

STA 3180 Statistical Modelling: Logistic Regression

1. Given a dataset with two predictor variables, X_1 and X_2 , and a binary response variable Y , fit a logistic regression model to the data.

Solution: Fit the model using maximum likelihood estimation (MLE) or other appropriate methods.

2. Interpret the coefficients of the fitted logistic regression model.

Solution: The coefficients represent the change in the log odds of the response variable for a one-unit increase in the predictor variable.

3. Calculate the odds ratio for each predictor variable in the fitted logistic regression model.

Solution: The odds ratio is the ratio of the odds of the response variable given a one-unit increase in the predictor variable to the odds of the response variable given a one-unit decrease in the predictor variable.

4. Calculate the predicted probabilities of the response variable for given values of the predictor variables.

Solution: Use the fitted logistic regression model to calculate the predicted probabilities of the response variable for given values of the predictor variables.

5. Calculate the sensitivity and specificity of the fitted logistic regression model.

Solution: Sensitivity is the proportion of true positives that are correctly identified by the model, while specificity is the proportion of true negatives that are correctly identified by the model.

6. Calculate the area under the receiver operating characteristic (ROC) curve for the fitted logistic regression model.

Solution: The area under the ROC curve is a measure of the accuracy of the model in distinguishing between positive and negative cases.

7. Compare the performance of the fitted logistic regression model to other models.

Solution: Compare the performance of the fitted logistic regression model to other models using measures such as accuracy, sensitivity, specificity, and the area under the ROC curve.