AI- BASED DIABETES PREDICTION SYSTEM

- K.MONISHA
- BE(CSE) III YEAR
- EMAIL ID: kmonisha560@gmail.com
- NM: au513521104027

INTRODUCTION

Taking care of health or efforts for the betterment of health by way of treating diagnosis, salvage from the disease, sickness, injury and other physical and mental deficiencies in people comes under health care. Health care includes physical therapy, nursing, pharmacy , dentistry , athletic training, optometry etc.

PROJECT OVERVIEW

- This work is used four types of kernels,linear, polynomial,RBF,and sigmoid, to predict diabetes in the machine learning platform.
- The authors obtained diverse accuracies in different kernals , ranging between 0.69 and 0.82.
- The SVM technique with radial basic kernal function obtained the highest accuracy of 0.82.

PROBLEM STATEMENT

- A system is used to predict whether a patient based on some of its health related details such as BMI (Body Mass Index),blood pressure, Insulin ,etc.
- This system is only for females as the dataset used to make this system exclusively belongs to the females.

CASE - STUDY

- A system is used to predict whether a patient has diabetes based on some of its health-related details such as BMI (Body Mass Index), blood pressure, Insulin, etc.
- •This system is only for females as the dataset used to make this system exclusively belongs to the females.

CHALLENGES

- Loss of eyesight: in 2010 Diabetic retinopathy caused 2.6% of blindness globally and 1.9% of moderate or severe visual loss. Studies show the diabetic patient prevalence of any retinopathy is 35%, but vision-threatening is 7%. People suffering from type 1 diabetes retinopathy rates are higher among them.
- Renal disease: Information [29] received from different sources describes that diabetes is the main cause of 80% cases of kidney-related disease (ESRD). The ratio of kidney problems because of diabetes is 15–55%.

LOSS OF EYESIGHTS

- In 2010 Diabetic retinopathy caused 2.6% of blindness globally and 1.9% of moderate or severe visual loss.
- Studies show the diabetic patient prevalence of any retinopathy is 35%, but vision-threatening is 7%. People suffering from type 1 diabetes retinopathy rates are higher among them.

RENAL DISEASES

- Information received from different sources describes that diabetes is the main cause of 80% cases of kidney-related disease (ESRD).
- The ratio of kidney problems because of diabetes is 15–55%. Renal disease very much dependent on renal replacement therapy and access to dialysis and—(and in some cases within) in different countries these are highly variable.

EXTREMELY SERGIGAL

- Diabetes became the danger of below extremity surgical due to septic, foot sores. Ratio of surgical extremity in diabetes patient is 20% more than non-diabetic people, and in the last past years, this ratio rising 1.5–3.5 in each year in people with having diabetes.
- United States of America study showed a reduction in rates of amputations from 40 to 60% among adults with diabetes

OBTAIN STEPS FOR PRECAUTIONS

PROGRAM

Programiz
Python Online Compiler

Python Course

main.py | Shell

```
1  import numpy as np
2  import pandas as pd
3  import Matplotlib.pyplot as plt
4  import seaborn as sns
5
6  sns.set()
7
8  from mlxtend.plotting import
       plot_decision_regions
9  import missingno as msno
10 from pandas.plotting import
       scatter_matrix
11 from sklearn.preprocessing import
       StandardScaler
12 from sklearn.model_selection import
       train_test_split
13 from sklearn.neighbors import
       KNeighborsCkassifier
14 from sklearn.metrics import
       confusion_matrics
15 from sklearn import metrics
16 from sklearn.metrics import
       classification_report
17 import warnings
18 warning.filterwarnings('ignore')
19 %matplotlib inline
20
21 diabetes_df=pd.read_csv('diabete
```

Run

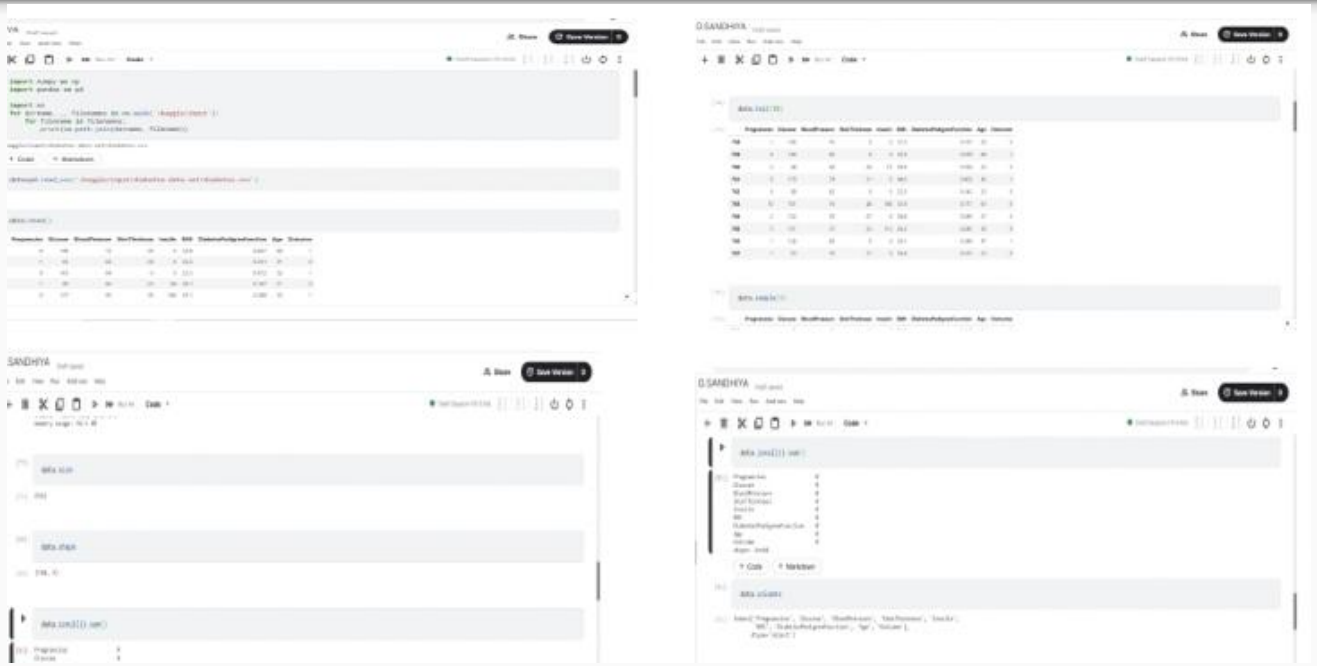
Programiz
Python Online Compiler

Python Course

main.py | Shell

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	6	148	72	35	0	33.6	0.627	50	1
1	1	85	66	29	0	26.6	0.351	31	0
2	8	183	64	0	0	23.3	0.672	32	1
3	1	89	66	23	94	28.1	0.167	21	0
4	0	137	40	35	168	43.1	2.288	33	1

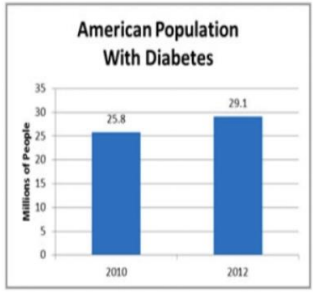
EXAMPLE PROGRAM



U.S.PREVELENCE

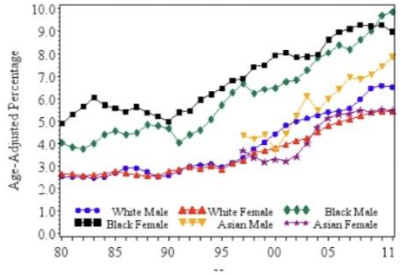
Overall Numbers, Diabetes and Prediabetes

- **Prevalence**: In 2012, 29.1 million Americans, or 9.3% of the population, had diabetes.
  - In 2010 the figures were 25.8 million and 8.3%.
- **Undiagnosed**: Of the 29.1 million, 21.0 million were diagnosed, and 8.1 million were undiagnosed.
  - In 2010 the figures were 18.8 million and 7.0 million.
- **Prevalence in Seniors**: The percentage of Americans age 65 and older remains high, at 25.9%, or 11.8 million seniors (diagnosed and undiagnosed).



- **New Cases**: The incidence of diabetes in 2012 was 1.7 million new diagnoses/year; in 2010 it was 1.9 million.
- **Prediabetes**: In 2012, 86 million Americans age 20 and older had prediabetes; this is up from 79 million in 2010.
- **Deaths**: Diabetes remains the 7th leading cause of death in the United States in 2010, with 69,071 death certificates listing it as the underlying cause of death, and a total of 234,051 death certificates listing diabetes as an underlying or contributing cause of death.

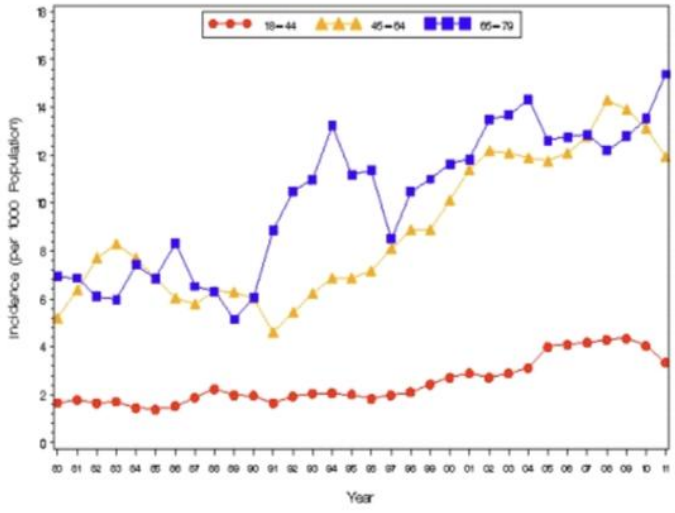
Age-Adjusted Rate per 100 of Civilian, Noninstitutionalized Population with Diagnosed Diabetes, by Race and Sex, United States, 1980-2011



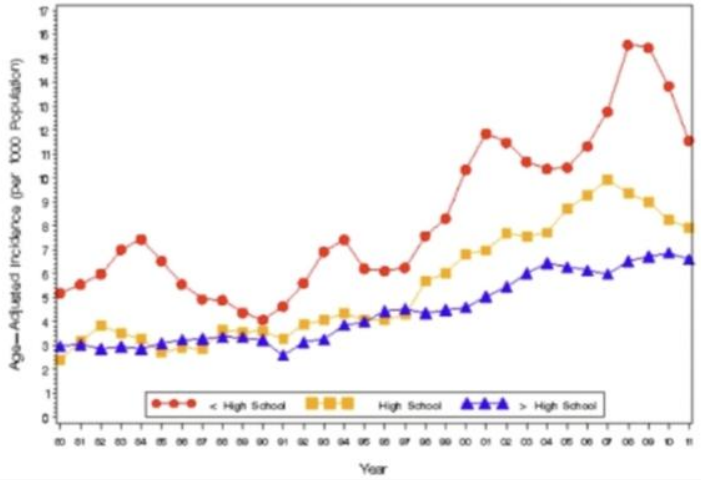
Year	White				Black				Asian			
	Male		Female		Male		Female		Male		Female	
	Rate	Std Error	Rate	Std Error	Rate	Std Error	Rate	Std Error	Rate	Std Error	Rate	Std Error
2008	6.0	0.16	5.2	0.13	8.6	0.40	9.3	0.29	6.8	0.58	5.5	0.61
2009	6.5	0.16	5.4	0.13	9.0	0.40	9.2	0.30	7.0	0.52	5.4	0.60
2010	6.6	0.15	5.4	0.12	9.7	0.38	9.3	0.32	7.4	0.55	5.5	0.56
2011	6.5	0.16	5.4	0.14	9.9	0.43	9.0	0.37	7.8	0.69	5.5	0.48

GRAPHIC REPRESENTATION

Incidence of Diagnosed Diabetes per 1,000 Populatic
18-79 Years, by Age, 1980-2011



Age-Adjusted Incidence of Diagnosed Diabetes per 1,000 population Aged 18-79 Years, by Education, United States, 1980-2011



DIABETES AND OBESITY

Diabetes and Obesity:

Although excess weight increases the rate of type 2 diabetes, it's worth remembering that most overweight people don't have diabetes, and many people with type 2 are of normal weight or only moderately overweight—so again, it's not clear-cut.

Research:

Primary Prevention of Type 2 Diabetes

Hu, FB, et al: Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. N Engl J Med 2001;345:790-7.

This prospective cohort study followed 84,941 female nurses from 1980 to 1996; the subjects were initially free of diagnosed cardiovascular disease, diabetes, and cancer. The investigators defined a "low risk" group based on five characteristics:

- BMI < 25
- a diet high in cereal fiber and polyunsaturated fat and low in trans fat and glycemic load
- moderate-to-vigorous physical activity for at least 30 min per day
- no current smoking
- consumption of an average of at least half a drink of an alcoholic beverage per day.

After 6 years of follow-up, the study found that overweight or obesity was the single most important predictor of type 2 diabetes. However, "... lack of exercise, a poor diet, current smoking, and abstinence from alcohol use were all associated with a significantly increased risk of diabetes, even after adjustment for the body-mass index."

Only 3.4% of the women in the cohort met the criteria for being "low-risk." Nevertheless, compared with the rest of the cohort, these low-risk women had a risk ratio of 0.09 (95% confidence interval: 0.05 - 0.17), suggesting that 91% of the cases of type 2 diabetes in the cohort (95% confidence interval: 38-95%) could be attributed to a lifestyle that did not conform to the low-risk criteria. They concluded that the majority of cases of type 2 diabetes could be prevented by the adoption of a healthier lifestyle.

WHAT YOU DO

Cost of Diabetes

Updated March 6, 2013

- $245 billion: Total costs of diagnosed diabetes in the United States in 2012
- $176 billion for direct medical costs
- $69 billion in reduced productivity

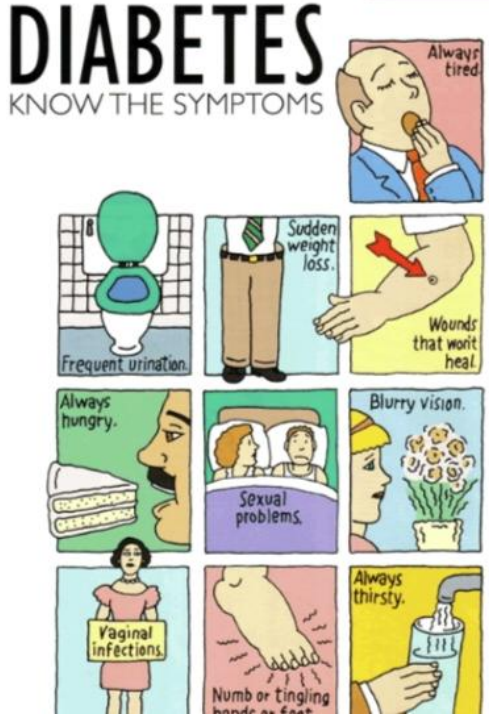
After adjusting for population age and sex differences, average medical expenditures among people with diagnosed diabetes were 2.3 times higher than what expenditures would be in the absence of diabetes.

SYMBOLS OF DIABETES

Symptoms of Diabetes:

Common symptoms of diabetes include:

- Excessive thirst and appetite
- Increased urination (sometimes as often as every hour)
- Unusual weight loss or gain
- Fatigue
- Nausea, perhaps vomiting
- Blurred vision
- In women, frequent vaginal infections
- In men and women, yeast infections
- Dry mouth
- Slow-healing sores or cuts
- Itching skin, especially in the groin or vaginal area

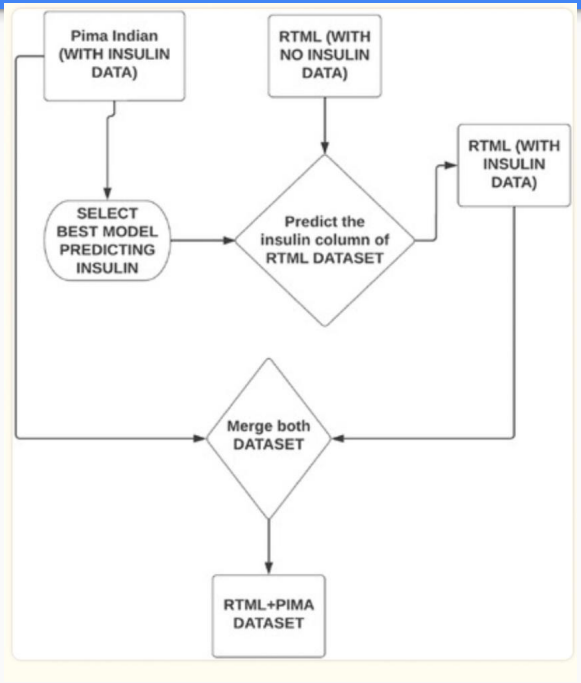


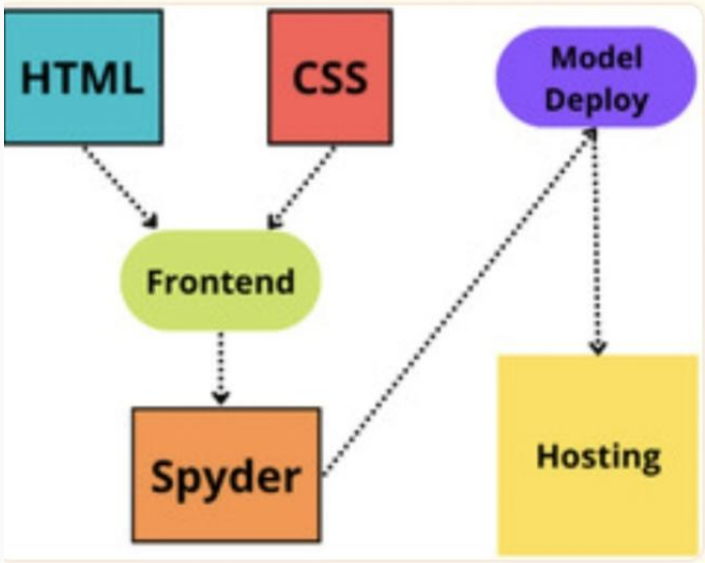
U.S. Prevalence:

THE LINK

https://www.kaggle.com/code/dsandhiya/d-sandhiya/edit

WORKING STEPS





Development of the web application

RESULTS AND DISCUSSION

$$Precision = \frac{TP}{TP + FP}$$

$$Recall = \frac{TP}{TP + FN}$$

$$F1\ score = \frac{2 \times Recall \times Precision}{Recall + Precision}$$

CONCLUSION

AI in Diabetes helps to predict or Detect Diabetes. Any neglect in health can have a high cost for the patients and the medical practitioner. It becomes challenging for the patient to trust that this decision is taken by the machine that does not explain how it reaches a particular conclusion