Ex2: one against all: logistic regression

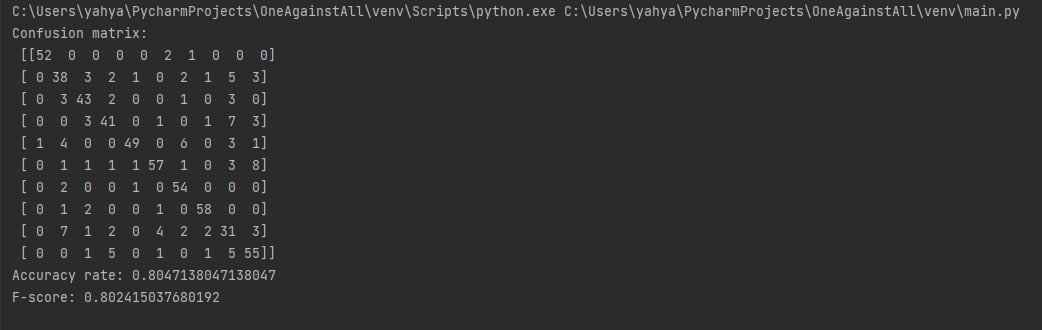
**Conclusions**-

the code demonstrates the process of training and evaluating logistic regression models for multi-class classification, including data preparation, model training, prediction, and evaluation

Prediction and Conversion: The trained models are used to make predictions on the test set. The predicted probabilities are then converted into class labels using the argmax function.

Model Evaluation: The code prints the confusion matrix, which provides insights into the classifier's performance by showing the number of true positive, true negative, false positive, and false negative predictions. Additionally, it calculates and prints the accuracy rate and F-score as evaluation metrics.

**Results-**



**Confusion Matrix**: The confusion matrix provides a tabular representation of the classifier's performance. Each row represents the true labels, while each column represents the predicted labels. The numbers in the matrix indicate the count of samples falling into each category. For example, the value in the first row and first column (52) represents the count of samples correctly predicted as the first class (true positive), while the value in the second row and third column (3) represents the count of samples incorrectly predicted as the third class (false positive).

**Accuracy Rate**: The accuracy rate is a measure of how well the classifier predicts the correct class labels. It is calculated by dividing the total number of correct predictions (sum of the diagonal elements in the confusion matrix) by the total number of samples. In this case, the accuracy rate is approximately 0.805, indicating that the classifier correctly predicts the class labels for about 80.5% of the test set samples.

**F-score**: The F-score is a metric that combines precision and recall to provide an overall evaluation of the classifier's performance. It is particularly useful when dealing with imbalanced datasets. The F-score ranges from 0 to 1, where a value of 1 represents perfect precision and recall. In this case, the F-score is approximately 0.802, suggesting that the classifier achieves a good balance between precision and recall across all classes.

These results provide insights into the performance of the logistic regression classifier on the test set, indicating how well it can predict the correct class labels and the overall quality of the predictions.