KERNEL – 0

java -cp "%CLASSPATH%;C:\Users\Snow_Leopard\workspace\tmp\Weka\weka-3-7-12\weka.jar" weka.classifiers.misc.InputMappedClassifier -I -trim -W weka.classifiers.functions.LibSVM -- -S 0 -K 0 -D 3 -G 0.0 -R 0.0 -N 0.5 -M 40.0 -C 1.0 -E 0.001 -P 0.1 -model "C:\\Program Files\\Weka-3-7" -seed 1-t " home\workspace\LIBSVM\training.arff" -T " home\workspace\LIBSVM\validation.arff

Correctly Classified Instances 30 85.7143 %

Incorrectly Classified Instances 5 14.2857 %

Kappa statistic 0.7136

Mean absolute error 0.1429

Root mean squared error 0.378

Relative absolute error 28.4711 %

Root relative squared error 75.2649 %

Coverage of cases (0.95 level) 85.7143 %

Mean rel. region size (0.95 level) 50 %

Total Number of Instances 35

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.875	0.158	0.824	0.875	0.848	0.715	0.859	0.778	Yes
	0.842	0.125	0.889	0.842	0.865	0.715	0.859	0.834	No
Weighted Avg.	0.857	0.140	0.859	0.857	0.857	0.715	0.859	0.808	

=== Confusion Matrix ===

a	b	<-- classified as
14	2	a = Yes
3	16	b = No

KERNEL - 1

java -cp "%CLASSPATH%;C:\Users\Snow_Leopard\workspace\tmp\Weka\weka-3-7-12\weka.jar" weka.classifiers.misc.InputMappedClassifier -I -trim -W weka.classifiers.functions.LibSVM -- -S 0 -K 1 -D 3 -G 0.0 -R 0.0 -N 0.5 -M 40.0 -C 1.0 -E 0.001 -P 0.1 -model "C:\\Program Files\\Weka-3-7" -seed 1-t " home\workspace\LIBSVM\training.arff" -T " home\workspace\LIBSVM\validation.arff

Correctly Classified Instances 26 74.2857 %

Incorrectly Classified Instances 9 25.7143 %

Kappa statistic 0.4688

Mean absolute error 0.2571

Root mean squared error 0.5071

Relative absolute error 51.248 %

Root relative squared error 100.9785 %

Coverage of cases (0.95 level) 74.2857 %

Mean rel. region size (0.95 level) 50 %

Total Number of Instances 35

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.563	0.105	0.818	0.563	0.667	0.491	0.729	0.660	Yes
	0.895	0.438	0.708	0.895	0.791	0.491	0.729	0.691	No
Weighted Avg.	0.743	0.286	0.759	0.743	0.734	0.491	0.729	0.677	

=== Confusion Matrix ===

a	b	<-- classified as
9	7	a = Yes
2	17	b = No

KERNEL – 2

java -cp "%CLASSPATH%;C:\Users\Snow_Leopard\workspace\tmp\Weka\weka-3-7-12\weka.jar" weka.classifiers.misc.InputMappedClassifier -I -trim -W weka.classifiers.functions.LibSVM -- -S 0 -K 2 -D 3 -G 0.0 -R 0.0 -N 0.5 -M 40.0 -C 1.0 -E 0.001 -P 0.1 -model "C:\\Program Files\\Weka-3-7" -seed 1-t " home\workspace\LIBSVM\training.arff" -T " home\workspace\LIBSVM\validation.arff

Correctly Classified Instances 27 77.1429 %

Incorrectly Classified Instances 8 22.8571 %

Kappa statistic 0.5349

Mean absolute error 0.2286

Root mean squared error 0.4781

Relative absolute error 45.5538 %

Root relative squared error 95.2034 %

Coverage of cases (0.95 level) 77.1429 %

Mean rel. region size (0.95 level) 50 %

Total Number of Instances 35

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.688	0.158	0.786	0.688	0.733	0.539	0.765	0.683	Yes
	0.842	0.313	0.762	0.842	0.800	0.539	0.765	0.727	No
Weighted Avg.	0.771	0.242	0.773	0.771	0.770	0.539	0.765	0.707	

=== Confusion Matrix ===

a	b	<-- classified as
11	5	a = Yes
3	16	b = No

KERNEL – 3

java -cp "%CLASSPATH%;C:\Users\Snow_Leopard\workspace\tmp\Weka\weka-3-7-12\weka.jar" weka.classifiers.misc.InputMappedClassifier -I -trim -W weka.classifiers.functions.LibSVM -- -S 0 -K 3 -D 3 -G 0.0 -R 0.0 -N 0.5 -M 40.0 -C 1.0 -E 0.001 -P 0.1 -model "C:\\Program Files\\Weka-3-7" -seed 1-t " home\workspace\LIBSVM\training.arff" -T " home\workspace\LIBSVM\validation.arff

Correctly Classified Instances 16 45.7143 %

Incorrectly Classified Instances 19 54.2857 %

Kappa statistic 0

Mean absolute error 0.5429

Root mean squared error 0.7368

Relative absolute error 108.1903 %

Root relative squared error 146.7184 %

Coverage of cases (0.95 level) 45.7143 %

Mean rel. region size (0.95 level) 50 %

Total Number of Instances 35

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	1.000	1.000	0.457	1.000	0.627	0.000	0.500	0.457	Yes
	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.543	No
Weighted Avg.	0.457	0.457	0.209	0.457	0.287	0.000	0.500	0.504	

=== Confusion Matrix ===

a	b	<-- classified as
16	0	a = Yes
19	0	b = No

The data given in the training and validation set is linearly separable and thus highest accuracy is recorded for Kernel 0. The accuracy reduces with higher the kernel size. Kernel 1 or Polynomial Kernel records the second highest accuracy followed by Kernel 2 and least being found for Sigmoid function.

PERCEPTRON (From WEKA)

Iteration value = 50

java -cp "%CLASSPATH%;C:\Users\Snow_Leopard\workspace\tmp\Weka\weka-3-7-12\weka.jar" weka.classifiers.misc.InputMappedClassifier -I -trim -W weka.classifiers.functions.VotedPerceptron -- -I 50 -E 1.0 -S 1 -M 10000 -t " home\workspace\LIBSVM\training.arff" -T " home\workspace\LIBSVM\validation.arff

Correctly Classified Instances 26 74.2857 %

Incorrectly Classified Instances 9 25.7143 %

Kappa statistic 0.4793

Mean absolute error 0.2571

Root mean squared error 0.5071

Relative absolute error 51.248 %

Root relative squared error 100.9785 %

Coverage of cases (0.95 level) 74.2857 %

Mean rel. region size (0.95 level) 50 %

Total Number of Instances 35

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.688	0.211	0.733	0.688	0.710	0.480	0.738	0.647	Yes
	0.789	0.313	0.750	0.789	0.769	0.480	0.738	0.706	No
Weighted Avg.	0.743	0.266	0.742	0.743	0.742	0.480	0.738	0.679	

=== Confusion Matrix ===

a	b	<-- classified as
11	5	a = Yes
4	15	b = No

Iteration value = 100

java -cp "%CLASSPATH%;C:\Users\Snow_Leopard\workspace\tmp\Weka\weka-3-7-12\weka.jar" weka.classifiers.misc.InputMappedClassifier -I -trim -W weka.classifiers.functions.VotedPerceptron -- -I 100 -E 1.0 -S 1 -M 10000 -t " home\workspace\LIBSVM\training.arff" -T " home\workspace\LIBSVM\validation.arff

Correctly Classified Instances	26	74.2857 %
Incorrectly Classified Instances	9	25.7143 %
Kappa statistic	0.4793	
Mean absolute error	0.2571	
Root mean squared error	0.5071	
Relative absolute error	51.248	%
Root relative squared error	100.9785	%
Coverage of cases (0.95 level)	74.2857	%
Mean rel. region size (0.95 level)	50	%
Total Number of Instances	35	

=== Detailed Accuracy By Class ===

	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.688	0.211	0.733	0.688	0.710	0.480	0.738	0.647	Yes
	0.789	0.313	0.750	0.789	0.769	0.480	0.738	0.706	No
Weighted Avg.	0.743	0.266	0.742	0.743	0.742	0.480	0.738	0.679	

=== Confusion Matrix ===

a	b	<-- classified as
11	5	a = Yes
4	15	b = No

Iteration value = 200:

java -cp "%CLASSPATH%;C:\Users\Snow_Leopard\workspace\tmp\Weka\weka-3-7-12\weka.jar" weka.classifiers.misc.InputMappedClassifier -I -trim -W weka.classifiers.functions.VotedPerceptron -- -I 200 -E 1.0 -S 1 -M 10000 -t " home\workspace\LIBSVM\training.arff" -T " home\workspace\LIBSVM\validation.arff

Correctly Classified Instances	26	74.2857 %
Incorrectly Classified Instances	9	25.7143 %
Kappa statistic	0.4793	
Mean absolute error	0.2571	
Root mean squared error	0.5071	
Relative absolute error	51.248	%
Root relative squared error	100.9785	%
Coverage of cases (0.95 level)	74.2857	%
Mean rel. region size (0.95 level)	50	%
Total Number of Instances	35	

=== Detailed Accuracy By Class ===

TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
0.688	0.211	0.733	0.688	0.710	0.480	0.738	0.647	Yes
0.789	0.313	0.750	0.789	0.769	0.480	0.738	0.706	No

Weighted Avg. 0.743 0.266 0.742 0.743 0.742 0.480 0.738 0.679

=== Confusion Matrix ===

a b <-- classified as

11 5 | a = Yes

4 15 | b = No

Iteration value = 1000

java -cp "%CLASSPATH%;C:\Users\Snow_Leopard\workspace\tmp\Weka\weka-3-7-12\weka.jar" weka.classifiers.misc.InputMappedClassifier -I -trim -W weka.classifiers.functions.VotedPerceptron -- -I 1000 -E 1.0 -S 1 -M 10000 -t " home\workspace\LIBSVM\training.arff" -T " home\workspace\LIBSVM\validation.arff

Correctly Classified Instances 26 74.2857 %

Incorrectly Classified Instances 9 25.7143 %

Kappa statistic 0.4793

Mean absolute error 0.2571

Root mean squared error 0.5071

Relative absolute error 51.248 %

Root relative squared error 100.9785 %

Coverage of cases (0.95 level) 74.2857 %

Mean rel. region size (0.95 level) 50 %

Total Number of Instances 35

=== Detailed Accuracy By Class ===

TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Class

	0.688	0.211	0.733	0.688	0.710	0.480	0.738	0.647	Yes
	0.789	0.313	0.750	0.789	0.769	0.480	0.738	0.706	No
Weighted Avg.	0.743	0.266	0.742	0.743	0.742	0.480	0.738	0.679	

=== Confusion Matrix ===

a	b	<-- classified as
11	5	a = Yes
4	15	b = No

PERCEPTRON (USING PROGRAM)

Iteration value = 50

Enter the number of iterations and the learning rate:

50 0.1

The accuracy is: 54.285714285714285%

Iteration Value = 100

Enter the number of iterations and the learning rate:

100 0.1

The accuracy is: 65.71428571428571

Iteration Value = 200

Enter the number of iterations and the learning rate:

200 0.1

The accuracy is: 60.0

Highest record accuracy for Perceptron from WEKA is 75% approximately and from the modified program is 66%.

Linear SVM maximizes the margin (the sum of the squared distance of each point from the hyper plane) under the constraint that the hyper plane separates the points into two classes.

Perceptrons are required to be trained online (i.e. their weights can be updated as new examples arrive one at a time). Thus more the number of examples better our Perceptron algorithm classifying the examples.

Since there are much less number of examples, Perceptron algorithm has lesser accuracy over Linear SVM.