Assignment II

CMP5130 (1) Machine Learning and Pattern Recognition 20/21 (3)

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Keywords: Linear Discriminant Analysis, Quadratic Discriminant Analysis, LDA, QDA, Machine Learning

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1. Linear Discriminant Analysis

Firstly, pre-2005 data were filtered for the train data, and then 2005 data were used for the test data.Our score is 0.5595, that means LDA prediction accuracy is almostly 56%.

Table 1: Prior Probabilities for Linear Discriminant Analysis

Prior probabilities	
Down	0.491984
Up	0.508016

According to the Table 1, prior probabilities of the groups are 0.491984 and 0.491984. Training observations refer to days that market's down is 49.2% and in the same way, the training observations refer to days that market's up is 0.51%.

Table 2: Group Means for Linear Discriminant Analysis

Group Means		
	Lag1	**Lag2**
Down	0.042790	0.033894
Up	-0.039546	-0.031325

Using function means_ returns averages of each predictor of each class.For average Lag1 value for the days that the market's down is 0.042790 and the average Lag2 value for the days that market's down is 0.033894.

Table 3: Coefficients for Linear Discriminant Analysis

Coefficients	
Lag1	-0.055441
Lag2	-0.044345

Table 4: Confusion Matrix for Linear Discriminant Analysis

Confusion Matrix		
	PredDown	**PredUp**
ActualDown	168	323
ActualUp	160	347

Table 5: Predictions for Linear Discriminant Analysis

Predictions	
Down	**Up**
0.495099	0.504901
0.509461	0.490539
0.516876	0.483124
0.494753	0.505247
0.493550	0.506450

2. Quadratic Discriminant Analysis

Similarly, pre-2005 data were filtered for the train data, and then 2005 data were used for the test data in quadratic discriminant analysis.Unlike, QDA has no parameter including coefficients of the linear discriminants.Additionally, according to score, QDA prediction accuracy is like 51% for the data of 2005.

Table 6: Prior Probabilities for Quadratic Discriminant Analysis

Prior probabilities	
Down	0.491984
Up	0.508016

Similar to LDA, according to the Table 6, prior probabilities of the groups are 0.491984 and 0.491984. Training observations refer to days that market's down is 49.2% and in the same way, the training observations refer to days that market's up is 0.51%.

Table 7: Group Means for Quadratic Discriminant Analysis

Group Means		
	Lag1	**Lag2**
Down	0.042790	0.033894
Up	-0.039546	-0.031325

For average Lag1 value for the days that the market's down is 0.042790 and the average Lag2 value for the days that market's down is 0.033894.

Table 8: Confusion Matrix for Quadratic Discriminant Analysis

Confusion Matrix		
	PredDown	**PredUp**
ActualDown	162	329
ActualUp	156	351

Table 9: Predictions for Quadratic Discriminant Analysis

Predictions	
Down	**Up**
0.492344	0.507656
0.506003	0.493997
0.514504	0.485496
0.495024	0.504976
0.491881	0.508119