Project Report

Title: Predicting Life Expectancy using Machine Learning

Category: Machine Learning

Application ID: SPS_APL_20200003958

Project ID: SPS_PRO_215

Internship at: SMARTINTERNZ

Completed by: Pranshu Tiwari

E-mail id: imptiwari185@gmail.com

Contents:

1. INTRODUCTION

Life expectancy, an estimate of the number of remaining years of life a person has, is an important consideration for making clinical decisions in primary care. Predicting Life Expectancy helps analyze the average lifespan of the citizens, which helps in making crucial health decisions.

1.1 Overview

Life expectancy is a statistical measure of the average time a human being is expected to live. Life expectancy depends on various factors: Regional variations, Economic Circumstances, Sex Differences, Mental Illnesses, Physical Illnesses, Education, Year of their birth and other demographic factors. It is very important to predict average life expectancy of a country to analyze further requirements to increase its rate of growth or stabilize the rate of growth in that country. So, this is a typical Regression Machine Learning project that leverages historical data to predict insights into the future.

This project is to build a model while considering historical data from a period of 2000 to 2015 for all the countries. The model trained in this project will be able to predict the average lifetime of a human being given some input factors .With the help of this project any country is able to predict the expected lifetime of their countrymen and then, accordingly take preventive measures to improve on their healthcare measures. This will also help countries in improving a particular field such as GDP, alcohol intake, etc which have a high impact on a country's life expectancy.

Good prognostication helps to determine the course of treatment and helps to anticipate the procurement of health care services and facilities, or more broadly: facilitates Advance Care Planning. So this problem statement is aimed at predicting Life Expectancy rate of a country given various features. So, the end product will predict the future life expectancy of the person with the help of prior given appropriate matrix of features by the user like current year, GDP, education, alcohol intake of people in the country, expenditure on healthcare system and some specific disease related deaths that happened in the country are given.

1.2 Purpose

The purpose of the project is to design a model for predicting the Life Expectancy of people in a country based on various features such as year, GDP, education, alcohol intake of people in the country, expenditure on health care system and some specific disease related deaths that has happened in the country.

The average life expectancy of a certain country says many things about that particular country. It ultimately helps in predicting the health conditions and the development of the health sector in that particular country. This ultimately helps the nation to find the area which needs attention in an urge to improve its contribution in average lifespan of a human being. The expectancy

obviously depends upon the country's population, GDP, the economy of the country and many more factors. It is not enough to have a long life; instead with having a long life one should have a fit life as well.

A country can predict the expected life of their citizens based on various parameters. According to that, the country can take necessary preventive measures to improve the healthcare system. This will serve as an example for countries to assess and then, to improve life expectancy for their citizens. This will help in suggesting which factor should be given importance in order to efficiently improve the life expectancy of the country's population.

2. LITERATURE SURVEY

2.1 Existing Problem

Past studies have revealed a lot of work in the field of predicting life expectancy of a human being. After reviewing existing works and techniques in the prediction of human Life Expectancy, it has been found that, it is possible to predict an Average Life Expectancy for individuals using advanced technologies and devices such as machine learning techniques and mobile health monitoring devices. It is noticed that the collection of data is a huge challenge due to the privacy and government policy considerations, which will require collaboration of various bodies in the health industry. The interworking of a heterogeneous health network is also a challenge for data collection.

In our regular prediction system, there are many problems which exist, such as morbidity and mortality (smoking, alcohol consumption, overweight and obesity, and physical activity) and health related diseases. Although there have been a lot of studies undertaken in the past on factors affecting life expectancy considering demographic variables, income composition and mortality rates. It was found that effect of immunization and human development index was not taken into account in the past. Also, some of the past research was done considering multiple linear regression based on data set of one year for all the countries.

Despite these challenges, there is a possibility of predicting life span by proposing an approach of data collection and application by smart phone, in which users can enter their information to access the cloud server to obtain their own predicted life span based on the given inputs. As machine learning technology is evolving and being applied rapidly, the feasibility may be increasing to collect health data from the public as well as existing health agencies such as centralized health servers.

2.2 Proposed Solution

For the above problem to get solved we have a dataset consist of various factors. In this system we have taken all the correlated features into consideration. So, the target output variable i.e. expected life span of the people depends upon variety of factors and not factors of particular fields.

Important immunization like Hepatitis B, Polio and Diphtheria are also considered. The data-set related to life expectancy, health factors for 193 countries has been collected from WHO data repository website and its corresponding economic data was collected from the United Nations website. Among all categories of health-related factors only those critical factors were chosen which are more representative.

It has been observed that in the past 15 years, there has been a huge development in health sector resulting in improvement of human mortality rates especially in the developing nations in comparison to the past 30 years. Therefore, in this project we have considered data from year 2000-2015 for 193 countries for further analysis. The individual data files have been merged

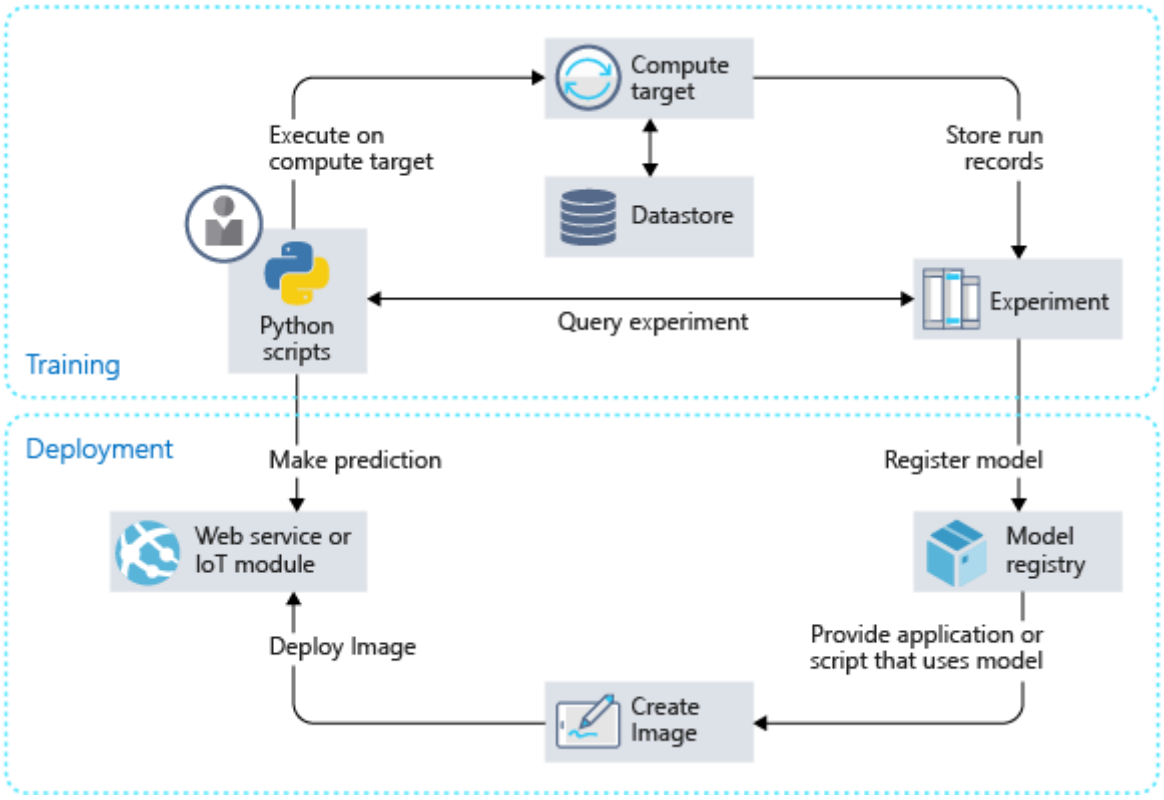
together into a single data-set.

The project uses immunization factors, mortality factors, economic factors, social factors and other health related factors to predict life expectancy of a country for a given year using a machine learning model. Since, the observations in this dataset are based on different countries; it will be easier for a country to determine the predicting factor which is contributing to lower value of life expectancy. This will help in suggesting a country, which area should be given importance in order to efficiently improve the life expectancy of its population.

The model of “Predicting Life Expectancy using Machine Learning” uses IBM Cloud services, which helps to avoid any storage issues. The UI Presented to the users is a website URL i.e. on user’s fingertips.

3. THEORETICAL ANALYSIS

3.1 Block Diagram



3.2 Hardware / Software Designing

This project mainly aims at predicting life expectancy. The basic requirement of the project is the availability of the suitable dataset which will aid the prediction. So, in this project I have used the standard WHO dataset on "kaggle". The machine learning model is trained on the basis of the data provided, such that it could predict the average lifespan of an individual in the coming years.

- Functional Requirements
  - Download the dataset of WHO
  - Analyze it and clean the dataset
  - Create IBM account
  - Create the appropriate cloud and node red services
  - Train the regression model on different algorithms
  - Check for the best one and finalize that algorithm to train our mode
  - Build Node red flow for GUI(web app)
  - Create scoring end point for integrating our model to node red

- Provide the model with the inputs fields
- The model will return the output as the average predicted lifespan

- Technical Requirements
  - The GUI must be integrated with the backend trained model.
  - The model before training must be given with clean dataset (done by preprocessing)

- Software Requirements
  - Python IDE
  - Excel
  - IBM Cloud Account
  - IBM Watson
  - Node-Red

- Designing
  1. Create necessary IBM Cloud services
  2. Create Watson studio project
  3. Configure Watson Studio
  4. Create IBM Machine Learning instance
  5. Create machine learning model in Jupyter notebook
  6. Deploy the machine learning model
  7. Create flow and configure node
  8. Integrate node red with machine learning model
  9. Deploy and run Node Red app
  10. Input is taken from the user using a “Form” element in Node-Red. Then, an HTTP request is made to the IBM cloud that further makes an HTTP request to the deployed model using model’s instance id. After verification of id, the model sends an HTTP response which is finally parsed by the Node-Red application and the predicted result is then, displayed on the user’s screen.

4. EXPERIMENTAL INVESTIGATIONS

Following factors are taken into account for predicting the life expectancy of a country.

1. Country
2. Status: Developed or Developing status of the country.
3. Year
4. Adult mortality: Adult Mortality Rates of both sexes (probability of dying between 15 and 60 years per 1000 population).
5. Infant deaths: Number of Infant Deaths per 1000 population.
6. Alcohol: Alcohol, recorded per capita (15+) consumption.
7. Percentage Expenditure: Expenditure on health as a percentage of Gross Domestic Product per capita (%).
8. Hepatitis B: Hepatitis B =immunization coverage among 1-year-olds (%).
9. Measles: Measles - number of reported cases per 1000 population.
10. BMI: Average Body Mass Index of entire population.
11. Under-five deaths: Number of under-five deaths per 1000 population.
12. Polio: Polio (Pol3) immunization coverage among 1-year-olds (%).
13. Total expenditure: General government expenditure on health as a percentage of total government expenditure (%).
14. Diphtheria: Diphtheria tetanus toxoid and pertussis (DTP3) immunization coverage among 1-yearolds (%).
15. HIV/AIDS: Deaths per 1 000 live births HIV/AIDS (0-4 years).
16. GDP: Gross Domestic Product per capita (in USD).
17. Population: Population of the country.
18. Thinness 10-19 years: Prevalence of thinness among children and adolescents for Age 10 to 19(%).
19. Thinness 5-9 years: Prevalence of thinness among children for Age 5 to 9(%).
20. Income composition of resources: Human Development Index in terms of income composition of resources (index ranging from 0 to 1).
21. Schooling: Number of years of schooling.

Steps

Create IBM Cloud services

- Watson Studio
- Watson Machine Learning
- Node Red
- Create Watson Studio service instance.

1. Select Catalog found at the top right of the page.
2. Click on Watson from the menu on the left, which you can find under Platform services.
3. Select Watson Studio.
4. Enter the Service name or keep the default value and make sure to select the US South as the region/location and your desired organization, and space.
5. Select Lite for the Plan, which you can find under Pricing Plans and is already selected. Please note you are only allowed one instance of a Lite plan per service.
6. Click on Create.
7. You will be taken to the main page of the service. Click on Get Started.
8. Create a New Project

❖ Add WML service

1. Click on the Settings in the project view, locate Associated services => Add Service => Watson.
2. You should also create an Access Token in the project setting. Click on New token, give it a name, then click Create.

❖ Create Notebook

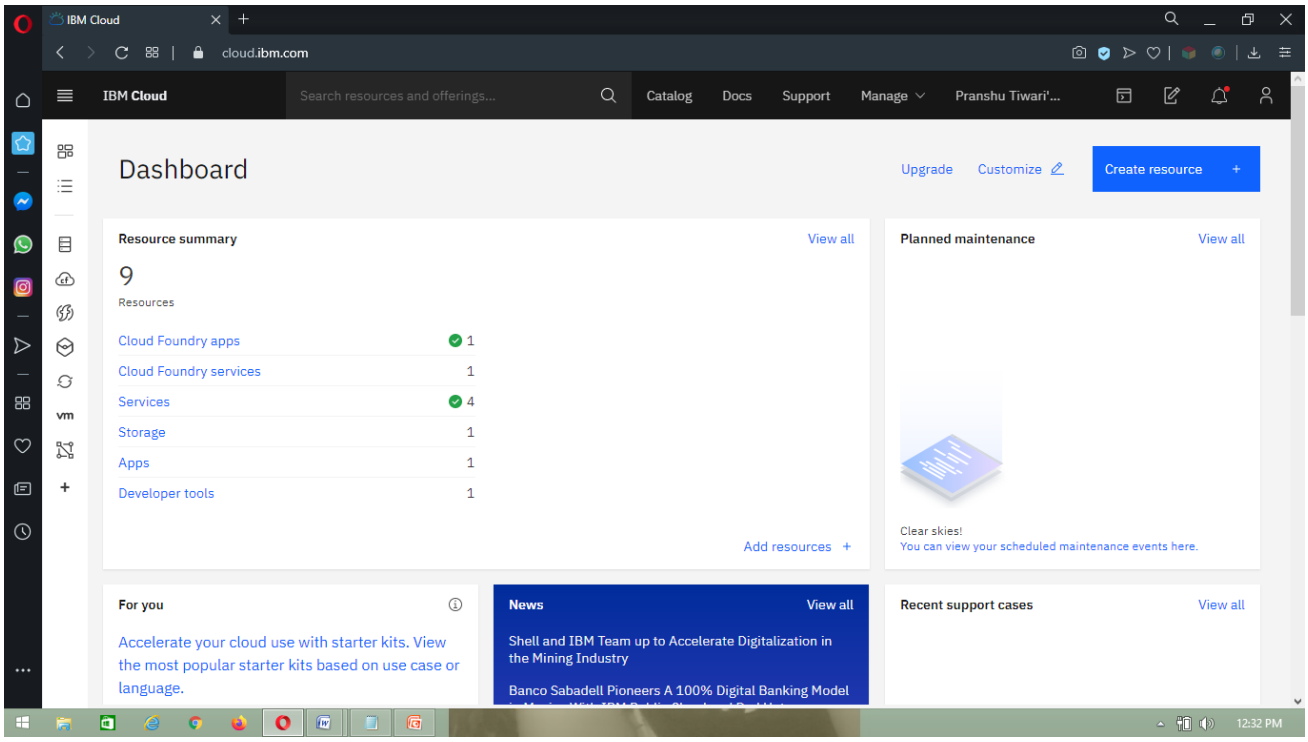
1. Click Add to project => Notebook
2. And create your Model here.

❖ Deploy Model as Web Service

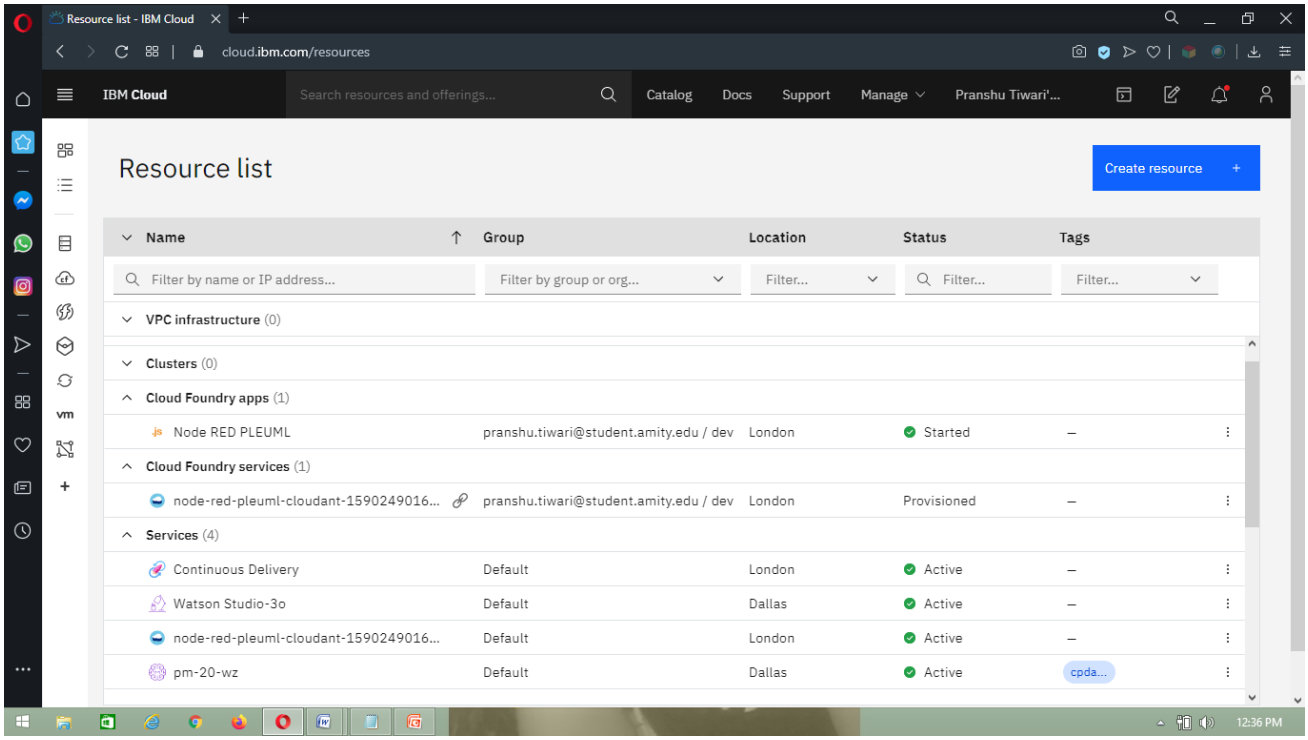
❖ Build Node-RED Flow to Integrate ML Services

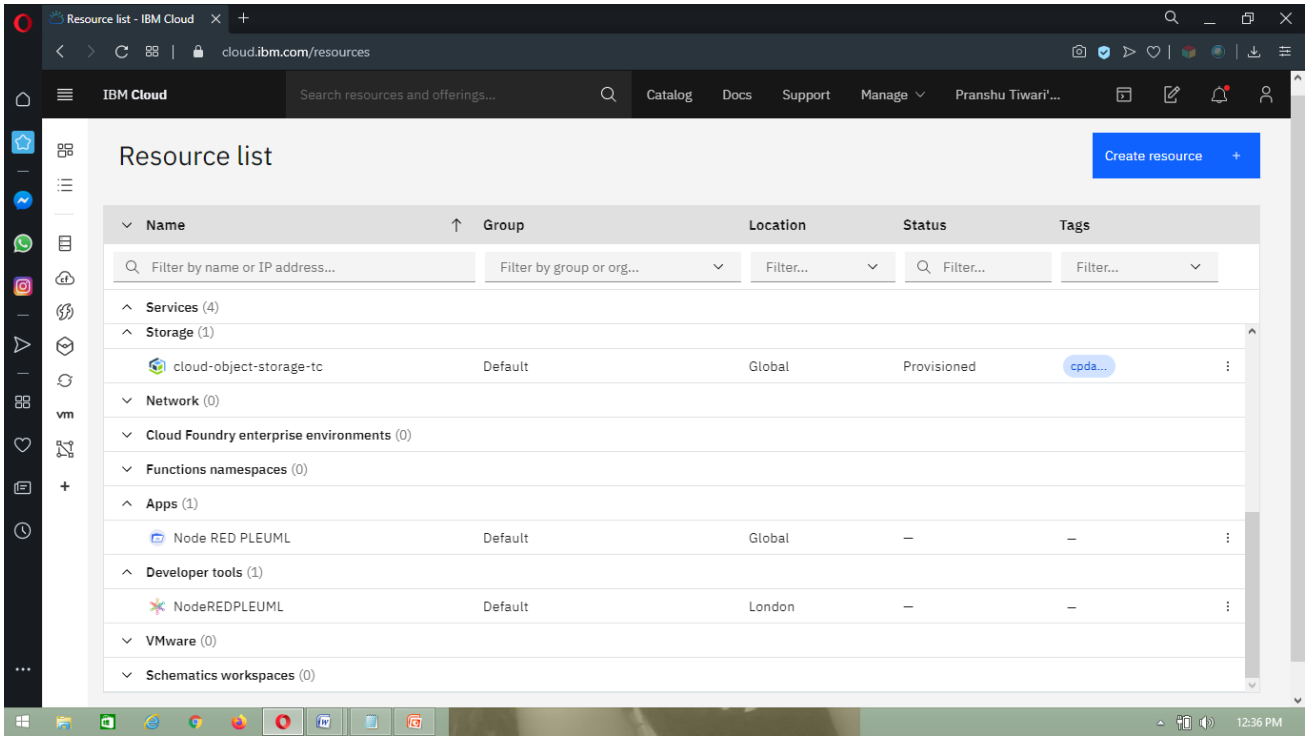
SCREENSHOTS

IBM Cloud Dashboard:

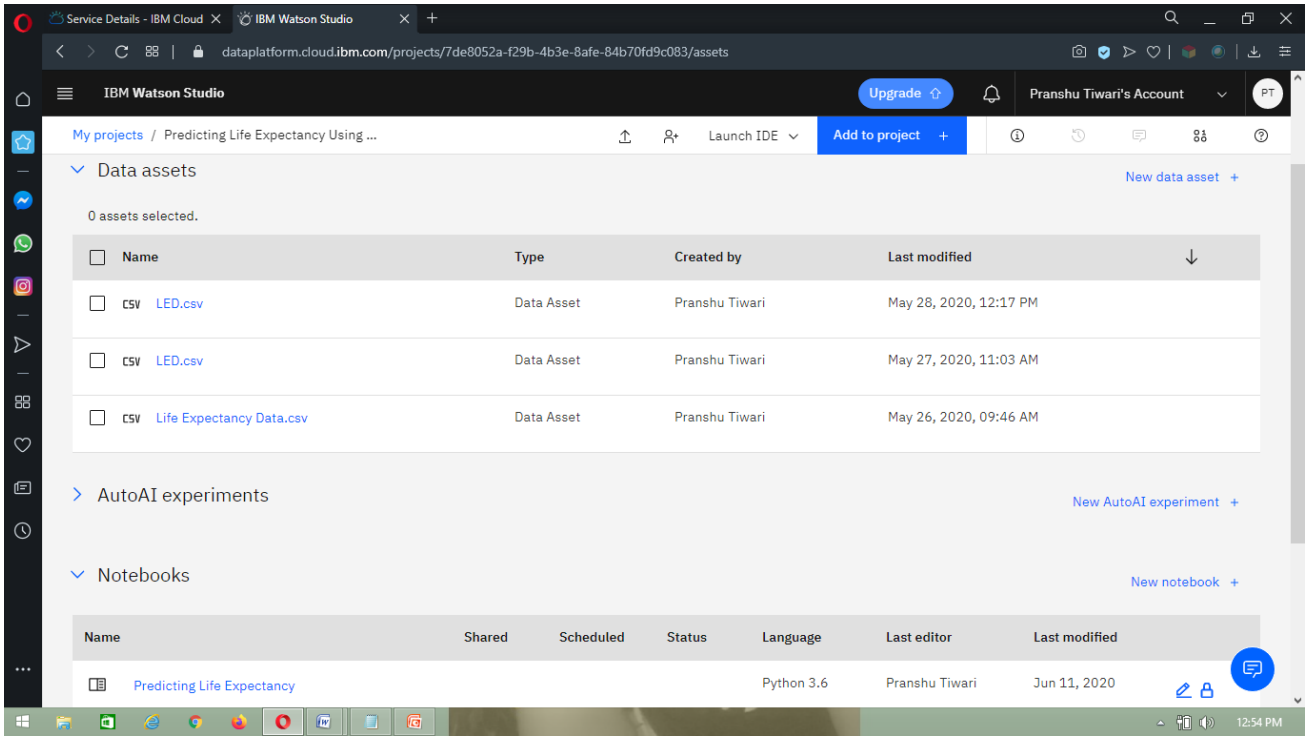


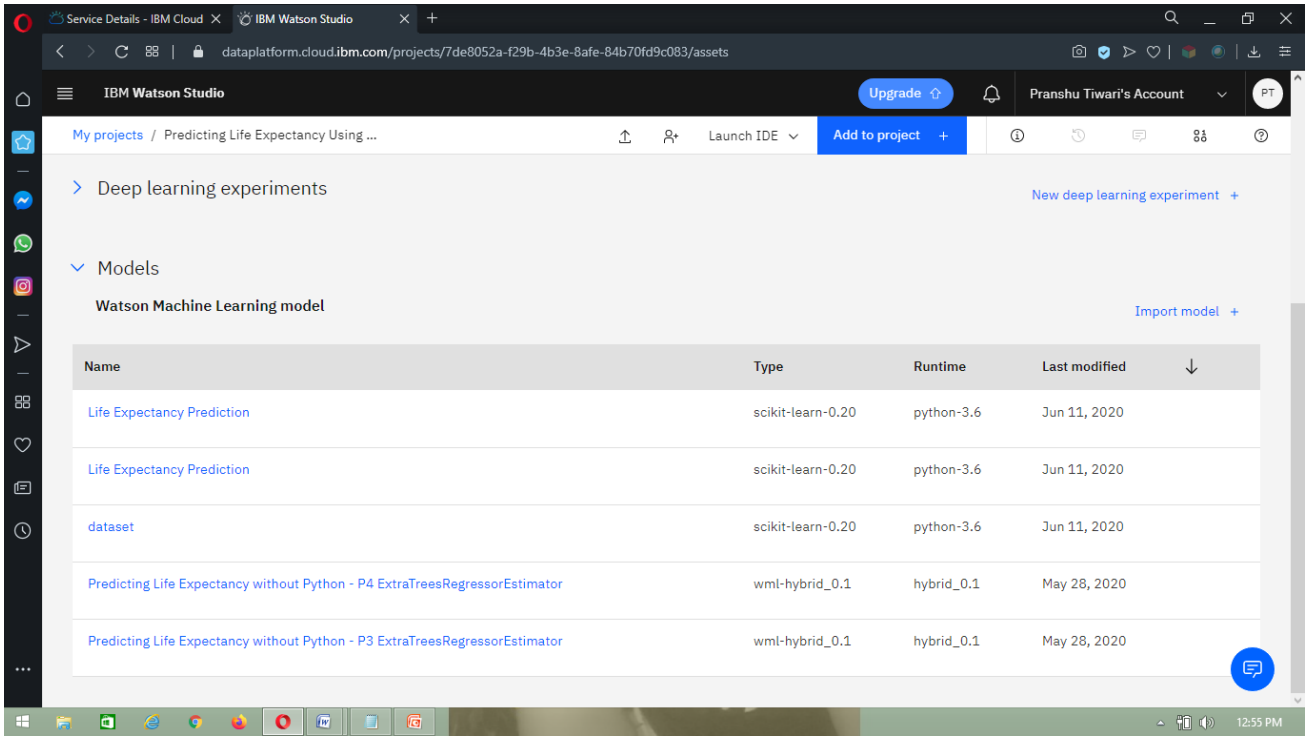
Resource List:



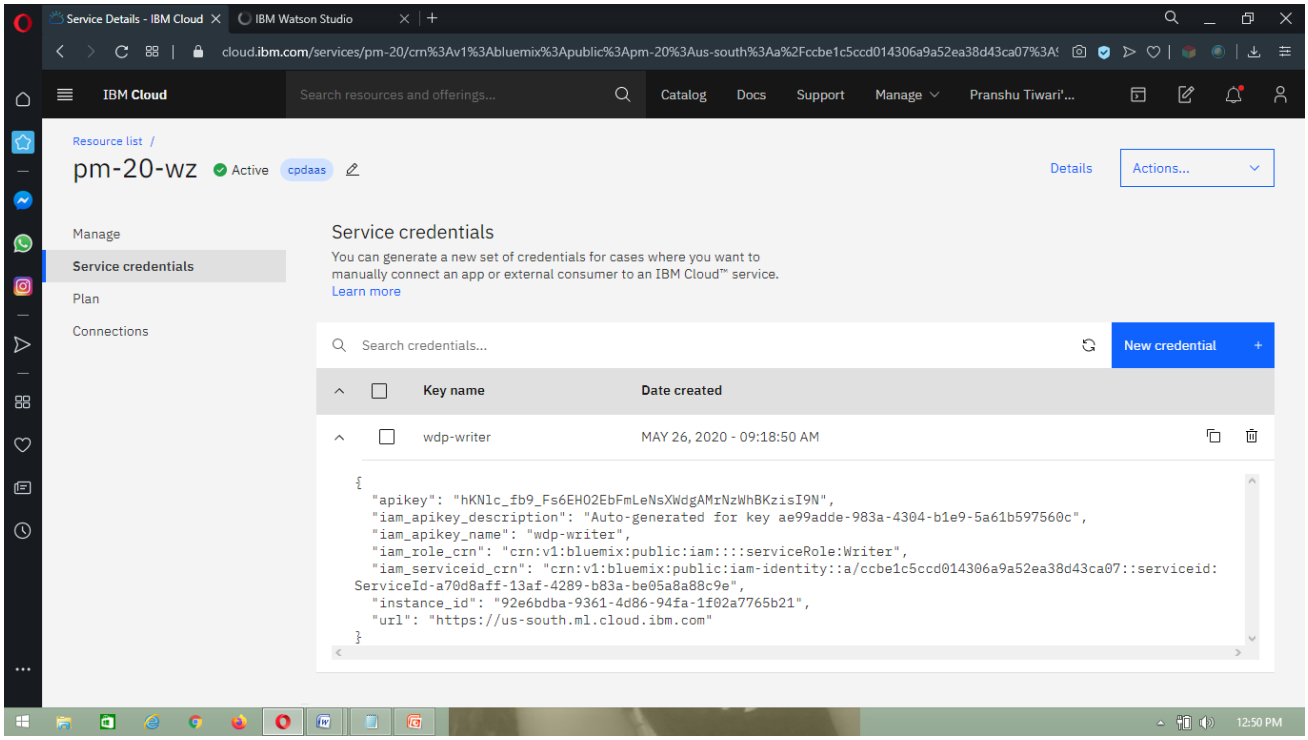


IBM Watson Studio:

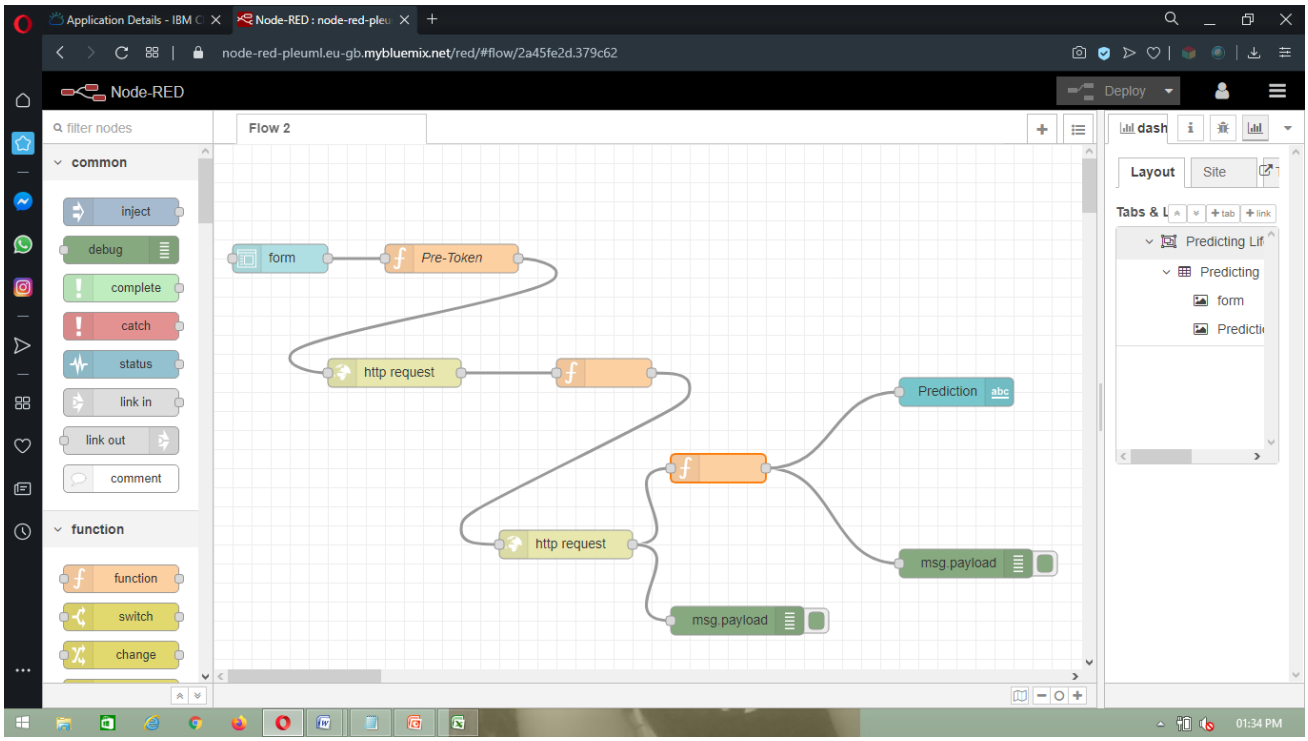




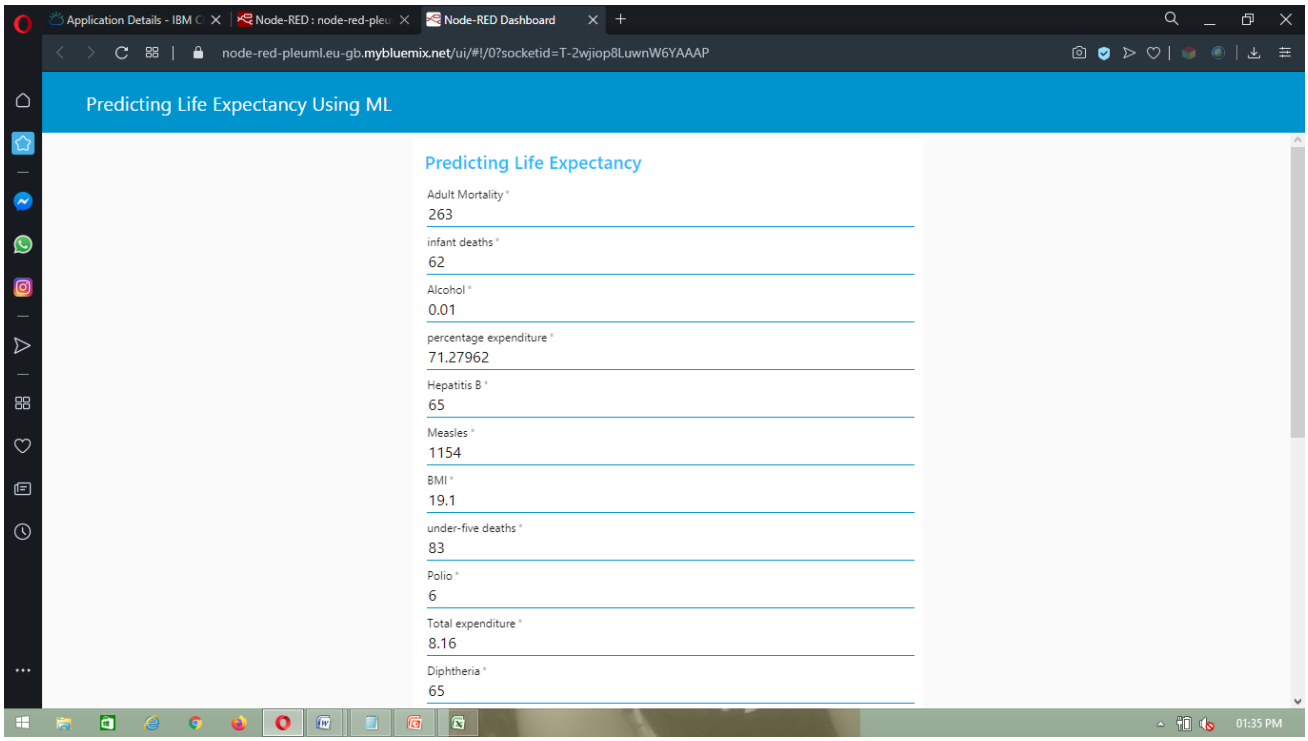
IBM Watson Machine Learning Service:



Node-Red Flow:

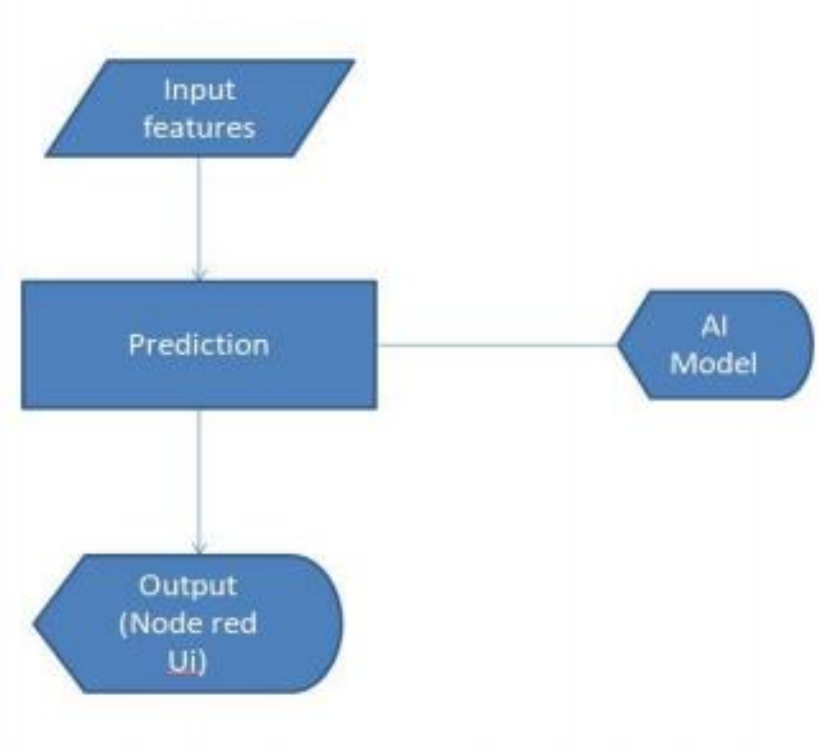


Life Expectancy Prediction UI:



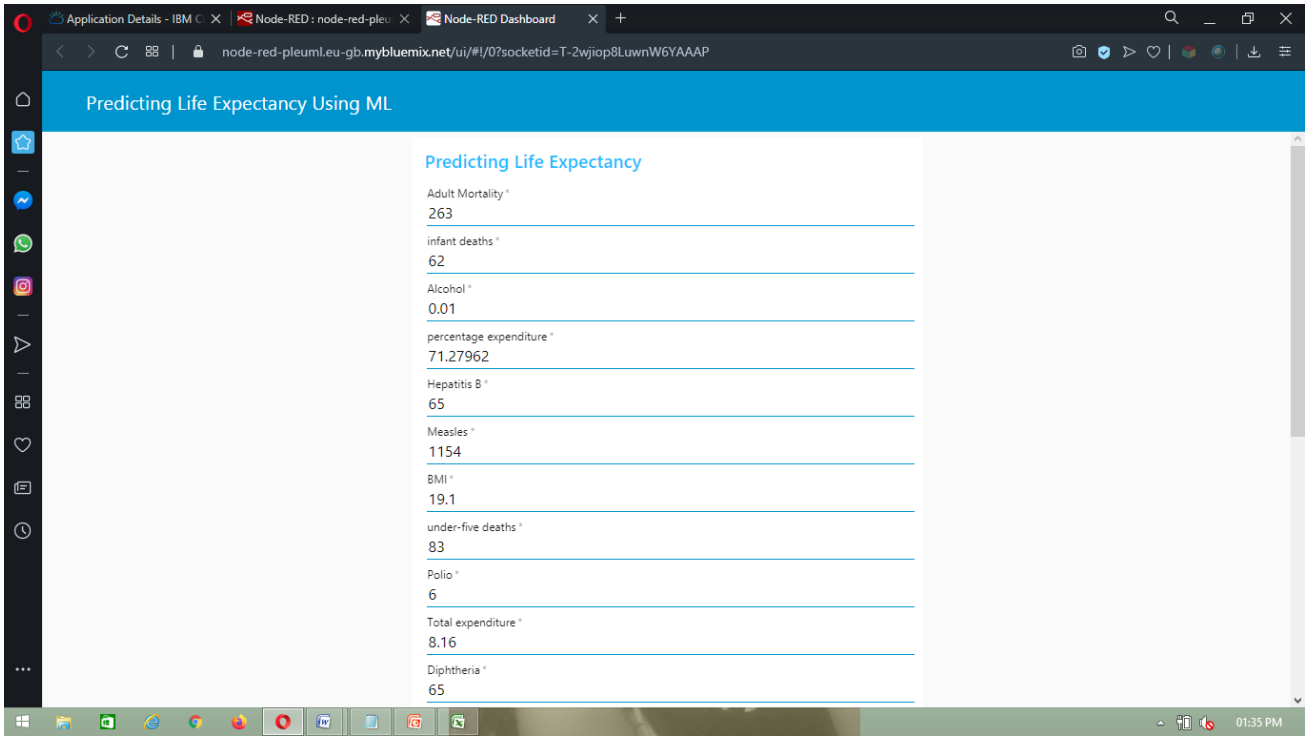
5. FLOWCHART

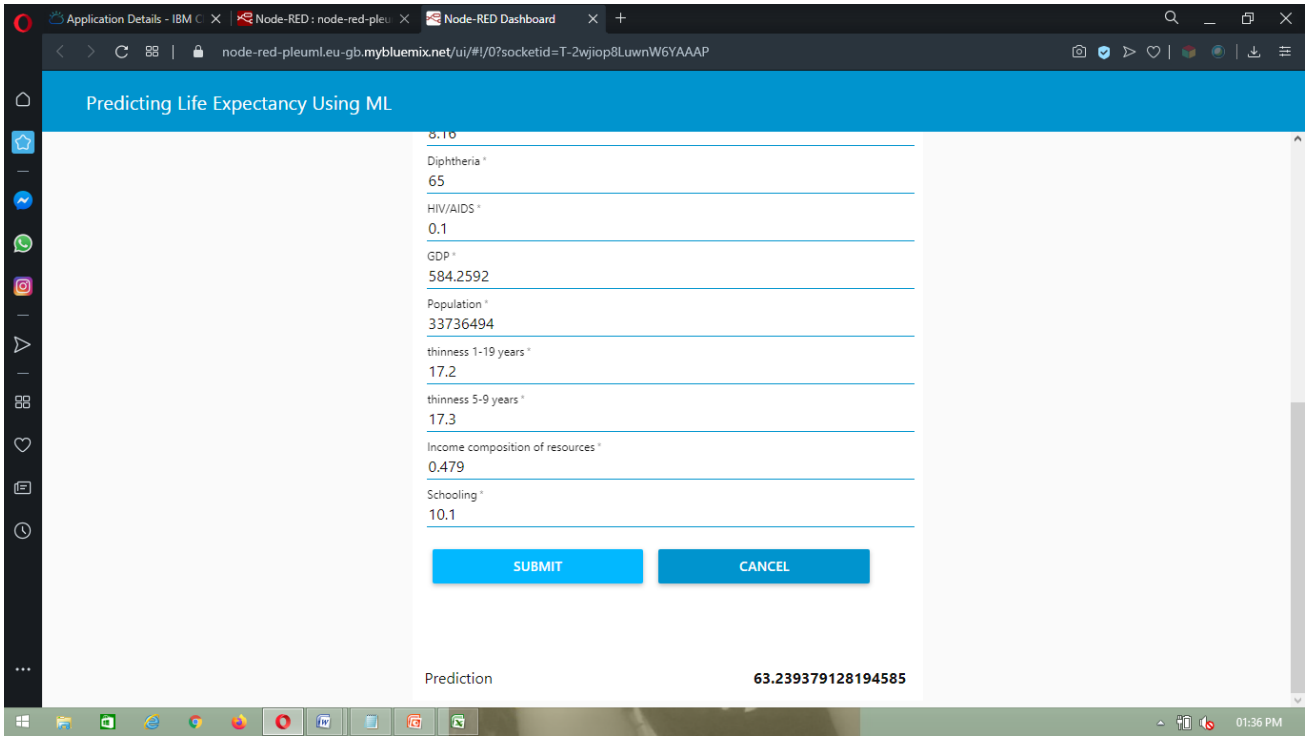
A flowchart is a diagram that depicts a flow of process, system or computer algorithm. They are widely used in multiple fields to document, study and plan, improve and communicate complex processes in clear, easy-to-understand diagrams. Flowcharts, sometimes spelled as flow charts, use rectangles, ovals, diamonds and potentially numerous other shapes to define the type of step, along with connecting arrows to define flow and sequence.



6. RESULT

The user friendly Graphical User interface is shown in the figure. This GUI is connected to the trained machine learning model present in the backend (IBM Watson notebook). The user has to fill in the inputs accordingly and click on the “Predict” button present at the end of the form. On clicking the “Predict” button, the user will be displayed the predicted life expectancy at the predict label, based on the inputs provided as shown in the figure.





7. ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

1. Advantages of using IBM Watson:

- Processes unstructured data
- Fills human limitations
- Acts as a decision support system, doesn't replace humans
- Improves performance + abilities by giving best available data
- Improve and transform customer service
- Handle enormous quantities of data
- Sustainable Competitive Advantage

2. Easy for users to interact with the model via the UI.

3. User-friendly.

4. Easy to build and deploy.

5. Doesn't require much storage space.

DISADVANTAGES:

a) Wrong Prediction: As it depends completely on user, so if the user provides some incorrect values then, it will predict an undesirable value.

b) Seen as disruptive technology

c) Only in English (Limits areas of use)

d) Maintenance and even requires internet connection

e) Doesn't process structured data directly

f) Increasing rate of data, with limited resources

8. APPLICATIONS

We are also to distinguish different risk factors for life expectancy, such as smoking-status, occupation, socio-economic class, and others. More complex analyses for assessing cancer survival, that involves comparisons between two populations or a population in two points in time can also be undertaken. In addition to public health domains, life tables are also used by insurance companies and various governmental departments. When used in biology, age specific fertility rates are also included in the calculations. When data has not been available, such as in low income countries, life tables have been modeled using the data available, usually childhood mortality data.

Life expectancy is the primary factor in determining an individual's risk factor and the likelihood they will make a claim. This project/idea is useful for Insurance companies as they consider age, lifestyle choices, family medical history, and several other factors when determining premium rates for individual life insurance policies. The principle of life expectancy suggests that you should purchase a life insurance policy for yourself and your spouse sooner rather than later. Not only will you save money through lower premium costs, but you will also have longer for your policy to accumulate value and become a potentially significant financial resource as you age. It can be used by researchers to make meaningful research out of it and thus, bring something that will help increase the expectancy considering the impact of a specific factor on the average lifespan of people in a specific country.

9. CONCLUSION

We have developed a model that will predict the life expectancy of a specific demographic region based on the inputs provided. Various factors have a significant impact on the life span such as Adult Mortality, Population, Under 5 Deaths, Thinness 1-5 Years, alcohol, HIV, Hepatitis B, GDP, Percentage Expenditure and many more. Users can interact with the system via a simple Graphical user interface which is in the form of a form with input spaces which the user needs to fill the inputs into and then press the “predict” button.

The potential use of the project is not limited to health care in practice, but could also be useful in other clinical applications such as clinical trials. The project makes a good use of machine learning in predicting life expectancy of individuals in a country which can help the respective government in making policies for the benefit of the nation and entire humankind.

10. FUTURE SCOPE

As future scope, we can connect the model to the database which can predict the life Expectancy of not only human beings but also of the plants and different animals present on the earth. This will help us analyze the trends in the life span. A model with country wise bifurcation can be made, which will help to segregate the data demographically. Use the Twitter API to incorporate NLP analysis for a country to see how it relates to Life Expectancy.

Currently, the project is just a web application. It can be developed to support other platforms like Android, IOS and Windows Mobile. Other regression models can also be used for prediction and later the best among them should be chosen. Integrating with services such as speech recognition

11. BIBLIOGRAPHY

- https://cloud.ibm.com/docs/overview?topic=overview-whatis-platform
- https://developer.ibm.com/tutorials/how-to-create-a-node-red-starter-application/
- https://nodered.org/
- https://github.com/watson-developer-cloud/node-red-labs
- https://www.youtube.com/embed/r7E1TJ1HtM0
- https://bookdown.org/caoying4work/watsonstudio-workshop/jn.html
- https://www.kaggle.com/kumarajarshi/life-expectancy-who
- https://www.youtube.com/watch?v=DBRGlAHdj48&list=PLzpeuWUENMK2PYtasCaKK4b ZjaYzhW23L
- https://www.youtube.com/watch?v=-CUi8GezG1I&list=PLzpeuWUENMK2PYtasCaKK4bZjaYzhW23L&index=2
- https://www.youtube.com/watch?v=Jtej3Y6uUng
- https://bookdown.org/caoying4work/watsonstudio-workshop/jn.html#deploy-model-as-web- service
- https://machinelearningmastery.com/columntransformer-for-numerical-and-categorical-data/

APPENDIX

Source Code

Watson Studio

```
import types
import pandas as pd
from botocore.client import Config
import ibm_boto3

def __iter__(self): return 0

# @hidden_cell
# The following code accesses a file in your IBM Cloud Object Storage. It includes your credentials.
# You might want to remove those credentials before you share the notebook.
client_217b794e3aba444c91f1125f2b6ff165 = ibm_boto3.client(service_name='s3',
    ibm_api_key_id='8oCALbPy00_E6g5TTpTzGCbDREqMc0Fdi2aN5rE9dXuh',
    ibm_auth_endpoint="https://iam.cloud.ibm.com/oidc/token",
    config=Config(signature_version='oauth'),
    endpoint_url='https://s3-api.us-geo.objectstorage.service.networklayer.com')

body = client_217b794e3aba444c91f1125f2b6ff165.get_object(Bucket='predictinglifeexpectancyusingml-
donotdelete-pr-ejpaux8gzeqotr',Key='Life Expectancy Data.csv')['Body']
# add missing __iter__ method, so pandas accepts body as file-like object
if not hasattr(body, "__iter__"): body.__iter__ = types.MethodType( __iter__, body )

df = pd.read_csv(body)
df.head()
import numpy as np

import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.linear_model import LinearRegression, Lasso, Ridge
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.metrics import mean_squared_error, accuracy_score

df.shape
df.columns
df.info()
df.isnull().sum(axis=0)

# deleting the null values
before_drop = df.shape[0]
df = df.dropna()
after_drop = df.shape[0]
print('rows before droping nulls:', before_drop)
print('rows after droping nulls:', after_drop)
df.head()
df.info()
df.describe().transpose()
```

```
sns.heatmap(df.corr(), square=True, cmap='RdYlGn')

# deleting the non numeric values
df = df.drop(['Country','Year','Status'], axis=1)
df.head()

# labels(y) and data(X_all)
y = df['Life expectancy '].values
X_all = df.drop(['Life expectancy '], axis=1).values

# splitting the data to train and test parts
X_train, X_test, y_train, y_test = train_test_split(X_all, y, test_size=0.3, random_state=42)

# create the model
ln_reg_all = LinearRegression()

# fitting the model to the train data
ln_reg_all.fit(X_train, y_train)

# predicting the data
y_pred = ln_reg_all.predict(X_test)

# accuracy
print('R^2: {}'.format(ln_reg_all.score(X_test, y_test)))
print('rmse: {}'.format(np.sqrt(mean_squared_error(y_pred, y_test))))
!pip install watson-machine-learning-client
from watson_machine_learning_client import WatsonMachineLearningAPIClient

wml_credentials={
  "apikey": "hKNlc_fb9_Fs6EHO2EbFmLeNsXWdgAMrNzWhBKzisI9N",
  "instance_id": "92e6bdba-9361-4d86-94fa-1f02a7765b21",
  "url": "https://us-south.ml.cloud.ibm.com"
}
client=WatsonMachineLearningAPIClient(wml_credentials)
print(client.version)

client = WatsonMachineLearningAPIClient( wml_credentials)
metadata= {client.repository.ModelMetaNames.AUTHOR_NAME:"Pranshu",

client.repository.ModelMetaNames.AUTHOR_EMAIL:"pranshu.tiwari@student.amity.edu",
          client.repository.ModelMetaNames.NAME:"Life Expectancy Prediction"}

model_artifact= client.repository.store_model(model=ln_reg_all, meta_props=metadata)
published_model_uid= client.repository.get_model_uid(model_artifact)
published_model_uid

deployment = client.deployments.create(published_model_uid, name="Life Expectancy Prediction")
scoring_endpoint = client.deployments.get_scoring_url(deployment)
scoring_endpoint
```

JSON Flow


```
[
    {
        "id": "2a45fe2d.379c62",
        "type": "tab",
        "label": "Flow 2",
        "disabled": false,
        "info": ""
    },
    {
        "id": "6c2e2c51.c03884",
        "type": "ui_form",
        "z": "2a45fe2d.379c62",
        "name": "",
        "label": "",
        "group": "23d98bee.d861e4",
        "order": 1,
        "width": 10,
        "height": 23,
        "options": [
            {
                "label": "Adult Mortality",
                "value": "e",
                "type": "number",
                "required": true,
                "rows": null
            },
            {
                "label": "infant deaths",
                "value": "f",
                "type": "number",
                "required": true,
                "rows": null
            },
            {
                "label": "Alcohol",
                "value": "g",
                "type": "number",
                "required": true,
                "rows": null
            },
            {
                "label": "percentage expenditure",
                "value": "h",
                "type": "number",
                "required": true,
                "rows": null
```

```
},
{
   "label": "Hepatitis B",
   "value": "i",
   "type": "number",
   "required": true,
   "rows": null
},
{
   "label": "Measles ",
   "value": "j",
   "type": "number",
   "required": true,
   "rows": null
},
{
   "label": "BMI",
   "value": "k",
   "type": "number",
   "required": true,
   "rows": null
},
{
   "label": "under-five deaths",
   "value": "l",
   "type": "number",
   "required": true,
   "rows": null
},
{
   "label": "Polio",
   "value": "m",
   "type": "number",
   "required": true,
   "rows": null
},
{
   "label": "Total expenditure",
   "value": "n",
   "type": "number",
   "required": true,
   "rows": null
},
{
   "label": "Diphtheria",
   "value": "o",
   "type": "number",
   "required": true,
   "rows": null
},
```

```
    {
      "label": " HIV/AIDS",
      "value": "p",
      "type": "number",
      "required": true,
      "rows": null
    },
    {
      "label": "GDP",
      "value": "q",
      "type": "number",
      "required": true,
      "rows": null
    },
    {
      "label": "Population",
      "value": "r",
      "type": "number",
      "required": true,
      "rows": null
    },
    {
      "label": "thinness  1-19 years",
      "value": "s",
      "type": "number",
      "required": true,
      "rows": null
    },
    {
      "label": "thinness 5-9 years",
      "value": "t",
      "type": "number",
      "required": true,
      "rows": null
    },
    {
      "label": "Income composition of resources",
      "value": "u",
      "type": "number",
      "required": true,
      "rows": null
    },
    {
      "label": "Schooling",
      "value": "v",
      "type": "number",
      "required": true,
      "rows": null
    }
],
```

```
        "formValue": {
            "e": "",
            "f": "",
            "g": "",
            "h": "",
            "i": "",
            "j": "",
            "k": "",
            "l": "",
            "m": "",
            "n": "",
            "o": "",
            "p": "",
            "q": "",
            "r": "",
            "s": "",
            "t": "",
            "u": "",
            "v": ""
        },
        "payload": "",
        "submit": "submit",
        "cancel": "cancel",
        "topic": "",
        "x": 70,
        "y": 420,
        "wires": [
            [
                "9139838e.b0c97"
            ]
        ]
    },
    {
        "id": "9139838e.b0c97",
        "type": "function",
        "z": "2a45fe2d.379c62",
        "name": "Pre-Token",
        "func": "//make the user values as global
variables\n\nglobal.set(\"e\",msg.payload.e);\nglobal.set(\"f\",msg.payload.f);\nglobal.set(\"g\",msg.p
ayload.g);\nglobal.set(\"h\",msg.payload.h);\nglobal.set(\"i\",msg.payload.i);\nglobal.set(\"j\",msg.pa
yload.j);\nglobal.set(\"k\",msg.payload.k);\nglobal.set(\"l\",msg.payload.l);\nglobal.set(\"m\",msg.pa
yload.m);\nglobal.set(\"n\",msg.payload.n);\nglobal.set(\"o\",msg.payload.o);\nglobal.set(\"p\",msg.p
ayload.p);\nglobal.set(\"q\",msg.payload.q);\nglobal.set(\"r\",msg.payload.r);\nglobal.set(\"s\",msg.pa
yload.s);\nglobal.set(\"t\",msg.payload.t);\nglobal.set(\"u\",msg.payload.u);\nglobal.set(\"v\",msg.pay
load.v);\n\n//following are required to receive a token\nvar apikey=
\"hKNlc_fb9_Fs6EHO2EbFmLeNsXWdgAMrNzWhBKzisI9N\";\nmsg.headers={\"content-type\"
:\"application/x-www-form-urlencoded\"};\nmsg.payload={\"grant_type\":
\"urn:ibm:params:oauth:grant-type:apikey\",\"apikey\":apikey};\nreturn msg;",
        "outputs": 1,
        "noerr": 0,
```

```
        "x": 130,
        "y": 240,
        "wires": [
            [
                "157cfbbc.e0cdf4"
            ]
        ]
    },
    {
        "id": "157cfbbc.e0cdf4",
        "type": "http request",
        "z": "2a45fe2d.379c62",
        "name": "",
        "method": "POST",
        "ret": "obj",
        "paytoqs": false,
        "url": "https://iam.cloud.ibm.com/identity/token",
        "tls": "",
        "persist": false,
        "proxy": "",
        "authType": "basic",
        "x": 250,
        "y": 80,
        "wires": [
            [
                "8536f10c.e28df"
            ]
        ]
    },
    {
        "id": "8536f10c.e28df",
        "type": "function",
        "z": "2a45fe2d.379c62",
        "name": "",
        "func": "//get token and frame the headers\nvar token=msg.payload.access_token;\nvar
instance_id=\"92e6bdba-9361-4d86-94fa-1f02a7765b21\";\nmsg.headers={'Content-type':
'application/json', \"Authorization\":\"Bearer\"+token,\"ML-Instance-ID\":instance_id}\n\n//get
variables that are set earlier\n\nvar e = global.get(\"e\");\nvar f = global.get(\"f\");\nvar g =
global.get(\"g\");\nvar h = global.get(\"h\");\nvar i = global.get(\"i\");\nvar j = global.get(\"j\");\nvar
k = global.get(\"k\");\nvar l = global.get(\"l\");\nvar m = global.get(\"m\");\nvar n =
global.get(\"n\");\nvar o = global.get(\"o\");\nvar p = global.get(\"p\");\nvar q =
global.get(\"q\");\nvar r = global.get(\"r\");\nvar s = global.get(\"s\");\nvar t = global.get(\"t\");\nvar u
= global.get(\"u\");\nvar v = global.get(\"v\");\n\n//send the user values to service end-
point\nmsg.payload={\"fields\":[\"Adult Mortality\",\"infant deaths\",\"Alcohol\",\"percentage
expenditure\",\"Hepatitis B\",\"Measles\",\"BMI\",\"under-five deaths\",\"Polio\",\"Total
expenditure\",\"Diptheria\",\"HIV/AIDS\",\"GDP\",\"Population\",\"thinness 1-19 years\",\"thinness
5-9 years\",\"Income composition of
resources\",\"Schooling\"],\"values\":[[e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v]]};\n\nreturn msg;",
        "outputs": 1,
        "noerr": 0,
```

```
    "x": 310,
    "y": 280,
    "wires": [
      [
        "26e444ed.a0dafc"
      ]
    ]
  },
  {
    "id": "26e444ed.a0dafc",
    "type": "http request",
    "z": "2a45fe2d.379c62",
    "name": "",
    "method": "POST",
    "ret": "obj",
    "paytoqs": false,
    "url": "https://us-south.ml.cloud.ibm.com/v3/wml_instances/92e6bdba-9361-4d86-94fa-
1f02a7765b21/deployments/4faabc8d-0318-41f7-8ff8-f8be7b61b420/online",
    "tls": "",
    "persist": false,
    "proxy": "",
    "authType": "",
    "x": 410,
    "y": 400,
    "wires": [
      [
        "877d158.41f2ce8",
        "e27876e8.09b1c8"
      ]
    ]
  },
  {
    "id": "877d158.41f2ce8",
    "type": "function",
    "z": "2a45fe2d.379c62",
    "name": "",
    "func": "msg.payload=msg.payload.values[0][0];\nreturn msg;",
    "outputs": 1,
    "noerr": 0,
    "x": 520,
    "y": 100,
    "wires": [
      [
        "30dc6e3d.6efd22",
        "28af4022.fe951"
      ]
    ]
  },
  {
    "id": "30dc6e3d.6efd22",
```

```
    "type": "debug",
    "z": "2a45fe2d.379c62",
    "name": "",
    "active": true,
    "tosidebar": true,
    "console": false,
    "tostatus": false,
    "complete": "false",
    "x": 670,
    "y": 40,
    "wires": []
},
{
    "id": "28af4022.fe951",
    "type": "ui_text",
    "z": "2a45fe2d.379c62",
    "group": "23d98bee.d861e4",
    "order": 2,
    "width": 0,
    "height": 0,
    "name": "",
    "label": "Prediction",
    "format": "{{msg.payload}}",
    "layout": "row-spread",
    "x": 660,
    "y": 200,
    "wires": []
},
{
    "id": "e27876e8.09b1c8",
    "type": "debug",
    "z": "2a45fe2d.379c62",
    "name": "",
    "active": true,
    "tosidebar": true,
    "console": false,
    "tostatus": false,
    "complete": "false",
    "x": 610,
    "y": 500,
    "wires": []
},
{
    "id": "23d98bee.d861e4",
    "type": "ui_group",
    "z": "",
    "name": "Predicting Life Expectancy ",
    "tab": "ef6209f2.5651c8",
    "order": 1,
    "disp": true,
```

```
        "width": "10",
        "collapse": false
    },
    {
        "id": "ef6209f2.5651c8",
        "type": "ui_tab",
        "z": "",
        "name": "Predicting Life Expectancy Using ML",
        "icon": "dashboard",
        "order": 1,
        "disabled": false,
        "hidden": false
    }
]
```