HIGH LEVEL DESIGN (HLD)

Thyroid Disease Detection

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DOCUMENT VERSION CONTROL

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ABSTRACT

Thyroid disease is a common cause of medical diagnosis and prediction, with an onset   
that is difficult to forecast in medical research. The thyroid gland is one of our body's   
most vital organs. Thyroid hormone releases are responsible for metabolic regulation.   
Hyperthyroidism and hypothyroidism are one of the two common diseases of the thyroid   
that releases thyroid hormones in regulating the rate of body's metabolism.   
The main goal is to predict the estimated risk on a patient's chance of obtaining thyroid   
disease or not.

1. INTRODUCTION

* 1. WHY THIS HIGH-LEVEL DESIGN DOCUMENT?

The purpose of this High-Level Design (HLD) Document is to add the necessary detail to the current project description to represent a suitable model for coding. This document is also intended to help detect contradictions prior to coding, and can be used as a reference manual for how the modules interact at a high level.

THE HLD WILL:

* PRESENT ALL THE DESGIN ASEPCTS AND DEFINE THEM IN DETAIL
* DESCRIBE THE USER INTERFACE BIENG IMPLEMENTED
* DESCRIBE THE HARDWARE AND SOFTWARE INTERFACE
* DESCRIBE THE PERFORMANCE REQUIREMENT
* INCLUDE DEFINE FEATURE AND ARCHITECHTURE OF THE PROJECT
* LIST AND DESCRIBE THE NON-FUNCTIONAL ATTRIBUTES
* SECURITY
* RELIABLILTY
* MAINTAINABILITY
* PORTIBILITY
* REUSEABILITY
* APPLICATION COMPATIBILTY
* RESOURCE UTILIZATION
* SERVICEABILITY

1.2 SCOPE

The HLD documentation presents the structure of the system, such as the database architecture, application architecture (layers), application flow (Navigation), and technology architecture. The HLD uses non-technical to mildly-technical terms which should be understandable to the administrators of the system.

* 1. DEFINATION

|  |  |
| --- | --- |
| TERM | DESCRIPTION |
| DATABASE | Collection of Information Monitored by the System |
| IDE | Integrated Development Environment |

2. GENERAL DISCRIPTION

2.1 PRODUCT PERSPECTIVE

Thyroid Disease Detection is UI based application which will be predicting the condition of a patient given different features related to him/her.

2.2 PROBLEM STATEMENT

To create an UI application that will used by medical personnels to detect the condition that a patient might suffer from given his/her information about different medical procedures and medications.

2.3 PROPOSED SOLUTION

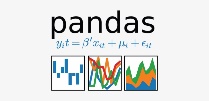
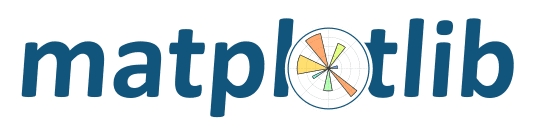
The solution for the problem statement is to train a machine learning model on the past patients’ data. This will allow the model to learn the pattern of occurrence of the disease given patients information. And after training the model, we will create a webapp that will provide an access to the trained machine learning model to the end user i.e., the medical personnel in this case.

2.4 FURTHER IMPROVEMENTS

With more datasets, we can improve our model to a great.

2.5 TECHINICAL REQUIREMENTS

No hardware tool is required but services like cloud services are required to host the website and database is required to store the data.

2.6 TOOLS USED





2.7 Data Requirements

In this model we are using thyroid patient’s data from UCI Machine Learning Repository. There are 31 unique column and around 9000 rows of data.

2.8 CONSTRAINTS

The scope of the trained model will only be for the disease named Thyroid. The model cannot be used for the detection of any other disease.

3. DESIGN DETAIL

3.1 PROCESS FLOW

3.1.1 Proposed methodology

ML model for prediction

Validation from the dataset

Data from the UCI machine learning repository

Prediction of disease

3.1.2 Model training and evaluation

Feature Validation and Feature Engineering

Validation Set

Training Set

Model

Result for Evaluation

Prediction

3.1.3 Deployment Process

Provide patient data

Load Model

Prediction Results

Make Predictions

3.2 EVENT LOG

The system is going to log everything so that the user gets to know which process is running internally.

3.3 ERROR HANDLING

Should errors be encountered, an explanation will be displayed as to what went wrong? An error will be defined as anything that falls outside the normal and intended usage.

4. PERFORMANCE

The hosted website will be used by many daily professionals so coding will be done in a proper modular fashion to reduce the run time and for faster execution.

4.1 REUSABLILITY

The code written should have the ability to be reused with no problems.

4.2 APPLICATION COMPATIBILTY

The different components for this project will be using Python as an interface between them. Each component will have its own task to perform, and it is the job of the Python to ensure proper transfer of information.

4.3 RESOURCE UTILIZATION

When any task is performed, it will likely use all the process power available until that function is finished.

4.4 DEPLOYMENT

The Thyroid Disease Detection project was deployed by integrating the machine learning model with the Streamlit web application, making it accessible for real-time predictions. The deployment involved configuring servers, ensuring security measures, and optimizing for user accessibility.

5. KEY PERFORMANCE INDICATOR

The indicators in our application will be precision score, recall score, f1 score and the balanced accuracy score.

6. CONCLUSION

This application will be helpful for medical personnel to get an initial idea about the probable anomaly in the patients body and could potentially reduce the time to look and test for every possible option.