have such huge amount to get check through doctors. This project helps the person to check whether they have tumor or not and then they can take initiative to meet with specialist for the treatment.

To address these challenges, tumor became very dangerous, I am developing this web-based application which can helps all the person to check either they have tumor or not. This application will be free for all who have their email address to register and login the application and access the web application to check the brain tumor. I have designed this project to create the ease between the people, because when they visit doctor due to large numbers of the patients, firstly identify yourself that you have brain tumor or not then visits the doctor and it there is any problem and concern with doctor.

The web application will be designed using web programming languages. The main functions of the web application will be id takes email for login is the user already have account if there is no account then the person should register the account and access the application and submit the image and get identified either the model predicts the images have tumor or not. The application will include an authentication, registration, and login system to ensure that only authorized users can access and use the system. The project is expected to be completed within a timeframe.

# - Project Objectives

The main objectives of this project are:

1. To provide a convenient and efficient way for all persons on the internet to access the application and check brain tumor and take initiative for early treatment.
2. To develop a user-friendly web application that is accessible from anywhere using a web browser, without the need to install any software.
3. To ensure that the web application is secure.
4. To allow users to check for brain tumor that have been originated or not, and

to concern with the specialist doctor.

1. To streamline the process of managing early brain tumor detection project, reduce errors, and improve efficiency.
2. To ensure that the web application is scalable and can accommodate a growing number of users over time.
3. To provide a platform for the people to collect data on early brain tumor detection, which can be used to analyze and improve the brain tumor detection process in the future.

# - Stakeholders

The stakeholders for this project are:

**Patients:** those who are either exhibiting signs of a brain tumor or may be at risk for one. Early detection is closely related to their desire for prompt treatment and improved results.

**Healthcare Providers:** This covers medical professionals who diagnose and treat brain tumors, such as neurologists, neurosurgeons, oncologists, radiologists, and general practitioners. They are essential in suggesting and carrying out screenings, deciphering findings, and organizing care regimens.

**Researchers and Scientists:** experts who research medical imaging, biomarkers, brain tumors, and other diagnostic instruments. Their research aids in the creation of cutting-edge early detection strategies, such as sophisticated imaging tools or blood-based biomarker tests.

**Medical Institutions and Hospitals:** Establishments that provide brain tumor care, treatment, and diagnosis to patients. These organizations might spend money on resources and technology for research projects and early detection programs.

**Pharmaceutical and Biotechnology Companies:** companies that create medications, treatments, and diagnostic equipment for the identification and management of brain tumors. They may work with researchers and healthcare professionals and have a stake in promoting early detection initiatives.

**Government and Regulatory Bodies:** Agencies capable for healthcare arrangement, financing inquire about, and directing therapeutic gadgets and demonstrative tests. They may give financing, set up rules, and direct the endorsement and observing of early discovery innovations.

**Insurance Companies**: Suppliers of wellbeing protections scope which will impact get to early location administrations and treatment alternatives for patients. They may survey the cost-effectiveness and viability of screening programs when deciding scope arrangements

# External Interface Requirements

# - User Interfaces

The external interface requirements for the user interface of the web-based Early Brain tumor detection:

**Authentication, Registration and Login System:** The UI should have a clear and intuitive interface for users to register, login, and authenticate their identity.

**Give Image and detect:** The person will give an image and the machine learning model will detect either the given image show brain tumor or not.

**User-Friendly Design:** The UI should be visually appealing, easy to navigate, and user-friendly to ensure a positive user experience.

**Compatibility:** The UI should be compatible with different web browsers and devices to ensure broad accessibility.

# - Hardware Interfaces and Software Interfaces

We would require the following technology for the development of the Early Brain Tumor Detection Project:

* + - Laptop/Computer System with Graphics card.

# Functional Requirements

# 2.4 - Functional Hierarchy

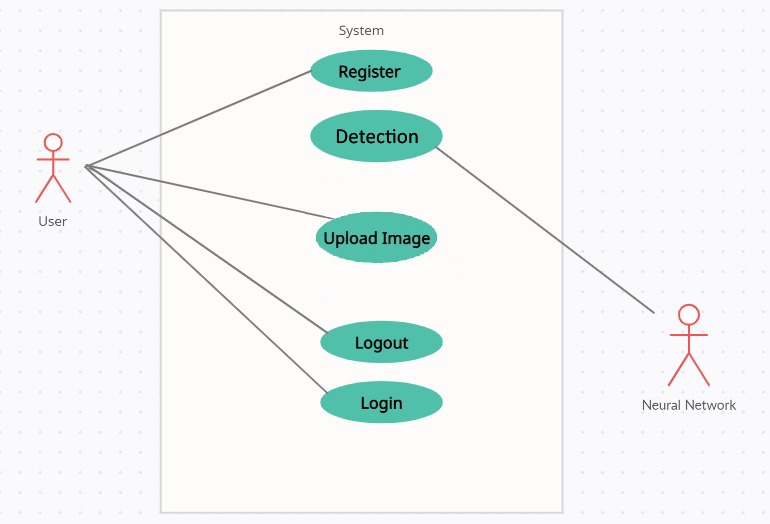
* 1. **User Registration and Login**

The framework might permit clients to make an account by giving fundamental data and login credentials a mail address and a secret strong password. Clients’ should to be able to log in to the application utilizing their own e-mail.

* 1. **Detect Brain Tumor:**

The system shall allow users to detect their brain tumor by giving image to the application.

# 2.5 – Use Case Diagram

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# Non-Functional Requirements

# – Usability

The system shall be designed to be user-friendly and easy to navigate. The system shall also provide clear and concise instructions for Early Brain tumor Detection.

# – Security

The system shall be designed to protect user data and prevent unauthorized access. The system shall use secure protocols for user authentication and data transmission.

# – Performance

The system shall be designed to handle a large volume of user traffic without experiencing performance issues. The system shall also have a response time of less than 5 seconds for all user requests.

# Technical Requirements

# – Platform

The system shall be a web application that is accessible from any modern web browser.

# – Database

The system shall use a relational database to store user data, Early Brain tumor Detection

# – Programming, Frameworks, & Tool

The system shall be developed using the following programming languages and frameworks: Machine Learning Model using Python, HTML, CSS, JavaScript,& MySQL.

**Tools:** VS Code, Jupyter Notebook, Development Environment, and testing tools

# Conclusion

The Early Brain Tumor Detection using Web Application will provide a platform for users to detect the tumor and it is a user-friendly and efficient manner. The application will be designed to meet the functional, non-functional, and technical requirements outlined in this SRS document.