**DIFFERENCES BETWEEN LOGISTIC REGRESSION AND LINEAR REGRESSION**

Logistic regression and linear regression are two different types of regression analysis used in statistics and machine learning for different purposes. Here are the key differences between them:

1. **Type of Dependent Variable**:
   * **Logistic Regression**: It is used when the dependent variable is categorical and binary, typically representing two classes (e.g., 0/1, Yes/No).
   * **Linear Regression**: It is used when the dependent variable is continuous and numeric, which means it can take any value within a range.
2. **Output**:
   * **Logistic Regression**: The output is a probability value that the independent variables will belong to one of the two classes. The output is typically transformed using the logistic function (Sigmoid) to ensure it falls between 0 and 1.
   * **Linear Regression**: The output is a continuous value, which can be positive or negative and can extend to infinity. It represents the predicted value of the dependent variable.
3. **Equation**:
   * **Logistic Regression**: The equation for logistic regression is based on the logistic function. It models the log-odds of the probability of the event occurring as a linear combination of the predictor variables.
   * **Linear Regression**: The equation for linear regression is a linear combination of the predictor variables. It predicts the mean or expected value of the dependent variable.
4. **Assumptions**:
   * **Logistic Regression**: It does not assume linearity, normality, or homoscedasticity. Instead, it assumes that the relationship between the independent variables and the log-odds of the event happening is linear.
   * **Linear Regression**: It assumes a linear relationship between the independent variables and the dependent variable. It also assumes that the errors (residuals) are normally distributed and have constant variance.
5. **Use Cases**:
   * **Logistic Regression**: It is typically used for classification tasks, such as predicting whether an email is spam or not, whether a customer will churn or not, etc.
   * **Linear Regression**: It is used for predicting a continuous outcome, such as predicting house prices, GDP growth, or temperature.
6. **Error Metric**:
   * **Logistic Regression**: Common evaluation metrics include accuracy, precision, recall, F1 score, and the area under the ROC curve (AUC).
   * **Linear Regression**: Common evaluation metrics include mean squared error (MSE), root mean squared error (RMSE), and mean absolute error (MAE).
7. **Parameter Estimation**:
   * **Logistic Regression**: The parameters are estimated using maximum likelihood estimation (MLE) or gradient descent.
   * **Linear Regression**: The parameters are typically estimated using ordinary least squares (OLS) or gradient descent.

In summary, the choice between logistic regression and linear regression depends on the nature of your dependent variable and the task at hand. Use logistic regression for binary classification problems, and use linear regression for predicting continuous numerical values.