Assignment-39

1. (a)
2. (a)
3. (b)
4. (b)
5. (c)
6. (b)
7. (d)
8. (d)
9. (a)
10. (b)
11. (a)
12. (d)
13. Ans: mathematics, statistics, finance,[1] and computer science, particularly in machine learning and inverse problems, **regularization** is a process that changes the result answer to be "simpler". It is often used to obtain results for ill-posed problems or to prevent overfitting. Although regularization procedures can be divided in many ways, the following delineation is particularly helpful:
    1. **Explicit regularization** is regularization whenever one explicitly adds a term to the optimization problem. These terms could be priors, penalties, or constraints. Explicit regularization is commonly employed with ill-posed optimization problems. The regularization term, or penalty, imposes a cost on the optimization function to make the optimal solution unique.
    2. **Implicit regularization** is all other forms of regularization. This includes, for example, early stopping, using a robust loss function, and discarding outliers. Implicit regularization is essentially ubiquitous in modern machine learning approaches, including stochastic gradient descent for training deep neural networks, and ensemble methods (such as random forests and gradient boosted trees).

14. Some of the commonly used algorithms for regularization include:

    1. **Ridge Regression (L2 Regularization)**: Adds a penalty term proportional to the sum of the squares of the coefficients.
    2. **Lasso Regression (L1 Regularization)**: Adds a penalty term proportional to the sum of the absolute values of the coefficients. Lasso can also induce sparsity by setting some coefficients to zero.
    3. **Elastic Net**: Combines L1 and L2 regularization penalties.
    4. **Logistic Regression with L1 or L2 Regularization**: Regularizes logistic regression models using either L1 (Lasso) or L2 (Ridge) penalties.
    5. **Support Vector Machines (SVM)**: SVMs can use L2 regularization to control the margin and prevent overfitting.
    6. **Neural Networks with Dropout**: While not strictly regularization in the traditional sense, dropout is a technique used in neural networks to prevent overfitting by randomly dropping units (along with their connections) during training.

15. Error Term Use in a Formula

An error term essentially means that the model is not completely accurate and results in differing results during real-world applications. For example, assume there is a multiple linear regression function that takes the following form:

$$Y=\alpha X+\beta\rho+\epsilon \text{where:} \alpha,\beta=\text{Constant parameters} X,\rho=\text{Independent variables} \epsilon=\text{Error term}$$

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When the actual Y differs from the expected or predicted Y in the model during an empirical test, then the error term does not equal 0, which means there are other factors that influence Y.