

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES
Department of Electrical Engineering

EE514/CS535 Machine Learning
Quiz 01 Solutions

Name: _____

Campus ID: _____

Total Marks: 10

Time Duration: 10 minutes

Question 1 (6 marks)

True or False:

- (a) In Supervised Learning, the learning algorithm would receive a set of inputs along with the corresponding correct labels to train a model. T/F

Solution: T: Self-explanatory

- (b) Predicting the sentiment of a tweet using labeled data is a type of unsupervised learning. T/F

Solution: F: It is supervised learning since the data is labeled.

- (c) If a model achieves high accuracy on training data and low accuracy on validation data, the model has overfitted. T/F

Solution: T: Overfitting is mostly due to the selection of a model that is more complex than the actual underlying model defining the data. This gives low loss on training data and high loss on the validation data.

- (d) In polynomial regression, we use test data to determine the best degree of the polynomial. T/F

Solution: F: Validation data is used to determine hyper-parameter (polynomial degree) instead of test data.

- (e) Regression models are used to predict discrete values/classes. T/F

Solution: F: We predict continuous values in regression.

- (f) We can use Classification/Regression to train a model based on input data without corresponding labels. T/F

Solution: F

Question 2 (2 marks)

Define 1/0 loss. Why don't we prefer using 1/0 loss in machine learning?

Solution: For a model h , 1/0 loss function is given by

$$\mathcal{L}_{0/1}(h) = \frac{1}{n} \sum_{i=1}^n 1 - \delta_{h(\mathbf{x}_i) - y_i},$$

where $\delta_{h(\mathbf{x}_i) - y_i}$ represents Kronecker delta function. It is not used frequently due to non-differentiability and non-continuity.

Rubric: 0.5 for non-continuity — 0.5 for non-differentiable — 1.0 for correct formula/definition

Question 3 (2 marks)

What is the difference between a model and an algorithm?

Solution: An algorithm is a method comprised of a series of operations and transformations applied to the data to produce a machine-learning model that can be used to make future predictions or classification tasks. For example, a linear regression algorithm builds a model, that is, a vector of values of the model's coefficients. Another example is a Neural network model in which we apply back-propagation and gradient descent algorithms to produce a model comprised of a trained (weights assigned) neural network.

Rubric: 1.0 for Algorithm is a series of rules/operations — 1.0 for Model is created using algorithms. — 2.0 if valid example is provided explaining the difference.