Assignment 13

1. What are the different types of logistic Regression?

There are three different types of Logistic Regression.

Binary Logistic Regression: The dependent variable can be classified into one or two categories.

Multinomial Logistic Regression: The dependent variable can be classified into more than two categories.

Multi-label Logistic Regression: The dependent variable can be classified into multiple ordered categories.

2. What is the difference between the outputs of the Logistic Model and the Logistic function?

The Logistic model gives the output of log-odds i.e. the probability of our input belonging to a particular class; whereas the Logistic function outputs the probabilities.

3. How do we handle categorical variables in Logistic Regression?

The inputs given to a Logistic Regression model need to be numeric. The algorithm cannot handle categorical variables directly. So, we need to convert the categorical data into a numerical format that is suitable for the algorithm to process. The categorical variables should be assigned unique numeric values also known as **dummy variable**. These dummy variables act as numeric variables and can be handled by the Logistic Regression model.

4. What are the assumptions made in Logistic Regression?

Some of the assumptions of Logistic Regression are as follows:

- It assumes that there is minimal or no multi-collinearity among the independent variables. Independent variables should not be correlated.
- There should be a linear relationship between the log-odds of the outcome and each independent variable. The log-odds= log(p/(1-p)), where p is the probability of the target outcome.
- Sometimes to predict properly, it usually requires a large sample size.
- The Logistic Regression which has binary classification i.e, two classes assume that the target variable is binary, and ordered Logistic Regression requires the target variable to be ordered.

5. Why Can’t we use MSE as a cost function for Logistic Regression?

In Logistic Regression, we use the sigmoid function to perform a non-linear transformation to obtain the probabilities. If we square this nonlinear transformation, then it will lead to the problem of non-convexity with local minimums and gradient descent gets stuck at local minima in such cases so it is not possible to find the global minimum. As a result, MSE is not suitable for Logistic Regression.