

Medical Image Analysis Homework II

Source code is in the hw_2.ipynb file. You can find the corresponding implementation for each table by following the comments in the source file.

Part II : Classification

When considering the training set, there is a class-imbalance problem in which Class II has more data than Class III. In order to overcome the problem, the library used for the homework has a parameter to give weights to the classes with respect to their ratio in total. Moreover, normalization is taken to get more accuracy. This is done by using the standardization method in the library used for classification.

When it comes to finding C and gamma values, an example list in the homework description is used first. After finding a good accuracy in test data, gamma and C lists are restricted to the values near the value which gives the best accuracy in the first list.

The library used in the homework is scikit-learn in Python. You can find SVM implementation and how it works [here](#).

	Selected parameter s	Training set accuracies				Test set accuracies			
		Class 1	Class 2	Class 3	Overall	Class 1	Class 2	Class 3	Overall
Linear kernel	C = 5.4	0.82	0.81	0.92	0.84	0.90	0.89	0.82	0.88
RBF kernel	C = 10 gamma = 0.1	0.83	0.89	0.97	0.89	0.90	0.86	0.90	0.88
Statistically different?		No	Yes	No	Yes	No	No	No	No

Part III : Grid-Based Approach

See part II for class-imbalance problem and normalization.

Even though there is an improvement in accuracy when training with the RBF kernel, the results are not statistically different from the training with the RBF kernel using entire image features.

	Selected parameter s	Training set accuracies				Test set accuracies			
		Class 1	Class 2	Class 3	Overall	Class 1	Class 2	Class 3	Overall
Linear kernel	C = 5.2	0.87	0.78	0.92	0.84	0.79	0.91	0.74	0.83
Linear Kernel (entire image)	C = 5.4	0.82	0.81	0.92	0.84	0.90	0.89	0.82	0.88
Statistically different?		No	No	No	No	No	No	No	No

	Selected parameter s	Training set accuracies				Test set accuracies			
		Class 1	Class 2	Class 3	Overall	Class 1	Class 2	Class 3	Overall
RBF kernel	C = 50 gamma = 0.1	0.92	0.90	0.95	0.91	0.875	0.84	0.90	0.87
RBF kernel (entire image)	C = 10 gamma = 0.1	0.83	0.89	0.97	0.89	0.89	0.86	0.90	0.88
Statistically different?		No	No	No	No	No	No	No	No