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Assignment- Machine Leanrning

1.A) Least Square Error

2.A) Linear regression is sensitive to outliers

3.B) Negative

4.A) Regression

5.C) Low bias and high variance

6.B) Predictive modal

7.D) Regularization

8.D) SMOTE

9.A) TPR and FPR

10.B) False

11.B) Apply PCA to project high dimensional data

12. A) We don't have to choose the learning rate.
B) It becomes slow when the number of features is very large.
D) It does not make use of the dependent variable.

13.   REGULARIZATION: In machine learning model many times the models performs
well on training data but performs low on test data.
      This happens because the model was able to understand the noices and the
trend in the training data but was not able to
      do the same on the test data. Suppose in a exam the teacher gave the same
question which was taught in the class.In that
      case students were able to get good marks but they got low marks when the
questions were different in the exam as compared
      to what was taught in the class.This is the same case with models. They
performs good on training data but not that much well
      on the test data.This is called the overfitting of the model. And to avoid
this overfitting we do the regularization of the model.
      And this is called regularization.The regularization models discourage the
use of large coefficients in the model that means
      they discourage the use of those featured which have great impact on the
label. By this they are able to build a good and simple
      model and read the data in a better precise way. Lasso and ridge are two
models widely used in regularization.

14. Algorithms used for regularization:

      1.lasso(least absolute shrinkage and selection operator)-let us assume we
have phone no., experience, skill,email as featured and
      have to predict the salary which is the label.So in this case lasso will
give zero importance to phone no., skill and email
      because they are not important for the label.If we add more and more
featured than chances of overfitting will be more so it minimizes the
      featured as much as possible.Lasso acts as a feature selector.It is able
to identify the featured in best possible way.In lasso we can also
      control the learing rate which means we can control at what speed our model
is understanding the data.If we give more time than changes are there
      that the model will be good.And we can also control the iteration rate
which means we can control how many times out model is reading the data.

It can be 1,2,3 or any other number of times. This depends up us only

2.Ridge-It stands for ridge regression. It is also almost same as lasso. But the difference is that lasso gives zero importance to the features
which are not important for the model but ridge gives the importance but very very low.Suppose it gives 80% importance to skill and 90% to experience
than it will give 1% or 2% to phone no. and email.It works in this way.In ridge also we can control the speed at which our model is getting trained which
is called as alphaa in the machine learning world and we can also control the iteration of our model.

15. Explain the term error present in linear regression equation
The error is the difference between the actual value of the label and the value of the label as predicted by the model.
error= actual- the value predicted by the label. The model predicts the label based on the various algorithms and by
understanding the relation between various features with the label.It then predicts the label based on its understanding.
If the model is perfect than the error will be zero which is very very rare.Every model in real time will have something as error.
Mathematically it can be explained as: error= yi-yi^. yi is the actual value of the label and yi^ is the predicted value by the
linear regression model.