VSIT

Business Intelligence Practical #9

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Class	TY BSC IT	**Division**	C
Subject/Course:	Business intelligence		
Topic	Linear Regression		

Explain what is Linear Regression? What is the use of Linear Regression.

Linear regression analysis is used to predict the value of a variable based on the value of another variable. The variable you want to predict is called the dependent variable. The variable you are using to predict the other variable's value is called the independent variable.

You'll find that linear regression is used in everything from biological, behavioral, environmental and social sciences to business. Linear-regression models have become a proven way to scientifically and reliably predict the future. Because linear regression is a long-established statistical procedure, the properties of linear-regression models are well understood and can be trained very quickly.

What are the types of Linear Regression?

Simple Linear Regression: This type of linear regression involves a single independent variable and a single dependent variable. It is used to analyze the relationship between two continuous variables. The equation for simple linear regression is y = b0 + b1 * x, where y represents the dependent variable, x represents the independent variable, b0 is the intercept, and b1 is the slope.
Multiple Linear Regression: This type of linear regression involves multiple independent variables and a single dependent variable. It is used to analyze the relationship between a dependent variable and several independent variables. The equation for multiple linear regression is y = b0 + b1 *x1 + b2* x2 + ... + bk * xk, where y represents the dependent variable, x1, x2, ..., xk represent the independent variables, b0 is the intercept, and b1, b2, ..., bk are the slopes.
Polynomial Regression: This type of linear regression also involves a single dependent variable but uses a polynomial function as the model instead of a straight line. Polynomial regression can capture nonlinear relationships between the dependent variable and the independent variable(s). The equation for polynomial regression depends on the degree of the polynomial.
Ridge Regression: This type of linear regression is used when there is multicollinearity (high correlation) among the independent variables. Ridge regression adds a penalty term to the sum of squared errors to shrink the coefficients towards zero, reducing the impact of multicollinearity.
Lasso Regression: Similar to ridge regression, lasso regression is also used when dealing with multicollinearity. However, instead of shrinking all coefficients towards zero, lasso regression sets some coefficients to zero, effectively removing some independent variables from the model.
Elastic Net Regression: Elastic net regression combines elements of ridge regression and lasso regression. It is useful when dealing with datasets containing both strong multicollinearity and outliers. Elastic net regression shrinks the coefficients towards zero, similar to ridge regression, but also sets some coefficients to zero, similar to lasso regression.

Write steps and program to implement Linear Regression

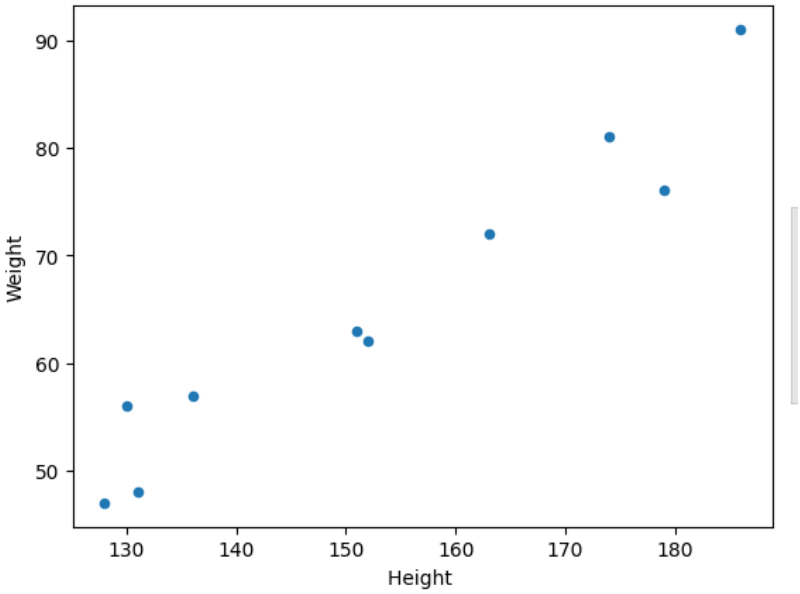
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn import linear_model

df = pd.read_csv('prac9san.csv')
df

df.plot(kind='scatter', x='Height ', y='Weight')

reg=linear_model.LinearRegression()
reg.fit(df[["Height"]], df[["Weight"]])

reg.predict([[100]])
```




```
[8]  reg=linear_model.LinearRegression()
     reg.fit(df[['Height']],df['Weight'])
```

```
LinearRegression()
```

```
reg.predict([[151]])
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarning: X does not have valid featu
  warnings.warn(
array([64.69867181])
```