

HIGH LEVEL DESIGN (HLD)

INSURANCE PREMIUM PREDITION

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ABSTRACT

We analysed the personal health data of insurance premium of individuals. And preformed five regression models Linear Regression,

Decision Tree Regression, Random Forest Regression, XGBoosting Regression, KNN algorithms and selected the best fit machine learning algorithm with high accuracy.

Training dataset was used for training model and that training model helped to come up with some predictions. Then the predicted amount was compared with actual data to test and verify the model accuracy. Later accuracies of all these models were compared. Random Forest algorithms performed better than the remaining models.

Random Forest algorithms is best fitted in this case because it gives best R2 score comparable to other models.

1.0 INTRODUCTION

1.1 WHY THIS HIGH-LEVEL DESIGN DOCUMENT?

The purpose of this High-Level document is to add necessary details to current project description to represent the coding. This document is used as a reference manual for how the model interact at a high-level.

THE HLD WILL

- Presents all 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 feature and the architecture of the project.

1.2 SCOPE

The HLD document presents the structure of the system, such as the database architecture, application architecture, and technology architecture. The HLD uses non-technical to middle-technical terms which should be understandable to the administrators of the system.

1.3 DEFINITIONS

Terms	Description
Database	Collection of all information
EDA	Exploratory Data Analysis
IDE	Integrated Development Environment
API	Application Programming Interface
Notebook	Anaconda Jupyter Python 3
VS code	Visual Studio Code
Heroku	Cloud platform to deploy the model

2.0 GENERAL DESCRIPTION

2.1 PRODUCT PERSPECTIVE

The Insurance premium estimation is a machine learning based predictive model which will help us to predict the premium of the personal for health insurance.

2.2 PROBLEM STATEMENT

To develop an API interface to predict the premium of insurance using people individual health data and which is predicted analyzing the following:

- To detect BMI value affects the premium.

- To detect smoking affects the premium of the insurance.
- To create API interface to predict the premium

2.3 PROPOSED SOLUTION

The solution proposed here is an estimating premium of insurance based on people health data and this can be implemented to perform above mention use cases. In first case, analyzing how BMI value affect the people health as well as premium of the insurance. In the second case, if model detects the smoking affecting the premium, we will inform that to people. And in the last use case, we will be making an interface to predict the premium.

2.4 FURTHER IMPROVEMENTS

The model is improved by removing the outliers in the given data.

2.5 TECHNICAL REQUIREMENTS

The solution can be a cloud-based or application hosted on an internal server or even be hosted on a local machine. For accessing this application below are the minimum requirements:

- Good internet connection.
- Web Browser.

For training model, the system requirements are as follows:

- +4 GB RAM preferred
- Operation System: Windows, Linux, Mac
- Visual Studio Code / Jupyter notebook
- Heroku Account

2.6 DATA REQUIREMENTS

Data requirements completely depends on our problem statement.

- Comma separated values (CSV) file.
- Input file feature/field names and its sequence should be followed as per decided.

2.7 TOOLS USED

Python programming language and frameworks such as NumPy, Pandas, Scikit-learn, Plotly, Flask are used to build the whole model.



- Pandas is an open-source Python package that is widely used for data analysis and machine learning tasks to create a 2D data frame.
- NumPy is most commonly used package for scientific computing in Python.
- Plotly is an open-source data visualization library used to create interactive and quality charts/graphs.
- Scikit-learn is used for a machine learning.
- Flask is used to build API.

- VS Code is used as IDE (Integrated Development Environment)
- GitHub is used as version control system.
- Front end development is done using HTML.
- Heroku cloud is used for deployment of the model.

2.8 CONSTRAINTS

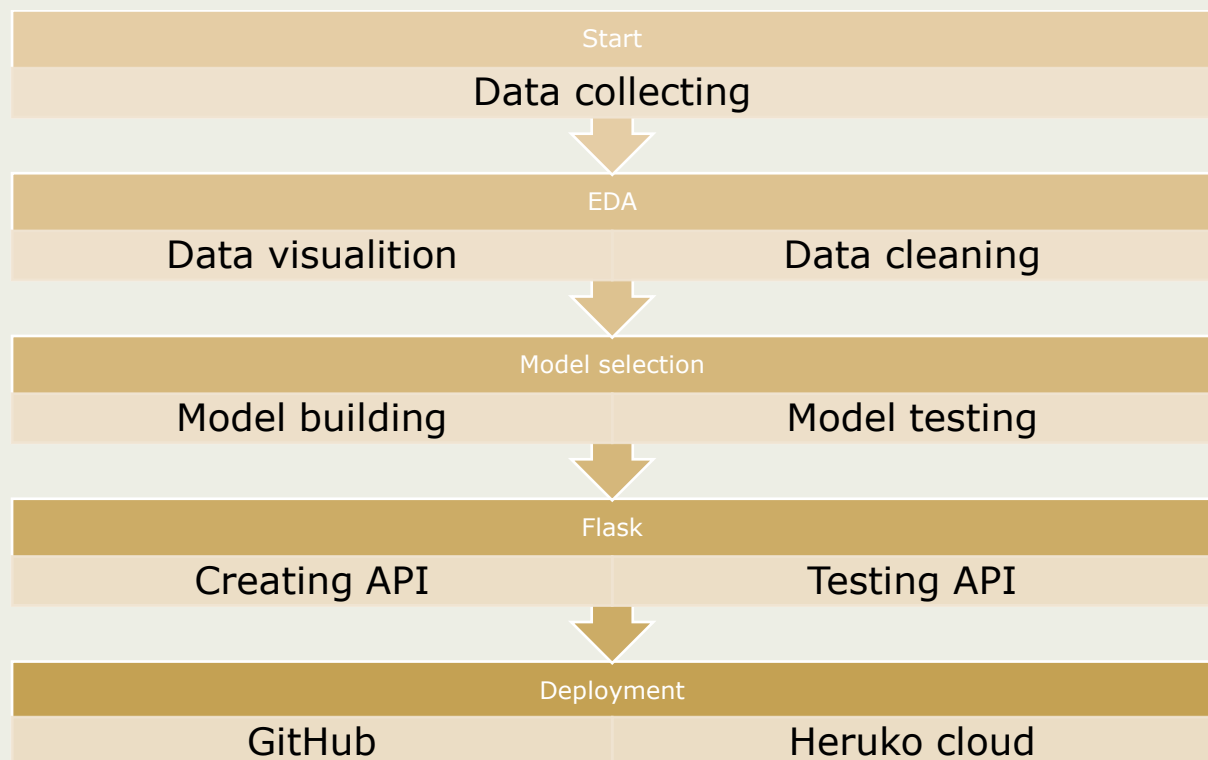
We can predict the individual person input data only on the deployed model.

2.9 ASSUMPTIONS

The main objective of the project is to develop an API to predict the premium for people on the basis of their health information. Random Forest regression model is used for predicting above mentioned cases on the input data.

3.0 DESIGN DETAILS

3.1 PROCESS FLOW



4.0 PERFORMANCE

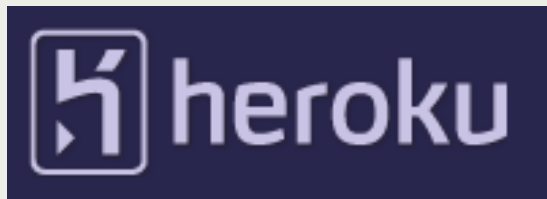
4.1 REUSABILITY

The entire solution will be API oriented. So, in the case of the scaling the application, the components are completely reusable.

4.2 APPLICATION COMPATIBILITY

The interaction with the application is done through the designed user interface.

4.3 DEPLOYMENT



5.0 CONCLUSION

This model shows us that the different techniques that are used in order to estimate the how much amount of premium required on the basis of individual health situation. After analyzing it shows how a smoker and non-smokers affecting the amount of estimate. Also, significant difference between number of children & also male and female salary expenses. Accuracy, which plays a key role in prediction-based system. From the results we could see that Random Forest regression turned out to be best working model for this problem in terms of the accuracy. Our predictions help user to know how much amount premium they get on the basis of their current health situation.