Mtry Hyperparameter analysis

Table 1: RMSE values for all datasets obtained from the experiments when Mtry is {1,3,5,7,9,11,13,15,17,19,21} and Ntree is 130

Dataset	Mtry										
	1	3	5	7	9	11	13	15	17	19	21
D1-1	5.2174 (11)	3.2234 (10)	2.1181 (9)	1.3797 (8)	0.8705 (7)	0.5211 (6)	0.3373 (5)	0.1892 (4)	0.1198 (3)	0.0588 (2)	0.0342 (1)
D1-2	15.1304 (11)	11.1168 (10)	8.8195 (9)	7.6710 (8)	6.6264 (7)	5.7094 (6)	5.1213 (5)	4.6339 (4)	4.1476 (3)	3.7743 (2)	3.7374 (1)
D1-3	0.1814 (1)	0.2042 (2)	0.2160 (4)	0.2127 (3)	0.2281 (5)	0.2308 (6)	0.2336 (8)	0.2400 (9)	0.2324 (7)	0.2406 (10)	0.2461 (11)
D1-4	0.0403 (11)	0.0239 (10)	0.0169 (9)	0.0134 (8)	0.0104 (7)	0.0089 (6)	0.0081 (5)	0.0075 (4)	0.0069 (3)	0.0067 (2)	0.0066 (1)
D1-5	0.1509 (1)	0.1720 (2)	0.1834 (4)	0.1831 (3)	0.1916 (5)	0.1940 (6)	0.1957 (7)	0.1995 (9)	0.1986 (8)	0.2027 (10)	0.2091 (11)
D1-6	0.0391 (10)	0.0226 (9)	0.0160 (8)	0.0124 (7)	0.0092 (6)	0.0074 (5)	0.0068 (4)	0.0064 (3)	0.0059 (1)	0.0060 (2)	0.0060 (2)
D1-7	0.1147 (1)	0.1237 (2)	0.1341 (3)	0.1383 (5)	0.1368 (4)	0.1473 (9)	0.1448 (8)	0.1441 (6)	0.1445 (7)	0.1541 (11)	0.1519 (10)
D1-8	0.0915 (11)	0.0628 (10)	0.0450 (9)	0.0365 (8)	0.0283 (7)	0.0228 (6)	0.0192 (5)	0.0166 (4)	0.0141 (3)	0.0133 (2)	0.0117 (1)
D1-9	0.0777 (1)	0.0826 (2)	0.0883 (4)	0.0923 (6)	0.0868 (3)	0.0936 (8)	0.0935 (7)	0.0921 (5)	0.0955 (11)	0.0948 (9)	0.0948 (10)
D1-10	0.0946 (11)	0.0636 (10)	0.0481 (9)	0.0379 (8)	0.0293 (7)	0.0235 (6)	0.0198 (5)	0.0170 (4)	0.0146 (3)	0.0135 (2)	0.0120 (1)
D1-11	8.1100 (11)	5.6392 (10)	4.6569 (9)	4.4326 (8)	4.2945 (7)	4.1563 (5)	4.1458 (4)	4.0140 (1)	4.0802 (2)	4.2880 (6)	4.1079 (3)
D1-12	0.0297 (8)	0.0248 (7)	0.0238 (4)	0.0228 (1)	0.0228 (1)	0.0231 (2)	0.0235 (3)	0.0239 (5)	0.0238 (4)	0.0239 (5)	0.0244 (6)
D1-13	0.0447 (10)	0.0422 (9)	0.0384 (8)	0.0364 (7)	0.0338 (6)	0.0329 (5)	0.0327 (4)	0.0324 (3)	0.0312 (1)	0.0316 (2)	0.0316 (2)
D1-14	0.1412 (10)	0.1364 (9)	0.1283 (8)	0.1206 (7)	0.1152 (6)	0.1141 (5)	0.1133 (3)	0.1140 (4)	0.1132 (2)	0.1140 (4)	0.1131 (1)
Avg.Rank	7.71	7.28	6.92	6.21	5.57	5.78	5.21	4.64	**4.14**	4.92	4.35
D2-15	0.0517 (5)	0.0465 (1)	0.0478 (2)	0.0482 (3)	0.0490 (4)						
D2-16	0.0794 (5)	0.0543 (4)	0.0529 (3)	0.0520 (1)	0.0521 (2)						
D2-17	0.8581 (3)	0.7792 (1)	0.8355 (2)	0.8664 (4)	0.9159 (5)						
Avg.Rank	4.3	**2**	2.3	2.6	3.6						

The hypothesis is there is no significant difference between Mtry parameter values and predictive performance. From the Friedman statistical test, we got p-value which is less than a significant level 0.05. Thus, there is a significant performance difference between different Mtry values. Table 2 shows the post hoc Nemenyi test results for pair wise comparison to see individual differences. These pair wise statistical results indicate that there is significant difference between larger Mtry configurations and smaller Mtry configurations.

Table 2: The post hoc Nemenyi test result for pair wise comparison between Mtry configurations for all datasets

Dataset	Mtry	1	3	5	7	9	11	13	15	17	19	21
D1-1	1	_	0.99956	0.90736	0.42950	0.07640	0.00573	**0.00021**	**0.00000**	**0.00000**	**0.00000**	**0.00000**
D1-2	3	0.99956	_	0.99915	0.90736	0.47104	0.06441	**0.00455**	**0.00028**	**0.00000**	**0.00000**	**0.00000**
D1-3	5	0.55641	0.99847	_	1.00000	0.95779	0.47104	0.38927	0.06441	0.27966	0.10586	**0.00222**
D1-4	7	0.42950	0.90736	0.99956	_	0.99956	0.88426	0.31410	0.05403	**0.00222**	**0.00016**	**0.00012**
D1-5	9	**0.00897**	0.16594	0.99564	0.98445	_	0.99990	0.99915	0.99310	0.99736	0.79579	0.55641
D1-6	11	**0.00455**	0.06441	0.38927	0.88426	0.99915	_	0.99956	0.64165	0.14362	0.16594	0.16594
D1-7	13	**0.00081**	**0.03097**	0.64165	0.95779	0.88426	1.00000	_	1.00000	1.00000	0.88426	0.92723
D1-8	15	**0.00000**	**0.00021**	0.00719	0.06441	0.47104	0.88426	0.99978	_	0.99736	0.94397	0.51349
D1-9	17	**0.00001**	**0.00105**	0.24755	0.99564	0.16594	0.99996	0.98947	0.98445	_	1.00000	0.99999
D1-10	19	**0.00000**	**0.00000**	**0.00001**	**0.00048**	**0.01116**	0.14362	0.55641	0.96894	1.00000	_	0.99915
D1-11	21	**0.00001**	**0.00062**	0.16594	0.94397	0.99915	1.00000	1.00000	0.99996	1.00000	0.99915	_
D1-12	3	0.64165	_	0.85790	**0.00048**	**0.00016**	0.00573	0.35071	0.92723	0.85790	0.95779	0.99990
D1-13	5	0.88426	0.99915	_	0.99990	0.55641	0.05403	**0.03746**	**0.01381**	**0.00003**	**0.00016**	**0.00028**
D1-14	7	0.12363	0.21788	0.88426	_	0.72271	0.68295	0.47104	0.76046	0.55641	0.76046	0.35071
D2-15	3	**0.00000**	_	0.79802	0.72765	0.12741						
D2-16	5	**0.00041**	0.72765	_	0.97192	0.99593						
D2-17	7	0.94600	**0.00190**	0.48930	_	0.79800						