Ryan Smith

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 |