**CHAPTER – 1**

**INTRODUCTION**

* 1. **Problem Definition**

Health insurance is a necessity nowadays, and almost every individual is linked with a government or private health insurance company. Factors determining the amount of insurance vary from company to company.

The objective of the proposed work is to predict the insurance premium that an individual pays at the end of the year which helps them to estimate amount that they had to pay for the insurance company.

* 1. **Project Overview**

The goal of this project is to allows a person to get an idea about the necessary amount required according to their own health status. Later they can comply with any health insurance company and their schemes & benefits keeping in mind the predicted amount from our project. This can help a person in focusing more on the health aspect of an insurance rather than the futile part.

This project aims at building a web App that automatically estimates premium cost by taking the input values. Using IBM Auto AI, we automate all of the tasks involved in building predictive models for different requirements. You create a model from a data set that includes the age, gender, BMI, number of children, smoking preferences, region, and charges to predict the health insurance premium cost that an individual pays.

**CHAPTER – 2**

**LITERATURE SURVEY**

* 1. **Existing System**

People in rural areas are unaware of the fact that the government of India provide free health insurance to those below poverty line. It is very complex method and some rural people either buy some private health insurance or do not invest money in health insurance at all. Apart from this people can be fooled easily about the amount of the insurance and may unnecessarily buy some expensive health insurance.Also there is lack of accuracy in estimating the premium costs.

* 1. **Proposed System**

Judicious use of predictive analysis has empowered health insurers to improve their premium pricing accuracy, create customized health insurance plans and services, and build stronger customer relationships.

Thus, the main goal of this project is to predict the insurance premiums based on the behavioural data collected from the individuals so that insurance companies can make useful and accurate predictions.

Based on these predictions, they can then evaluate the following decisions and make better judgement calls:

• Which individuals deserve which kind of insurance plan?

• Based upon an individual’s behaviour, predicting their premium helps in better risk management.

Using IBM Auto AI, we automate all of the tasks involved in building predictive models for different requirements. You create a model from a data set that includes the age, gender, BMI, number of children, smoking preferences, region, and charges to predict the health insurance premium cost that an individual pays .

* The user creates an IBM Watson Studio Service, IBM Cloud Object Storage Service on IBM Cloud.
* The user uploads the insurance premium data file into Watson Studio.
* The user creates an Auto AI Experiment to predict an insurance premium on Watson Studio.
* Auto AI uses Machine Learning Service to create several models, and the user deploys the best performing model.
* We use the Node-RED web application to connect to the deployed model and predict the insurance.

**DATA DESCRIPTION**

This dataset contains the information on individual attributes such as sex, age, smoking habits etcetera.

It has:

• 1338 rows

• 7 columns

Description of columns:

➢ age – age of primary beneficiary

➢ sex – gender of the beneficiary.

It has two categories:

o Male

o Female

➢ bmi – Body Mass Index, providing an understanding of body weights that are relatively high or low relative to height, objective index of body weight (kg/m^2) using the ratio of height to weight, ideally 18.5 to 24.9

➢ children – Number of children covered by the health insurance / Number of dependents. ➢ smoker – describing whether a person is a smoker or a non-smoker.

It has 2 values:

o Yes

o No

➢ region – the beneficiary’s residential area in the US.

It has 4 region values:

o Northeast

o Southeast

o Southwest

o Northwest

➢ Expenses– Individual insurance premiums billed by health insurance.

|  |  |  |
| --- | --- | --- |
| Column | Description | Data Type |
| Age | Primary beneficiary’s age | integer |
| Sex | Beneficiary’s gender (male, female) | character |
| BMI | Body mass index, providing an understanding of body weights that are relatively high or low relative to height, ratio of height to weight | numeric |
| Children | No of children covered by health insurance/ no of dependents | integer |
| Smoker | Whether a person is a smoker(yes) or not(no)? | character |
| Region | Beneficiary’s residential area (northeast, northwest, southeast, southwest) | character |
| Expenses | Individual insurance premiums billed by health insurance | numeric |

**Project Methodology**

The main goal of the project is to predict the insurance premium charge based upon other attributes.

The dependent variable is Expenses.

There are 6 independent variables:

* age
* sex
* children
* bmi
* smoker
* region

The following figure shows the independent and dependent variables:

**CHAPTER-3**

**SYSTEM ANALYSIS & DESIGN**

**3.1 Requirement Specification**

**Software Requirements**

* Operating System
* Watson Studio
* Node-Red

**Hardware Requirements**

RAM : 16GB and Higher

Processor : Intel i5 and above

Hard Disk : 1000GB: Minimum

**Machine Learning**

Machine learning (ML) is a type of artificial intelligence ([AI](https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence)) that allows software applications to become more accurate at predicting outcomes without being explicitly programmed to do so. Machine learning [algorithms](https://whatis.techtarget.com/definition/algorithm) use historical data as input to predict new output values.

**3.2 Design and Architecture**

**DEVELOPER**

**CLOUD OBJECT STORAGE**

**WATSON STUDIO**

**DATA FILE**

**AUTO AI**

**WATSON MACHINE LEARNING**

**UI**

**3.3 Algorithms and Sample Code**

**Algorithms**

**Source Code:**

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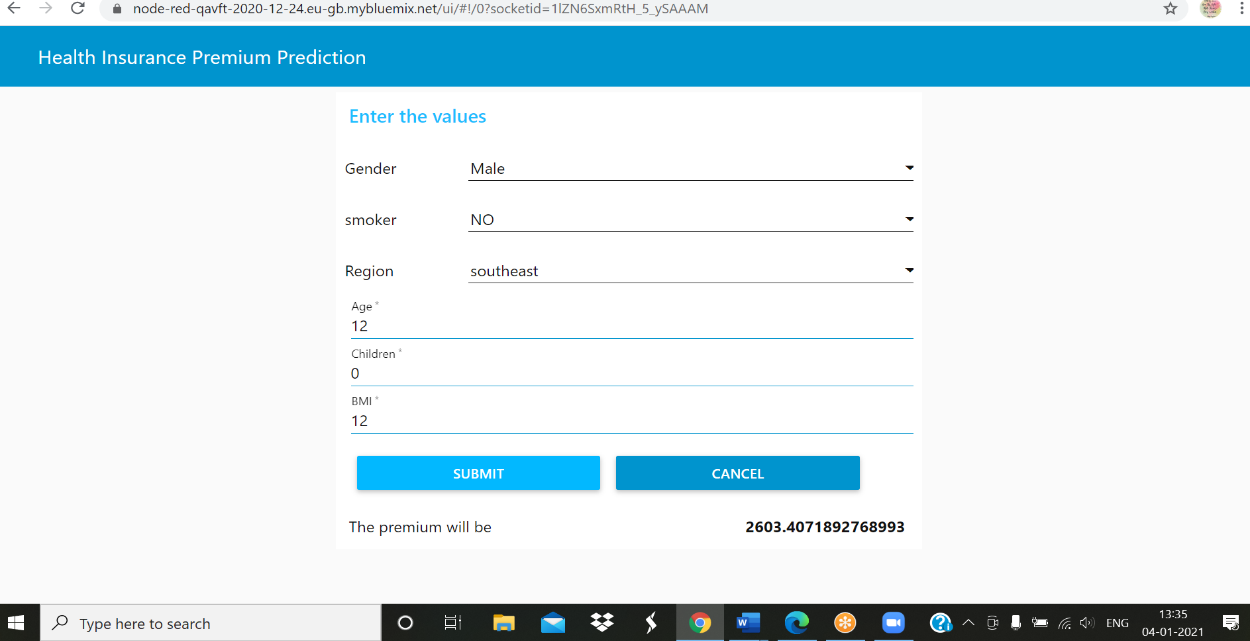
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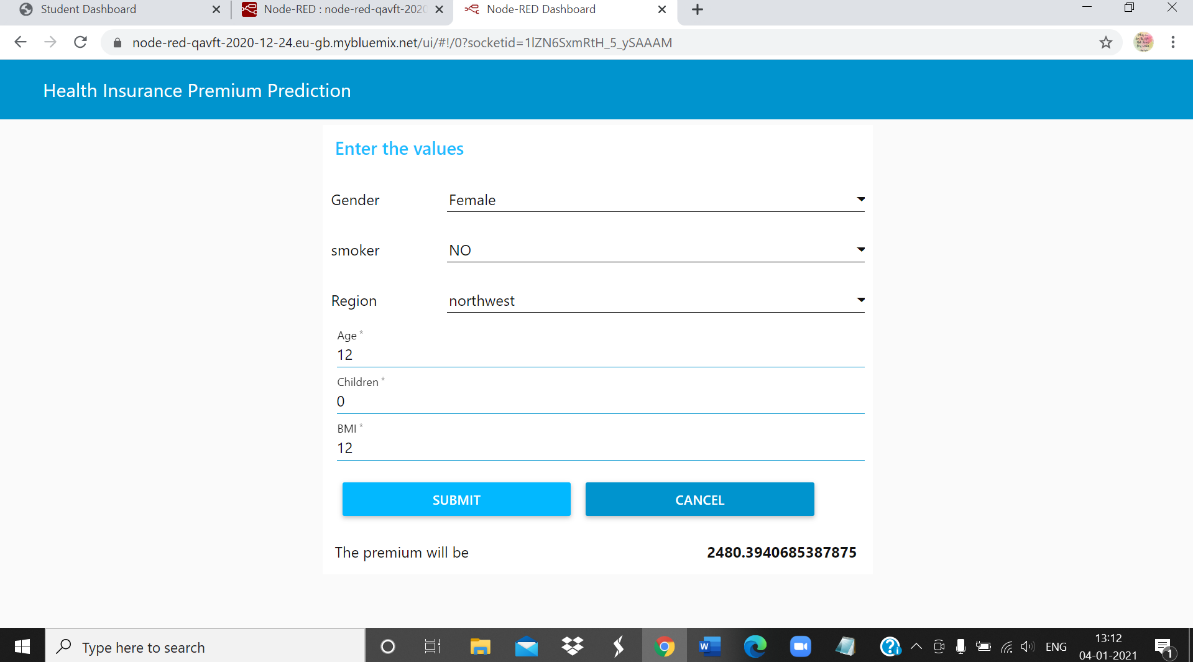
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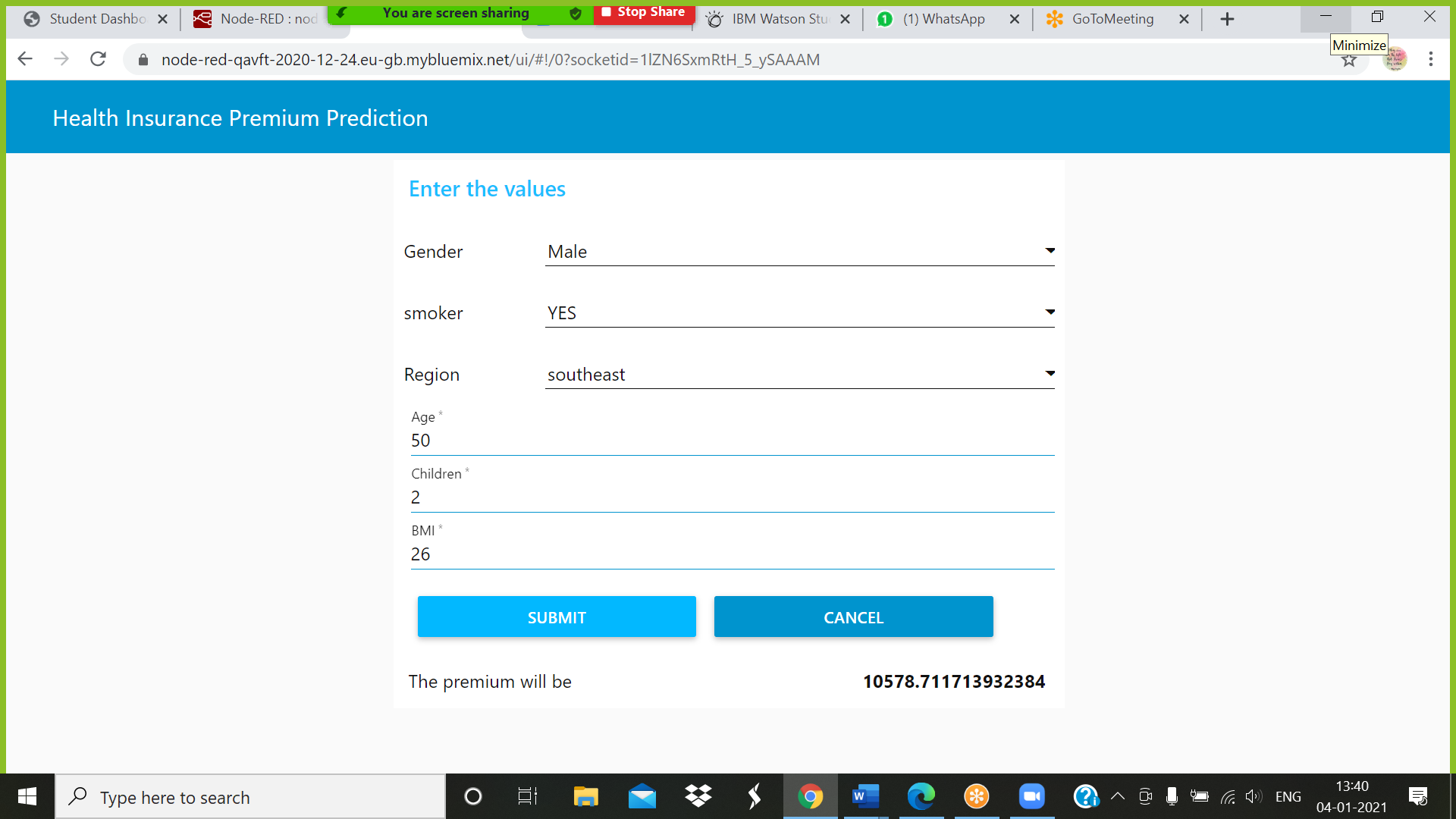
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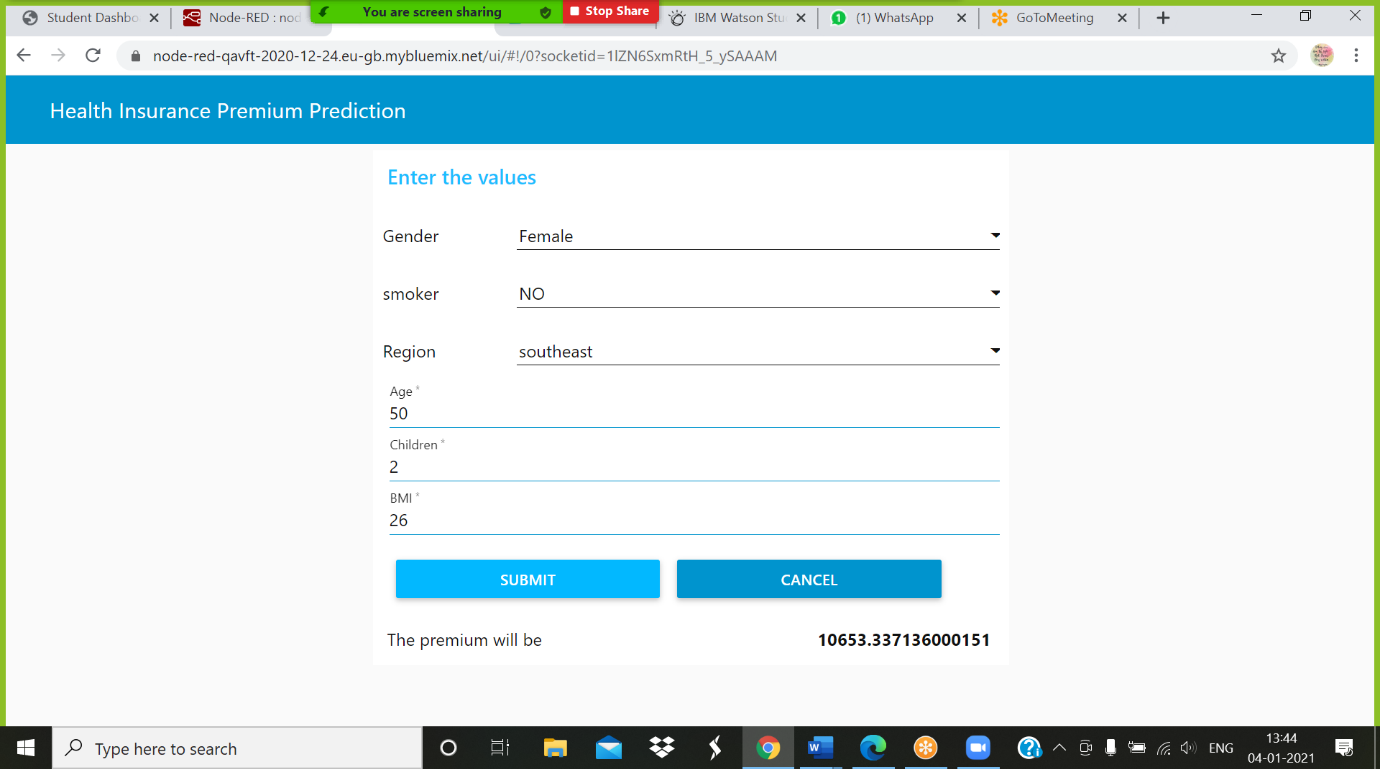
**CHAPTER – 4**

**OUTPUTS**

****

****



****

**CHAPTER 5**

**CONCLUSION**

Based on the findings of the project, it can be said that predictive modeling has tremendous benefits for the health insurance industry in determining how much the premium should be charged to the insured based upon his/her behaviors and health habits. Health insurance companies can then accurately charge the premium based upon a specific individual’s attributes. This will not only help the individuals in getting charged the right amount of premium for their health insurance but will also help in forging better relationships and a level of trust between the insurance company and the insured. Based on these predictions, the health insurance providers can then evaluate the following decisions :

* Which individuals deserve which kind of insurance plan?
* How much the premium should be charged based on an individual’s behaviours?
* Based upon an individual’s behaviour, predicting their premium helps in better risk management.

It helps forge trust between the customer and the insurance company. Thus, it is important for a health insurance company to collect and analyse the data such as a person’s age, BMI, health data to accurately predict the risk and charge accurate premiums to cover that risk.

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3. Rencher, Alvin C.; Christensen, William F. (2012), "Chapter 10, Multivariate regression – Section 10.1, Introduction", Methods of Multivariate Analysis, Wiley Series in Probability and Statistics, 709 (3rd ed.), John Wiley & Sons, p. 19, ISBN 9781118391679.

4. "Linear Regression (Machine Learning)" (PDF). University of Pittsburgh.

5. Ho, Tin Kam (1995). Random Decision Forests (PDF). Proceedings of the 3rd International Conference on Document Analysis and Recognition, Montreal, QC, 14–16.