

Wilcoxon Signed Ranks test.

KEEL non-parametric statistical module

December 15, 2011

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)		
Self-Training (NN) (1)	-	737.0	1037.0	849.5	1025.0	810.0	926.0	810.0	926.0	793.0	987.5	840.5	926.0	945.0	795.0	834.0	745.0	913.0	745.0	686.0	1524.3	1091.0	1056.0	1241.0	744.5	676.0	979.0	750.0	1451.0	1101.0	1054.0	1230.0	1059.0	1105.0	437.5	856.0	
Self-Training (C45) (2)	803.0	-	1236.5	943.5	992.0	803.0	1015.0	894.5	613.0	780.5	826.0	388.5	1033.0	1003.0	842.5	911.0	1122.0	933.0	670.0	1483.5	1349.5	1195.0	1357.0	830.5	533.5	1100.5	960.5	1486.0	1427.5	1179.5	1349.0	1062.5	1064.0	699.0	881.0		
Self-Training (NB) (3)	413.0	303.5	-	912.0	863.0	883.5	891.0	899.0	1120.0	1401.0	454.0	856.0	891.5	745.0	1281.0	334.0	800.0	832.0	886.0	1151.0	800.0	676.0	1092.0	1004.0	267.0	965.0	851.0	1154.0	838.0	910.0	985.5	614.0	941.0	662.0	660.0		
Self-Training (SMO) (4)	690.5	596.5	1028.0	-	-	912.0	681.0	883.0	548.5	538.0	650.0	664.5	479.0	886.0	756.5	669.0	675.0	960.5	695.5	961.0	1379.0	1078.0	1069.5	1320.0	649.5	535.0	865.0	762.0	1354.0	1014.0	1014.5	1242.0	887.0	863.0	596.0	741.0	
Co-Training (NN) (5)	460.0	548.0	-	607.0	628.0	-	-	681.0	794.0	605.0	378.0	370.0	491.0	507.0	824.0	688.0	570.5	576.0	804.0	509.5	494.5	1366.0	996.5	931.0	1114.5	481.0	515.0	871.0	673.5	1302.0	1009.0	956.0	1102.0	860.0	886.0	288.0	666.0
Co-Training (C45) (6)	675.0	682.0	1146.5	891.0	850.0	-	914.0	816.5	500.5	655.0	690.5	550.0	938.0	882.0	697.0	741.0	1036.5	802.5	508.0	1481.5	1338.0	1169.0	1314.0	685.0	370.5	573.5	853.0	1465.0	1387.0	1169.0	1326.0	914.0	974.0	595.5	890.0		
Co-Training (NB) (7)	569.0	625.0	1284.0	697.0	746.0	626.0	-	617.0	232.0	833.0	568.5	624.5	632.5	1289.0	788.0	846.0	611.0	618.5	885.0	1333.0	1020.0	976.0	1114.0	979.5	482.5	834.0	746.0	1328.0	1027.0	1053.0	1137.0	820.5	822.0	910.0	579.0		
Co-Training (SMO) (8)	819.0	645.5	1084.0	991.5	985.0	723.5	923.0	-	574.0	804.0	805.0	326.0	922.0	1029.0	778.0	739.5	863.5	813.0	611.0	1465.0	1141.5	1051.0	1462.0	782.0	574.0	1283.0	930.5	1436.0	1106.0	1063.0	1221.0	1054.5	1009.0	691.5	851.0		
Democratic9 (9)	497.0	922.0	1428.0	1052.0	1107.0	984.5	1398.0	966.0	-	931.5	892.5	705.5	1391.0	1105.0	938.0	1072.0	1311.0	1038.0	748.0	1529.0	1279.0	1279.0	1514.0	1384.0	969.0	785.5	1428.0	1497.0	1252.0	1494.0	1338.0	1198.0	1119.0	853.0	977.0		
SP-FREED (10)	1097.5	759.5	1100.0	881.0	1115.0	830.0	952.0	736.0	668.5	-	1002.5	670.0	958.0	817.0	884.5	803.0	974.5	801.0	717.0	1536.0	1102.0	1121.0	1259.0	838.0	707.0	1004.0	760.0	1469.0	1113.0	1168.0	1241.0	1064.5	1148.0	1059.0	899.0		
IT-Training (NN) (11)	699.5	714.0	1086.0	820.5	1049.0	849.5	971.5	734.0	520.5	482.5	-	398.0	938.0	820.0	826.5	747.0	884.0	756.5	601.0	1527.0	1117.0	1169.5	1270.5	742.0	666.0	998.0	739.5	1516.0	1130.5	1114.0	1250.0	1074.0	1093.0	434.5	832.0		
IT-Training (C45) (12)	911.0	1096.5	1285.0	1061.0	1073.0	1290.0	1115.5	1014.0	379.5	870.0	942.0	-	1111.0	1067.0	942.5	1137.0	1232.0	1015.0	649.0	1462.0	1432.0	1247.0	1419.0	587.5	881.5	1151.0	1059.5	1315.0	1094.0	1258.0	1211.0	1123.0	1114.0	820.0	1062.0		
IT-Training (NB) (13)	596.0	507.0	1278.5	654.0	716.0	602.0	907.5	618.0	239.0	582.0	591.0	629.0	-	799.0	663.0	678.5	818.5	627.5	675.0	1324.0	994.0	1052.0	1119.5	884.0	466.0	1086.5	731.5	1320.0	1028.0	1093.0	1134.0	861.0	801.0	603.0	662.5		
IT-Training (SMO) (14)	743.0	637.0	825.0	748.5	822.0	603.0	611.5	696.0	436.0	423.0	720.0	414.0	1141.0	-	706.5	591.0	836.0	674.5	666.0	1370.0	1053.0	912.0	1224.0	614.0	496.0	777.0	689.5	1562.0	1043.0	921.0	1285.5	899.5	892.0	624.0	741.5		
DE-IT-Training (NN) (15)	706.0	697.5	1112.0	871.0	969.5	843.0	957.0	764.0	592.0	655.5	713.5	597.5	937.0	839.5	-	785.5	1027.5	702.0	681.0	1478.0	1154.5	1071.0	1255.0	692.0	658.0	555.5	835.5	1472.0	1173.0	1084.5	1252.0	1060.0	1019.5	570.0	797.0		
DE-IT-Training (C45) (16)	796.0	629.0	1193.0	865.0	964.0	799.0	993.5	800.5	468.0	737.0	793.0	803.0	961.5	894.0	699.5	-	1081.0	848.0	662.0	1493.0	1241.0	1112.0	1360.0	804.5	593.5	1007.0	856.0	1489.0	1280.0	1139.0	1288.0	1021.0	1032.0	693.0	768.0		
DE-IT-Training (NB) (17)	572.0	388.0	1140.0	793.5	736.0	503.5	754.0	576.5	209.0	655.5	536.0	308.0	721.5	704.0	312.5	459.0	-	552.5	657.0	1385.0	1063.0	933.0	1130.0	605.0	331.0	823.0	609.0	1306.0	1033.0	1088.0	1111.0	865.0	716.0	474.0	501.5		
DE-IT-Training (SMO) (18)	796.0	607.0	1108.0	789.5	970.5	737.5	921.5	725.0	602.0	739.0	783.5	370.0	912.5	865.5	838.0	692.0	936.5	-	618.0	1367.0	1174.0	1067.0	1319.0	835.0	551.0	886.0	829.0	1494.0	1186.0	1114.0	1313.0	973.0	1027.0	669.5	812.0		
CoForest (19)	854.0	970.0	1153.5	979.0	1045.5	1032.0	1055.0	899.0	792.0	823.0	849.0	891.0	1065.0	974.0	839.0	978.0	1086.5	922.0	-	1367.0	1188.0	1126.5	1256.0	866.0	921.0	1095.0	943.0	1357.0	1195.0	1127.5	1246.0	1095.5	978.0	784.5	931.0		
Racco (NN) (20)	165	46	366.0	161.0	174.0	167	209.0	-	119	84	139	233	216.0	176	49	195	309	-	631	1017	1017	1017	1017	1017	1017	350	198	180	608	233	314	384	382	389	366	187	
Racco (C45) (21)	449.0	135.5	685.0	462.0	543.5	147.0	513.0	443.5	188.0	438.0	423.0	53.0	491.0	487.0	385.5	299.0	477.0	306.0	352.0	1295.0	836.0	971.0	1256.0	244.0	631.0	1017.0	864.0	661.5	473.0	427.0	429.0	608.5	672.0	357.5	511.0		
Racco (NB) (22)	444.0	345.0	867.0	530.5	609.0	431.0	609.0	489.0	195.5	419.0	430.5	293.0	488.0	627.5	469.0	428.0	651.5	473.0	413.5	1215.0	909.0	-	1052.0	406.0	301.5	580.5	566.0	1204.0	911.0	690.0	1026.5	694.0	680.5	974.0	501.0		
Racco (SMO) (23)	293.0	181.0	538.0	220.0	325.5	206.0	389.0	78	156.0	231.0	269.5	130.0	390.5	228	293.0	240.0	103.0	221.0	284.0	1194.0	535	688	-	1026.0	391	134.0	301	1324	511	623.0	774.0	560.0	550.0	338.5	368.0		
Co-Bagging (NN) (24)	795.5	709.5	1196.0	890.5	1059.0	855.0	960.5	788.0	570.5	702.0	798.0	602.5	956.0	868.5	793.0	825.5	1035.0	690.0	674.0	1618.0	1122.0	1134.0	1287.0	883.0	592.0	972.5	819.0	1668.0	1126.0	1099.0	1294.0	1009.0	1058.5	718.0	824.5		
Co-Bagging (C45) (25)	864.0	1006.5	1273.0	1005.0	1025.0	1114.5	1057.5	966.0	695.5	833.0	875.0	658.5	1074.0	1044.0	882.0	1036.5	1209.0	989.0	619.0	1514.0	1433.5	1238.5	1416.0	875.0	-	1138.0	1030.0	1515.0	1501.0	1245.5	1414.0	1084.0	1074.0	775.0	930.0		
Co-Bagging (NB) (26)	661.0	639.5	1120.0	620.0	669.0	466.5	606.0	609.0	221.0	836.0	342.0	838.0	388.5	663.0	635.5	833.0	417.0	880.0	843.0	1341.5	1012.0	896.5	1180.0	609.5	402.0	1160.0	999.0	1310.0	1089.0	910.0	1155.0	838.0	765.0	430.5	880.0		
Co-Bagging (SMO) (27)	760.0	579.5	986.0	783.0	866.5	687.0	796.0	609.5	470.0	760.0	780.5	483.5	808.5	895.5	704.5	629.0	821.0	711.0	597.0	1422.0	1115.0	1070.0	723.0	510.0	823.0	-	1393.0	1105.0	966.5	1053.0	846.0	919.5	663.5	738.0			
Rel-Racco (NN) (28)	341	51	386	186	183	75	212	104	11	16	24	27	22	22	179	68	51	177	46	183	91	231	836	41	31	25	201	147	-	358	396	404	26	200			
Rel-Racco (C45) (29)	439	92	702	311	311	153	513	339	135	327	405	367	512	379	367	267	354	345	131	801	622	1029	397	39	81	43	430	-	666	1026	608	668	314	69			
Rel-Racco (NB) (30)	456	460	970	625	584	431	432	475	136	435	429	282	419	619	496	501	62	426	426	412	1196	875	815	1036	388	294	630	973	5	182	630	686	388	48			
Rel-Racco (SMO) (31)	310	191	555	216	438	214	403	119	147	295	290	129	406	254	285	252	429	27	294	1156	548	519	171	266	126	387	187	1088	519	525	0	578	543	244	384		
GLC4 (32)	481	472	923	399	680	644	719	585	342	375	460	417	689	675	800	864	677	667	844	1158	841	846	980	576	456	707	630	1144	842	850	962	-	660	610	561		
APSSC (33)	380	476	869	592	654	666	718	631	361	407	392	426	439	648	626	588	616	510	662	1111	686	899	900	481	85	466	785	620	1136	60	872	60	955	824	-	342	
SPNHC (34)	1102.5	841	1178	944	1292	943	1070	943	848	697	911	1205	720	1037	919	910	847	1085	870	735	1514	1127	1166	1301	567	7											

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)		
Self-Training (NN) (1)	-		•		•				o	o										•	•	•	•			•	•	•	•	•	•	•	•	•	•	o	
Self-Training (C45) (2)		-	•		•		•					o	•	•			•		o	•	•	•	•		o	•		•	•	•	•	•	•	•	•	o	
Self-Training (NB) (3)	o	o	-	o	o	o	o	o	o	o	o	o	o		o	o	o	o	o	•	•	•	•	•	o	o	o	•	•	•	•	•	•	•	•	o	
Self-Training (SMO) (4)			•	-					o	o									o	•	•	•	•		o			•	•	•	•	•	•	•	•	o	
Co-Training (NN) (5)	o								o	o	o	o			o				o	•	•	•	•		o			•	•	•	•	•	•	•	•	o	
Co-Training (C45) (6)			•		-				o	o	o	o					•		o	•	•	•	•		o	•		•	•	•	•	•	•	•	•	o	
Co-Training (NB) (7)		o	•				-		o	o	o	o				o			o	•	•	•	•		o	•		•	•	•	•	•	•	•	•	o	
Co-Training (SMO) (8)			•					-				o		•					o	•	•	•	•		o			•	•	•	•	•	•	•	•	o	
Democratic-Co (9)		•			•	•	•		-		•		•	•		•	•	•		•	•	•	•	•	o		•	•	•	•	•	•	•	•	•	•	
SETRFD (10)	•		•		•				-	•										•	•	•	•				•	•	•	•	•	•	•	•	•	o	
TriTraining (NN) (11)			•		•				o	-										•	•	•	•				•	•	•	•	•	•	•	•	•	o	
TriTraining (C45) (12)		•	•	•	•	•	•	•				-	•	•			•	•	•		•	•	•				•	•	•	•	•	•	•	•	•	•	
TriTraining (NB) (13)		o	•						o			o	-						o	•	•	•	•		o	•		•	•	•	•	•	•	•	•	o	
TriTraining (SMO) (14)								o	o					-					o	•	•	•	•		o	•		•	•	•	•	•	•	•	•	o	
DE-TriTraining (NN) (15)			•						o						-		•			•	•	•	•				•	•	•	•	•	•	•	•	•	o	
DE-TriTraining (C45) (16)			•						o							-	•			•	•	•	•		o	•		•	•	•	•	•	•	•	•	o	
DE-TriTraining (NB) (17)		o	•		o				o			o				o	o	-		•	•	•	•		o	o		•	•	•	•	•	•	•	•	o	
DE-TriTraining (SMO) (18)			•						o			o						-		•	•	•	•		o	o		•	•	•	•	•	•	•	•	o	
CoForest (19)					•	•	•						•					-		•	•	•	•			•	•	•	•	•	•	•	•	•	•	o	
Rasco (NN) (20)	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	-	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Rasco (C45) (21)	o	o		o		o	o	o	o	o	o	o	o	o	o	o	o	o	o	•	-		•	o	o	o	o	o	•		•	•	•	•	•	o	
Rasco (NB) (22)	o	o		o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	•	-		•	o	o	o	o	•		•	•	•	•	•	•	o	
Rasco (SMO) (23)	o	o		o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	•	o	o	-	o	o	o	o	•		•	•	•	•	•	•	o	
Co-Bagging (NN) (24)			•	•	•	•	•						•	•			•	•		•	•	•	•				•	•	•	•	•	•	•	•	•	o	
Co-Bagging (C45) (25)		•	•	•	•	•	•						•	•			•	•		•	•	•	•		-	•	•	•	•	•	•	•	•	•	•	o	
Co-Bagging (NB) (26)		o	•						o	o		o	o			o			o	•	•	•	•			-	•	•	•	•	•	•	•	•	•	o	
Co-Bagging (SMO) (27)									o			o							o	•	•	•	•		o		-	•	•	•	•	•	•	•	•	o	
Rel-Rasco (NN) (28)	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Rel-Rasco (C45) (29)	o	o		o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Rel-Rasco (NB) (30)	o	o		o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Rel-Rasco (SMO) (31)	o	o		o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
CLCC (32)	o	o							o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
APSSC (33)	o	o							o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
SNRCE (34)	•	•	•		•		•			•		•								•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•
ADE-CoForest (35)			•																	•	•	•	•				•	•	•	•	•	•	•	•	•	•	

Table 2: Summary of the Wilcoxon test. •= the method in the row improves the method of the column. o= the method in the column improves the method of the row. Upper diagonal of level significance  $\alpha = 0.9$ , Lower diagonal level of significance  $\alpha = 0.95$

Method	$\alpha = 0.9$		$\alpha = 0.95$	
	+	±	+	±
Self-Training (NN)	13	31	12	32
Self-Training (C45)	17	31	15	32
Self-Training (NB)	4	10	2	13
Self-Training (SMO)	9	29	9	32
Co-Training (NN)	7	22	5	25
Co-Training (C45)	13	30	10	30
Co-Training (NB)	9	25	9	28
Co-Training (SMO)	12	31	11	33
Democratic-Co	27	34	21	34
SETRED	17	33	15	34
TriTraining (NN)	15	31	12	32
TriTraining (C45)	25	34	24	34
TriTraining (NB)	10	28	10	28
TriTraining (SMO)	6	28	6	30
DE-TriTraining (NN)	13	33	12	34
DE-TriTraining (C45)	14	30	13	31
DE-TriTraining (NB)	9	21	8	23
DE-TriTraining (SMO)	12	31	10	32
CoForest	21	34	16	34
Rasco (NN)	0	1	0	1
Rasco (C45)	4	10	3	11
Rasco (NB)	4	14	4	15
Rasco (SMO)	2	3	2	6
Co-Bagging (NN)	14	32	13	34
Co-Bagging (C45)	24	34	22	34
Co-Bagging (NB)	7	21	7	25
Co-Bagging (SMO)	8	31	6	31
Rel-Rasco (NN)	0	1	0	1
Rel-Rasco (C45)	4	10	4	10
Rel-Rasco (NB)	5	13	4	14
Rel-Rasco (SMO)	2	4	2	7
CLCC	3	19	2	21
APSSC	4	19	2	21
SNNRCE	22	34	18	34
ADE-CoForest	11	31	11	34

Table 3: Wilcoxon test summary results