**Assignment #3**

**Support Vector Machine**

**Written Responses**

1. In you written response writes a paragraph explaining your findings about each column.

Many of the columns are int64, meaning that almost all the columns are numerical, the bare column is stored as an object instead of a numerical value, because it contains non-numerical values like ‘?’, so, Pandas assumes that the whole column is a String. The Max

No missing Values are reported, the ID column has a very large range, it has 8 columns, the range 1 to 10 suggest they might be ordinal features (ratings or severity levels).

1. what are the key insights and findings from the plots

A graph of different colors

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This bar chart represents the distribution of the classes in this case the 10 columns in the dataset, the similar values of each features means that there are no missing values or imbalances, The different color represent the different categories, providing a different distinction

A graph of a number of bars

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This histogram displays the distribution of the Bare Nuclei Class, this one is highly right-skewed, so, most of the values are concentrated on the lower end (between 1 and 2), the there Is another increase in the 10, suggesting there is high amount of bare nuclei values which may correlate with malignant tumors, the rest of the values are imbalanced, indicating there are few bare nuclei counts.

A screenshot of a computer screen

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Finally, this graph represents the distribution of the classes in the dataset, where: Class 2 = Benign Tumors and Class 4 = Malign Tumors.

In this graph we can observe that there is a high count in Benign Tumors than Malign ones.

1. Print out two accuracies score one for the model on the training set i.e. X\_train, y\_train and the other on the testing set i.e. X\_test, y\_test. Record both results in your written response.

A number on a blue background

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The accuracy in this case is 95% mean that the SVM classifier is correctly predicted, it has a high accuracy and is well distinguishing between classes. This suggest the model is very effective.

1. Generate the accuracy matrix. Record the results in your written response.

A screenshot of a computer

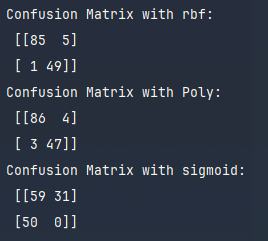
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Well, the Matrix is structured as [[True Negative (TN) False Positive (FP)]

[[False Negatives (FN) True Positives (TP)]

In my matrix the 85 represents that the model is correctly predicting the negative class, the 5 is incorrectly predicting the False Positive class, the 1 is incorrectly predicting the False Negative class, and finally the 491 is the number of True positives, the model is correctly predicting the Positive Class.

1. By now you have the results of four SVM classifiers with different kernels recorded in your written report. Please examine and write a small paragraph indicating which classifier you would recommend and why?



Well, let’s start with the first confusion matrix, which shows a good performance, High TP and TN, low FP and FN, the second Confusion matrix performs a poor performance with a slightly higher TP and lower FP compared to the first one, and the last one with sigmoid indicates a poor performance, especially in the TN and FN, making it non suitable for this dataset.

The best kernel is the RBF and Poly, based on its confusion matrix, its performance metric and application requirements are what makes them suitable, The sigmoid kernel and Poly.

1. Take a screenshot showing your num\_pipe\_firstname object and add it to your written report.



Representation of a machine learning preprocessing pipeline using scikit-learn’s pipeline.

1. Take a screenshot showing your grid search parameter object and add it to your written report.



Fitting the training Data:

A screen shot of a computer code

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15. Print out the best parameters and note it in your written response



This are the parameters used in the grid search, o find the best combinations of SVM for the model.

16. Printout the best estimator and note it in your written response

A computer code on a dark background

AI-generated content may be incorrect.

This is the best estimator, is a pipeline that includes all the preprocessing data steps and a SVM classifier.

17. Fit the training data to the best model. Printout the accuracy score and note it in your written  
response

A close up of a blue background

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The accuracy score of the best\_model is 95% this indicates that this model is very optimal and perform very well on the test data, so 95% of the predictions made by the model are correct.