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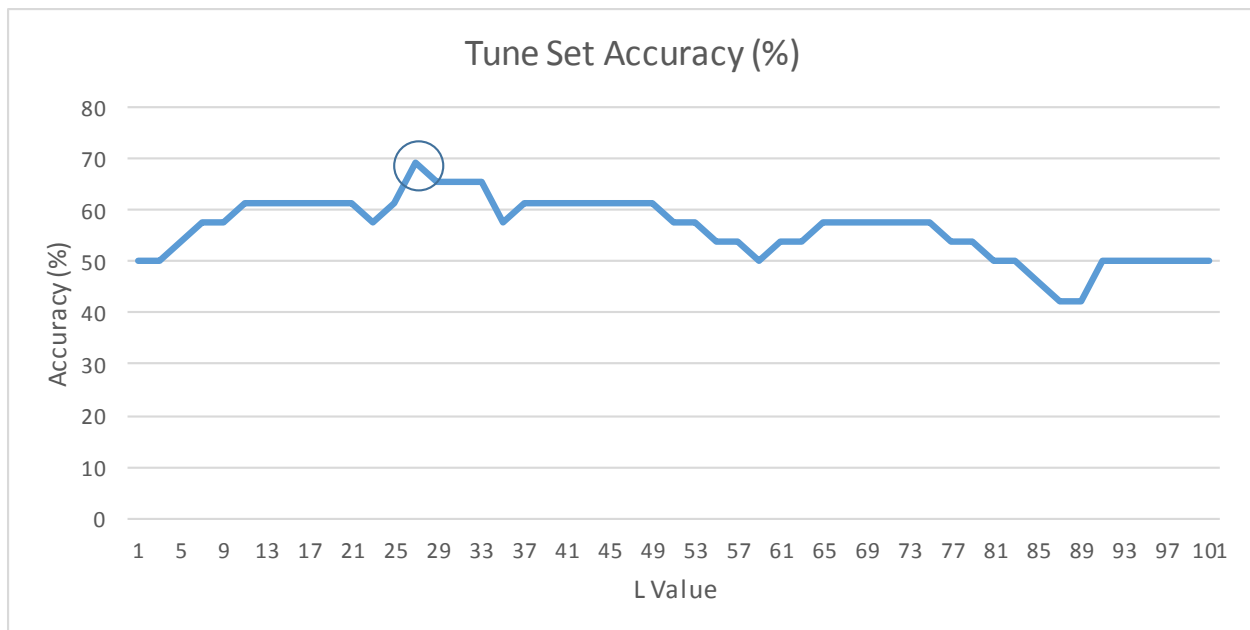
CS 540: AI

HW #2

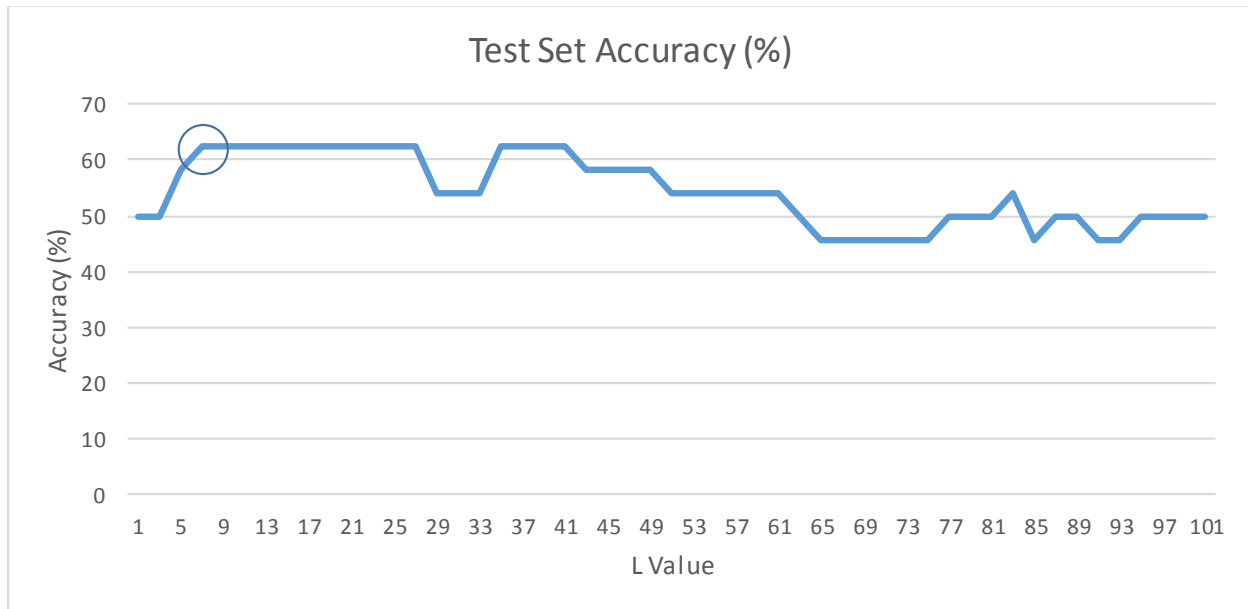
1.

a)

Best Tune Set results occur when $L = 27$, yielding a maximum accuracy of about 69.23%.



Best Test Set results occur when $L = 7$, yielding a maximum accuracy of about 62.5%.



Bagging appears to have helped, in that we see greater than 50% accuracy for many values of L . By using an ensemble we achieve accuracy of over 60% in many cases (and close to 70% in the best case against the tune set). Using a tune set allows us to see how a variety of L values with the combination rule provided affect the accuracy of the ensemble's predictions.

We see that for some L values we achieve greater accuracy than is using a majority vote ($L = 51$), and even using a majority vote provides better than 50% accuracy. We see a similar overall shape to each of these curves, with an initial rise and peak somewhere in the neighborhood of the first quartile, and then a dip and valley near the final stretch. This suggests that L values that lead to the best accuracy are likely to extend beyond these sets and provide increased accuracy on future sets.

The tune set did a good job picking the best L value for the test set. The best L value for the tune set is 27, and while the best L value for the test set is 7, this is only after an application of Occam's Razor – the same L value of 27 yields the same accuracy value that $L = 7$ does for the test set. So both sets have an equivalently optimal L value of 27.

Data points returned by my code and used in the above plots are laid out below for reference.

Tune Set:

Row Labels	Accuracy (%)
1	50
3	50
5	53.84615385
7	57.69230769
9	57.69230769
11	61.53846154
13	61.53846154
15	61.53846154
17	61.53846154
19	61.53846154
21	61.53846154
23	57.69230769
25	61.53846154
27	69.23076923
29	65.38461538
31	65.38461538
33	65.38461538
35	57.69230769
37	61.53846154
39	61.53846154
41	61.53846154
43	61.53846154
45	61.53846154
47	61.53846154
49	61.53846154
51	57.69230769
53	57.69230769
55	53.84615385
57	53.84615385
59	50
61	53.84615385
63	53.84615385
65	57.69230769
67	57.69230769
69	57.69230769
71	57.69230769
73	57.69230769
75	57.69230769
77	53.84615385

79	53.84615385
81	50
83	50
85	46.15384615
87	42.30769231
89	42.30769231
91	50
93	50
95	50
97	50
99	50
101	50

Test Set:

Row Labels	Accuracy (%)
1	50
3	50
5	58.33333333
7	62.5
9	62.5
11	62.5
13	62.5
15	62.5
17	62.5
19	62.5
21	62.5
23	62.5
25	62.5
27	62.5
29	54.16666667
31	54.16666667
33	54.16666667
35	62.5
37	62.5
39	62.5
41	62.5
43	58.33333333
45	58.33333333
47	58.33333333
49	58.33333333

51	54.16666667
53	54.16666667
55	54.16666667
57	54.16666667
59	54.16666667
61	54.16666667
63	50
65	45.83333333
67	45.83333333
69	45.83333333
71	45.83333333
73	45.83333333
75	45.83333333
77	50
79	50
81	50
83	54.16666667
85	45.83333333
87	50
89	50
91	45.83333333
93	45.83333333
95	50
97	50
99	50
101	50