machineLeaning1

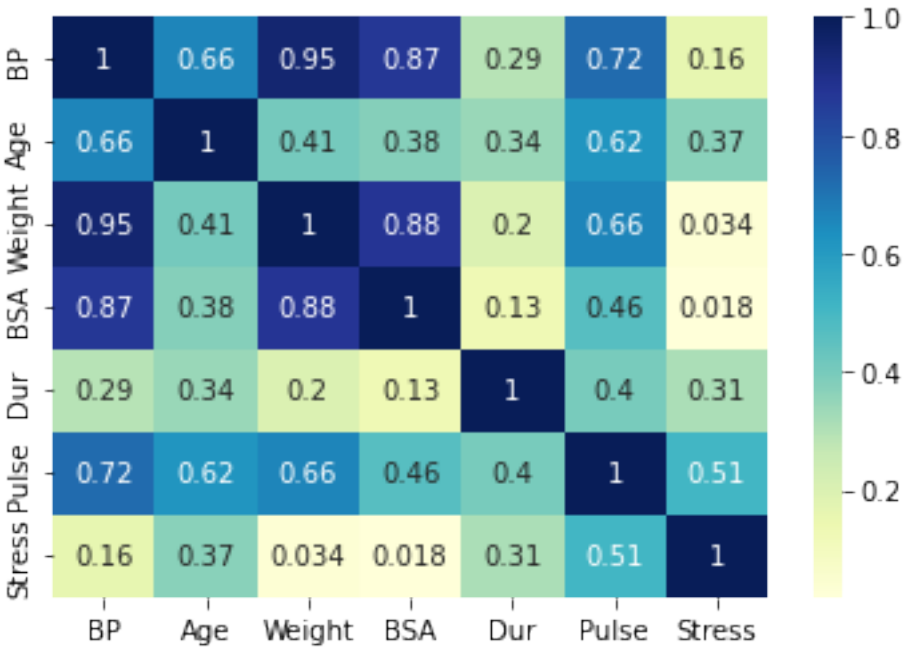
June 23, 2022

[1]:
```
# supervised learning - regression analysis

# removing multicollinearity

# import pandas
import pandas as pd

# read the blood pressure dataset
data = pd.read_csv("bloodpress.txt", sep='\t')

# see the top records in the data
data.head()
```

[1]:

	BP	Age	Weight	BSA	Dur	Pulse	Stress
0	105	47	85.4	1.75	5.1	63	33
1	115	49	94.2	2.10	3.8	70	14
2	116	49	95.3	1.98	8.2	72	10
3	117	50	94.7	2.01	5.8	73	99
4	112	51	89.4	1.89	7.0	72	95

[3]:
```
# import seaborn and matplotlib
import seaborn as sns
import matplotlib.pyplot as plt

# correlation matrix
corr = data.corr()

# plot heatmap on correlation matrix
sns.heatmap(corr, annot=True, cmap='YlGnBu')

# display the plot
plt.show()
```



[4]:
```
# dummy variables

# create pandas DataFrame
data = pd.DataFrame({'Gender':['F','M','M','F','M']})

# check the top-5 records
data.head()
```

[4]:

	Gender
0	F
1	M
2	M
3	F
4	M

[5]:
```
# dummy encoding
encoded_data = pd.get_dummies(data['Gender'])

# check the top-5 records of the dataframe
encoded_data.head()
```

[5]:

	F	M
0	1	0
1	0	1
2	0	1

```
3  1  0
4  0  1
```

[6]:
```
# dummy encoding
encoded_data = pd.get_dummies(data['Gender'], drop_first=True)

# check the top-5 records of the dataframe
encoded_data.head()
```

[6]:
```
   M
0  0
1  1
2  1
3  0
4  1
```

[7]:
```
# developing a linear regression model

# read the dataset using read_csv mothod
df = pd.read_csv("Advertising.csv")

# see the top-5 records in the data
df.head()
```

[7]:
```
      TV  Radio  Newspaper  Sales
0  230.1   37.8       69.2   22.1
1   44.5   39.3       45.1   10.4
2   17.2   45.9       69.3    9.3
3  151.5   41.3       58.5   18.5
4  180.8   10.8       58.4   12.9
```

[8]:
```
# Independent variables or Features
X = df[['TV', 'Radio', 'Newspaper']]

# Dependent or Target variable
y = df.Sales
```

[9]:
```
# Lets import the train_test_split method
from sklearn.model_selection import train_test_split

# Distribute the features(X) and labels(y) into two parts
# trainig and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size = 0.25, random_state=0)
```

[10]:
```
# Import linear regression model
from sklearn.linear_model import LinearRegression
```

```
# create linear regression model
lin_reg = LinearRegression()

# fit the linear regression model
lin_reg.fit(X_train, y_train)

# Predict the values given test set
predictions = lin_reg.predict(X_test)

# Print the intercept and coefficients
print("Intercept: ", lin_reg.intercept_)
print("Coefficients: ", lin_reg.coef_)
```

```
Intercept:  2.8925700511511483
Coefficients:  [0.04416235 0.19900368 0.00116268]
```

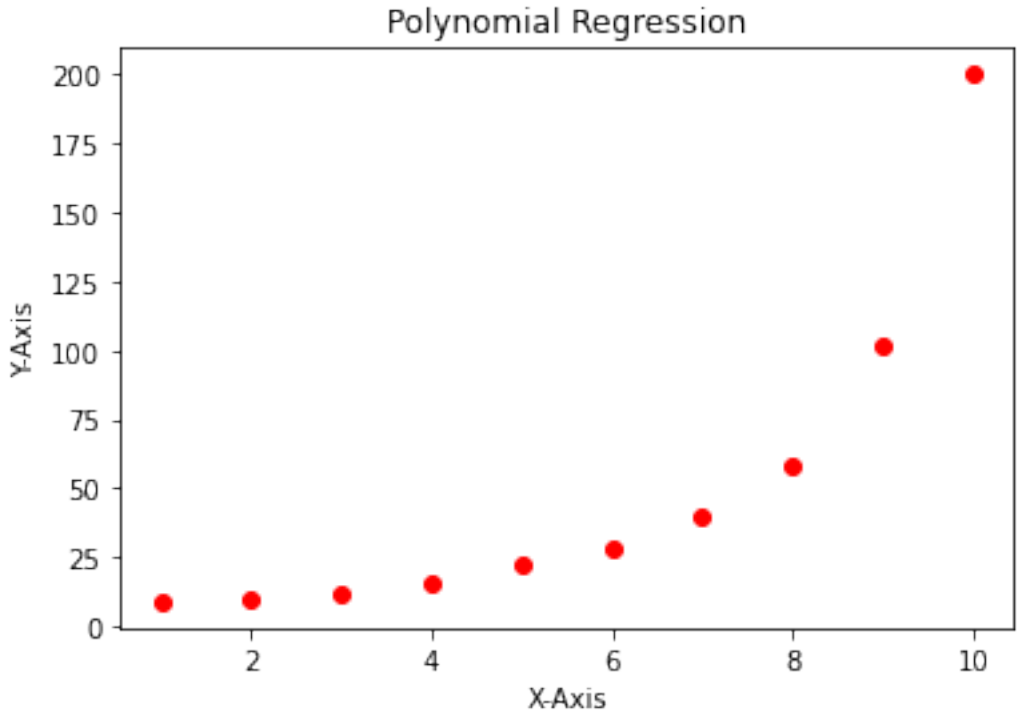
[11]:
```
# Evaluation regression model perfomance

# import the required libs
import numpy as np
from sklearn.metrics import mean_absolute_error
from sklearn.metrics import mean_squared_error
from sklearn.metrics import r2_score

# Evaluate mean absolute error
print('Mean Absoulute Error(MAE): ', mean_absolute_error(y_test, predictions))

# Evaluate mean squared error
print("Root Mean Squared Error(RMSE): ", mean_absolute_error(y_test,␣
 ↪predictions))

# Evaluate R-square
print("R-Square: ", r2_score(y_test, predictions))
```

```
Mean Absoulute Error(MAE):  1.3000320919235457
Root Mean Squared Error(RMSE):  1.3000320919235457
R-Square:  0.8576396745320892
```

[12]:
```
# Fitting plynomial regression

# import libraries
import matplotlib.pyplot as plt
import numpy as np

# create X and Y lists
X=[1,2,3,4,5,6,7,8,9,10]
```

```
y=[9,10,12,16,22,28,40,58,102,200]

# plot scatter diagram
plt.scatter(X,y, color='red')
plt.title('Polynomial Regression')
plt.xlabel('X-Axis')
plt.ylabel('Y-Axis')
```

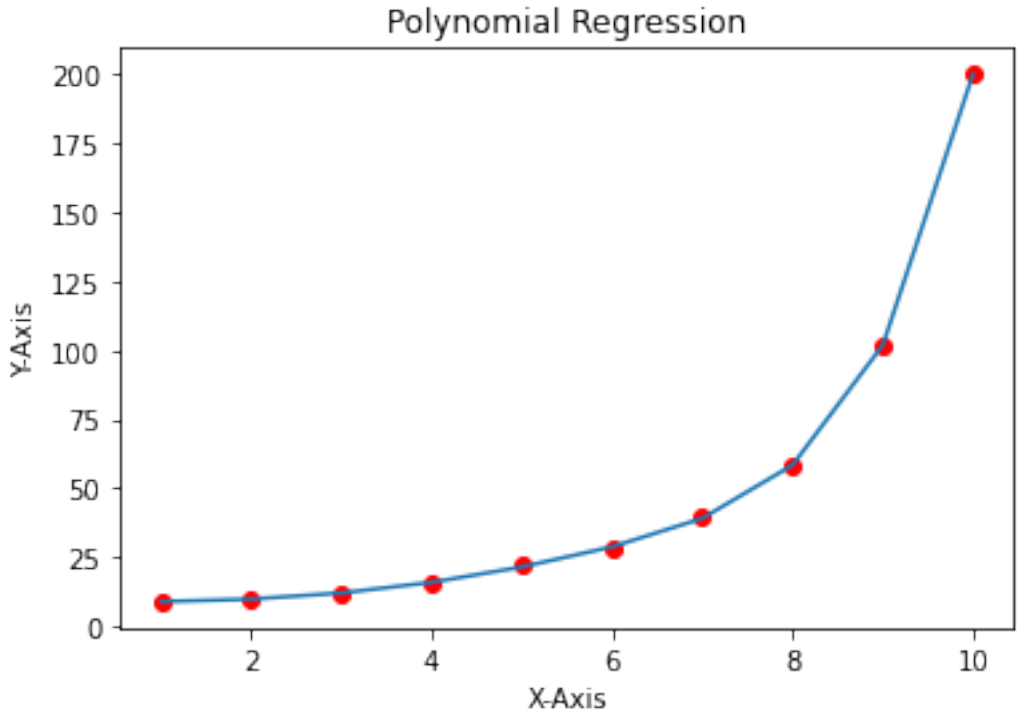
[12]:
```
Text(0, 0.5, 'Y-Axis')
```



[25]:
```
# import libraries
import pandas as pd
from sklearn.preprocessing import PolynomialFeatures
from sklearn.linear_model import LinearRegression

# prepare dataset
data = pd.DataFrame({"X":[1,2,3,4,5,6,7,8,9,10],"y":
 ↪[9,10,12,16,22,28,40,58,102,200]})

# code without data[['X']] and data[['y']] doesn't work
X = data[['X']].values
y = data[['y']].values
```

```
# Apply Polynomial Features
polynomial_reg = PolynomialFeatures(degree = 6)
X_polynomial = polynomial_reg.fit_transform(X)

# Apply Linear Regression Model
lin_reg = LinearRegression()
lin_reg.fit(X_polynomial, y)
predictions = lin_reg.predict(X_polynomial)

# plot the results
plt.scatter(X,y, color = 'red')
plt.plot(X, predictions)
plt.title('Polynomial Regression')
plt.xlabel('X-Axis')
plt.ylabel('Y-Axis')
```

[25]: `Text(0, 0.5, 'Y-Axis')`



[26]:
```
# implement logistic regression using scikit-learn

# import libraries
import pandas as pd
```

```
# read the dataset
diabets = pd.read_csv("diabetes.csv")

# show top 5-records
diabets.head()
```

[26]:

	pregnant	glucose	bp	skin	insulin	bmi	pedigree	age	label
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

[27]:
```
# split dataset in two parts: feature set and target label
feature_set = ['pregnant', 'insulin', 'bmi', 'age', 'glucose', 'bp', 'pedigree']

features = diabets[feature_set]

target = diabets.label

# Partition data into training and testing set
from sklearn.model_selection import train_test_split
feature_train, feature_test, target_train, target_test =␣
 ↪train_test_split(features, target, test_size=0.3, random_state=1)
```

[29]:
```
# import logistic regression sckit-learn model
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score

# instantiate the model
logreg = LogisticRegression(solver='lbfgs')

# fit the model with data
logreg.fit(feature_train, target_train)

# forecast the target variable for given test dataset
predictions = logreg.predict(feature_test)

# Asses model performance using accuracy measure
print("Logistic Regression Model Accuracy: ", accuracy_score(target_test,␣
 ↪predictions))
```

```
Logistic Regression Model Accuracy:  0.7835497835497836
```

[ ]: