VIEH GROUP

High Level Design (HLD)

Life Expectancy Prediction

Document Version Control

Date Issued	Version	Description	Author
18/05/2023	1.0	Added Introduction and General description	Sathvik N G
21/05/2023	1.1	Added Design details and abstract	Sathvik N G
22/05/2023	1.2	Created and organized whole document	Sathvik N G
25/05/2023	1.3	Updated Design Details	Sathvik N G
27/05/2023	1.4	Checked and added Performance	Sathvik N G
28/05/2023	1.5	Added Conclusion and References	Sathvik N G
31/05/2023	2.0	Updated diagrams in Design Details	Sathvik N G

VIEHGROUP

Table of Content

VIEHGROUP

Abstract

This project aims to predict life expectancy using machine learning techniques. By analysing various factors such as health status, socioeconomic indicators, and relevant variables, a predictive model will be trained to provide insights into life expectancy. The results can contribute to healthcare planning, policy development, and individual decision-making for a healthier and longer life.

VIEHGROUP

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 design aspects and define them in detail
- Describe the user interface being implemented
- Describe the hardware and software interfaces
- Describe the performance requirements
- Include design features and the architecture of the project

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.

VIEH GROUP

General Description

1. Product Perspective

The life expectancy prediction project is a machine learning-based model that estimates individuals' life expectancy based on various factors. It provides valuable insights for healthcare, lifestyle decisions, and policy-making. By leveraging machine learning, it offers a predictive tool for assessing and predicting life expectancy.

2. Problem Statement

To create the machine learning based solution to predict the life expectancy of the person.

3. Problem Solution

Develop a web application to predict life expectancy based on various factors, providing individuals and healthcare professionals with valuable insights into potential life expectancy. This application can assist individuals in making informed decisions about their lifestyle choices, healthcare planning, and overall well-being. By leveraging machine learning techniques, the application aims to provide accurate and personalized predictions of life expectancy, empowering users to take proactive steps towards a healthier and longer life.

4. Further Improvement

The project can be enhanced by incorporating additional features such as demographic data, socioeconomic factors, and lifestyle indicators to improve the accuracy of life expectancy predictions. Additionally, integrating real-time health monitoring devices and wearable technologies can provide personalized health insights and recommendations for individuals to make proactive lifestyle choices. By continuously updating the model with new data and incorporating advanced machine learning algorithms, the accuracy and reliability of the life expectancy predictions can be further improved.

5. Data Required

Data is provided by VIEH Group

6. Tools Used

- Python programming language and frameworks such as NumPy, Pandas, Scikit-learn, Matplotlib, Seaborn are used to build the whole model.
- PyCharm and Visual Studio Code is used as IDE.
- For visualization of the plots, Matplotlib and Seaborn are used.
- Render is used for deployment of the model.
- Front end development is done using HTML, CSS and Flask .
- GitHub is used as version control system.

7. Constraints

The life expectancy prediction project should ensure user-friendliness and ease of navigation on the website. It should be scalable to accommodate different regions or countries by developing specific models tailored to their unique characteristics. Consideration should be given to the availability and quality of data for different regions to ensure accurate and reliable predictions

8. Assumptions

The life expectancy prediction project assumes that the training data used for the machine learning model is representative and accurately captures the factors influencing life expectancy. It assumes that the selected features and algorithms are appropriate for predicting life expectancy. The project also assumes that the input data provided by the users is valid and reliable. Furthermore, it assumes that the project components, such as data ingestion, model training, and prediction, are properly integrated and function as intended.

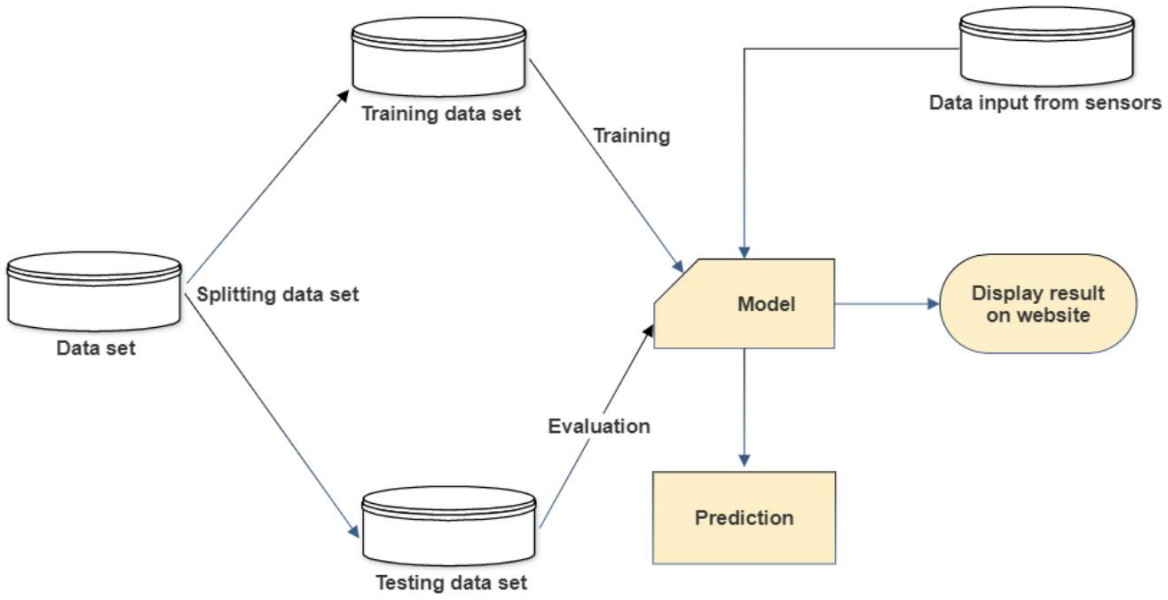
VIEHGROUP

Design Details

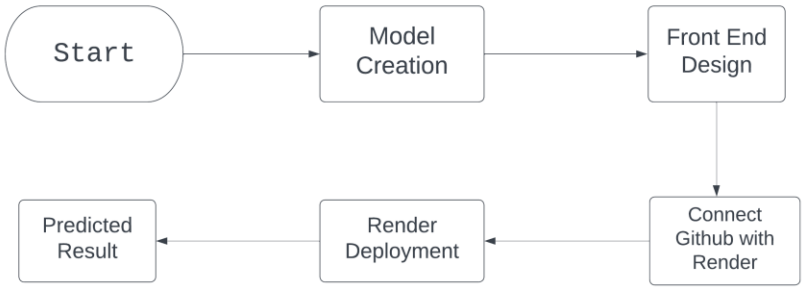
1. Process Workflow

For identifying the different types of anomalies, we will use a machine learning model. Below is the process flow diagram.

Model Training and Evaluation



Deployment Process



2. Error Handling

During the development of the life expectancy prediction project, potential errors and challenges may arise. It is possible to encounter errors when connecting the deployment platform with the project repository, but these can be resolved through troubleshooting and proper configuration

VIEHGROUP

Performance

1. Accuracy and Adaptability

The life expectancy prediction project aims to deliver highly accurate predictions while ensuring adaptability to various scenarios. By leveraging advanced machine learning techniques and flexible code architecture, the project provides accurate predictions that can be easily tailored to different frameworks or platforms. The focus is on achieving precise life expectancy estimates with the ability to adapt to changing requirements.

2. Application compatibility

Since we are using python and it is compatible with any platform, we follow Application compatibility

3. Resource utilization

At the initial stage, we were using high space to create the model. Once the model is created, our system only needs at least of 512MB RAM and 1 GB of storage to run the application smoothly. Whenever user tries to predict the Life Expectancy, system uses less than 10% of the processing power.

4. Deployment

The code is deployed in GitHub. The whole system is live and is hosted on Render.

VIEHGROUP

Conclusion

The life expectancy prediction project offers a valuable machine learning model for estimating life expectancy based on various factors. By leveraging this model, individuals and healthcare professionals can gain insights into life expectancy trends and make informed decisions. The project's focus on reducing disease and addressing health issues associated with air pollution contributes to overall well-being. Additionally, the project provides a basis for government initiatives to combat air pollution and improve public health in affected areas.

VIEHGROUP

References

1. https://scikit-learn.org/stable/user_guide.html
2. https://numpy.org/doc/
3. https://seaborn.pydata.org/examples/regression_marginals.html
4. https://seaborn.pydata.org/examples/scatterplot_matrix.html
5. https://matplotlib.org/
6. https://pandas.pydata.org/docs/