Part1

I used 4 classifiers:

1- Decision Tree
2- Naive Bayes
3- SVM
4- KNN

In general, all classifiers can predict class “no” well but doesn’t have good performance for predicting class “yes”. Below results are obtained by checking the results:

Accuracy and AUC: Decision Tree with depth 6 has achieved the best accuracy on test set and also the highest AUC. In fact, this classifier can predict class **“No”** very perfectly. In contrast, Naïve Bayes has the lowest accuracy and AUC.

Confusion Matrix: Although Decision Tree has reached the best results in terms of Accuracy, AUC, and predicting class “No”, but SVM has better classified class “Yes”.

So, **I would select Decision Tree with depth 6** for classifying the target variable. It predicts class “no” very well (about 92%). In other words, although this class cannot predict class “yes” well, but regarding Marketing campaign I would say it is still a good classifier. In fact, for Marketing campaigns, we should correctly predict the customers who DONOT register the campaign, otherwise we will ignore a potential customer who might register to the campaign.

However, if the aim of the classification was prediction class “yes”, then I would select Support Vector Machine as it has the better performance for predicting class “yes”.

Part2

In this part, I used One-vs-One strategy to split the multi-class classification into 3 binary classifications:

For Success-vs-Nonexistent and Failure-vs-Nonexistent, data is very skewed to “Nonexistent” so these classifiers can predict Nonexistent perfectly well but classify poorly for the opposite class. Indeed, the AUC is high for one class and low for another and the difference between Macro and Prevalence AUC is pretty much high.

For Success-vs-Failure, data is more balanced although still skewed to Failure. Also, the number of instances is less than the other classifiers. So, the AUC is less than the other two classifiers, but the difference between Macro and Prevalence AUC is lower. It means that for class “Success” also it still classifies not bad.

So, regarding the performance in practice, it depends on data and which class is preferable for us.