**SUMMARY:**

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| --- | --- | --- | --- | --- | --- | --- |
| **Sampling#** | **Train/Test**  **Percent**  **split** | **Neural Net Accuracy** | **Decision**  **Tree**  **Accuracy** | **SVM Accuracy** | **Perceptron Accuracy** | **Naïve Bayes Accuracy** |
| 1. | 80/20 | 99.42% | 88.73% | 74.64% | 98.97% | 92.95% |
| 2. | 80/20 | 99.32% | 91.54% | 83.09% | 98.20% | 94.36% |
| 3. | 80/20 | 99.37% | 83.09% | 77.46% | 99.61% | 87.32% |
| 4. | 80/20 | 99.30% | 81.69% | 77.46% | 99.11% | 85.91% |
| 5. | 80/20 | 99.30% | 84.50% | 70.42 | 99.58% | 84.50% |

As we can see from the above results, the best classifier for the dataset- “ionosphere” comes out to be the Neural Net classifier. It gives consistent accuracy of **99%** and more always. Since the **Neural Net** consist of interconnected perceptron with hidden layers, it gives us a better accuracy than Perceptron **when data is more complicated and not linearly separable** and hence, acts as a powerful classifier.

Here, **SVMs do not perform well**. It is because of highly imbalanced data sets. In training data sets when the number of samples that fall in one of the classes far outnumber those that are a member of the other class, SVM do not act as a good classifier.

Considering the relevant papers for this dataset, the accuracy of backprop and the perceptron training algorithm on this database, using the first 200 instances for training, which were carefully split almost 50% positive and 50% negative, came out to be 90.7% for “linear” perceptron, and 92% for a "non-linear" perceptron. While backprop yielded 96% accuracy on the remaining 150 test instances, consisting of 123 "good" and only 24 "bad" instances. Accuracy on "good" instances was much higher than for "bad" instances.

On the other hand, our performance metrics shows than the accuracy of “linear” perceptron is 98% and Neural Net is 99% on this dataset. I think these metrics are fare enough since we gave the parameter- Cost of high value. For even better accuracy, we can use more training data and change the value of “threshold”, “hidden layers” ,”stepmax” and “cost” parameters.

