The nine given classifiers were successfully executed over 10 different datasets ensuring the 10 X 10 Fold Cross Validation. Their performance will be analyzed one by one via each of the three performance measures, which are Accuracy, F1 measure and Area Under the ROC Curve (AUC). Then for each of the performance measure, the WIN-TIE-LOSE table including the t-test results will further be used to analyze which classifier(s) stands out as best among the others. It is important to note that all datasets were first converted into a binary class problem.

All of the work (Accuracy, F1 measure, AUC, WIN-TIE-LOSE and t-test tables) is accomplished via Python only and the results of each are written out, via the same code, to a CSV file named ‘Results’ (can be opened via MS EXCEL). Let’s start off with the first Accuracy table given below:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Accuracy** | |  |  |  |  |
| **Datasets** | Bagging with DT | Random Forest | AdaBoost | 3NN | Linear SVM | RBF SVM | Naive Bayes | Decision Tree | Stacking |
|  |  |  |  |  |  |  |  |  |  |
| Abalone | 0.9824 | 0.9843 | 0.984 | 0.9835 | **0.9852** | **0.9852** | 0.8207 | 0.9733 | 0.9837 |
|  | (0.0006) | (0.0004) | (0) | (0) | (0) | (0) | (0) | 0.0008 | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Balance Scale | 0.9179 | 0.9203 | **0.9216** | 0.9169 | **0.9216** | **0.9216** | **0.9216** | 0.9168 | 0.9169 |
|  | (0.0027) | (0.002) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| CMC | 0.6964 | 0.7061 | 0.7383 | 0.7214 | **0.7736** | 0.7424 | 0.678 | 0.666 | 0.72 |
|  | (0.007) | (0.004) | (0) | (0) | (0) | (0) | (0) | (0.0042) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Glass | 0.8848 | 0.8908 | 0.8781 | 0.8597 | **0.919** | **0.919** | 0.4491 | 0.8356 | 0.8688 |
|  | (0.0066) | (0.0071) | (0) | (0) | (0) | (0) | (0) | (0.0111) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Housing | 0.7608 | 0.763 | 0.7729 | 0.7612 | **0.7907** | **0.7907** | 0.5585 | 0.7042 | 0.7612 |
|  | (0.0116) | (0.009) | (0) | (0 | (0) | (0) | (0) | (0.0129) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Haberman | 0.6287 | 0.6418 | 0.6333 | 0.6302 | **0.7355** | 0.7225 | **0.7355** | 0.5873 | 0.6072 |
|  | (0.0165) | (0.0137) | (0) | (0) | (0) | (0) | (0) | (0.0099) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| HSLog | 0.793 | 0.7841 | 0.7667 | 0.6519 | 0.8185 | 0.5519 | **0.8333** | 0.7607 | 0.6519 |
|  | (0.0129) | (0.0238) | (0) | (0) | (0) | (0) | (0) | (0.0069) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Ionosphere | 0.906 | 0.9228 | 0.9203 | 0.8407 | 0.8635 | **0.9232** | 0.866 | 0.8738 | 0.8379 |
|  | (0.0059) | (0.0059) | (0) | (0) | (0) | (0) | (0) | (0.0074) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Nursery | 0.9725 | 0.9741 | 0.9676 | 0.9738 | **0.9747** | **0.9747** | 0.9738 | **0.9747** | 0.9738 |
|  | (0.0006) | (0.0003) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Phenome | 0.8877 | **0.8887** | 0.8164 | 0.8825 | 0.7731 | 0.8218 | 0.7174 | 0.8636 | 0.8829 |
|  | (0.0036) | (0.0027) | (0) | (0) | (0) | (0) | (0) | (0.0012) | (0) |

**Table 1:** Accuracy comparison of 9 classifiers for 10 different datasets. The standard deviations are shown in parenthesis.

The above table illustrates the fact that Linear SVM and RBF SVM stand out as consistently best classifiers among the rest of the pool for the 10 datasets. However, the rest of the classifiers are just a little far from the best results. Therefore, the competition is really tough and all can be termed as good classifiers. The places where standard deviations are zero, means that even rounding the values resulted in zero meaning the predictions are intensively similar.

Now let’s evaluate the F1 Measure table given below:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **F1-Measure** | |  |  |  |  |
| **Datasets** | Bagging with DT | Random Forest | AdaBoost | 3NN | Linear SVM | RBF SVM | Naive Bayes | Decision Tree | Stacking |
|  |  |  |  |  |  |  |  |  |  |
| Abalone | 0.991 | 0.992 | 0.9918 | 0.9916 | **0.9924** | **0.9924** | 0.8991 | 0.9863 | 0.9917 |
|  | (0.0003) | (0.0002) | (0) | (0) | (0) | (0) | (0) | (0.0004) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Balance Scale | 0.9571 | 0.9584 | **0.9592** | 0.9565 | **0.9592** | **0.9592** | **0.9592** | 0.9565 | 0.9565 |
|  | (0.0015) | (0.0011) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| CMC | 0.7462 | 0.7554 | 0.7877 | 0.7658 | **0.8118** | 0.7903 | 0.7223 | 0.7205 | 0.7645 |
|  | (0.0038) | (0.0027) | (0) | (0) | (0) | (0) | (0) | (0.0026) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Glass | 0.9281 | 0.9314 | 0.9242 | 0.9141 | **0.9465** | **0.9465** | 0.5311 | 0.8981 | 0.9194 |
|  | (0.0034) | (0.0038) | (0) | (0) | (0) | (0) | (0) | (0.0075) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Housing | 0.8434 | 0.847 | 0.855 | 0.8467 | **0.8791** | **0.8791** | 0.5566 | 0.8007 | 0.8467 |
|  | (0.0096) | (0.0066) | (0) | (0) | (0) | (0) | (0) | (0.0098) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Haberman | 0.7277 | 0.742 | 0.7169 | 0.7412 | **0.8441** | 0.8349 | **0.8441** | 0.6766 | 0.7213 |
|  | (0.0172) | (0.0116) | (0) | (0) | (0) | (0) | (0) | (0.009) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| HSLog | 0.8123 | 0.803 | 0.7955 | 0.693 | 0.8404 | 0.7094 | **0.8513** | 0.7864 | 0.693 |
|  | (0.0121) | (0.0214) | (0) | (0) | (0) | (0) | (0) | (0.0054) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Ionosphere | 0.915 | 0.9289 | 0.9318 | 0.8722 | 0.8856 | **0.9334** | 0.8941 | 0.8908 | 0.8699 |
|  | (0.0057) | (0.0055) | (0) | (0) | (0) | (0) | (0) | (0.0063) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Nursery | 0.9857 | 0.9865 | 0.9824 | 0.9864 | **0.9869** | **0.9869** | 0.9864 | **0.9869** | 0.9864 |
|  | (0.0003) | (0.0002) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Phenome | 0.8 | **0.8016** | 0.675 | 0.7931 | 0.5994 | 0.6999 | 0.6072 | 0.7664 | 0.793 |
|  | (0.0065) | (0.0049) | (0) | (0) | (0) | (0) | (0) | (0.0019) | (0) |

**Table 2:** F1-measure comparison of 9 classifiers for 10 different datasets. The standard deviations are shown in parenthesis.

The above table illustrates the similar results as that obtained from the accuracy table that is Linear and RBF SVM are consistently correct in classifying the positive cases. Yet other classifiers like Naïve Bayes etc. are also very close to the best classifiers and thus, they all can be regarded as very good classifiers again.

Now let’s evaluate the AUC measure table given below:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **AUC** |  |  |  |  |  |
| **Datasets** | Bagging with DT | Random Forest | AdaBoost | 3NN | Linear SVM | RBF SVM | Naive Bayes | Decision Tree | Stacking |
|  |  |  |  |  |  |  |  |  |  |
| Abalone | 0.7001 | 0.7006 | 0.6994 | 0.6991 | 0.7 | 0.7 | **0.7312** | 0.7191 | 0.6993 |
|  | (0.002) | (0.0014) | (0) | (0) | (0) | (0) | (0) | (0.0052) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Balance Scale | 0.4989 | 0.5005 | 0.5 | **0.5091** | 0.5 | 0.5 | 0.5 | 0.4974 | **0.5091** |
|  | (0.0029) | (0.003) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| CMC | 0.777 | 0.7746 | 0.7643 | 0.7783 | 0.75 | 0.7626 | **0.7915** | 0.7814 | 0.7753 |
|  | (0.0033) | (0.0042) | (0) | (0) | (0) | (0) | (0) | (0.0025) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Glass | 0.9021 | 0.9023 | 0.92 | 0.9 | 0.9 | 0.9 | 0.9192 | **0.9164** | 0.9 |
|  | (0.0028) | (0.0043) | (0) | (0) | (0) | (0) | (0) | (0.0088) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Housing | **0.5806** | 0.5691 | 0.5779 | 0.5513 | 0.5 | 0.5 | 0.5505 | 0.5441 | 0.5513 |
|  | (0.01) | (0.0117) | (0) | (0) | (0) | (0) | (0) | (0.0142) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Haberman | **0.5394** | 0.5392 | 0.4885 | 0.5133 | 0.5 | 0.4956 | 0.5 | 0.5322 | 0.5027 |
|  | (0.0142) | (0.0139) | (0) | (0) | (0) | (0) | (0) | (0.0053) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| HSLog | 0.7926 | 0.7853 | 0.7659 | 0.6457 | 0.8122 | 0.4967 | **0.831** | 0.7549 | 0.6457 |
|  | (0.013) | (0.0255) | (0) | (0) | (0) | (0) | (0) | (0.0082) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Ionosphere | 0.9156 | **0.9298** | 0.9278 | 0.8453 | 0.8677 | 0.925 | 0.8974 | 0.8872 | 0.8425 |
|  | (0.0065) | (0.0061) | (0) | (0) | (0) | (0) | (0) | (0.0085) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Nursery | 0.8076 | 0.803 | **0.8312** | 0.8047 | 0.8 | 0.8 | 0.8029 | 0.8 | 0.8066 |
|  | (0.002) | (0.002) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
|  |  |  |  |  |  |  |  |  |  |
| Phenome | **0.852** | **0.8528** | 0.7687 | 0.8487 | 0.7169 | 0.7895 | 0.7263 | 0.8345 | 0.8482 |
|  | (0.0044) | (0.0035) | (0) | (0) | (0) | (0) | (0) | (0.0014) | (0) |

**Table 3:** AUC comparison of 9 classifiers for 10 different datasets. The standard deviations are shown in parenthesis.

The above table illustrates a different yet intriguing find. There are new faces here, like Bagging, Random Forest and Naïve Bayes which are performing more than average over the 10 datasets. Even AdaBoost, 3NN, Decision Tree and Stacked (5Means and 3NN) are performing better than Linear and RBF SVM. Thus, as stated prior, all classifiers are performing great.

It’s time to move our focus to the WIN-TIE-LOSE for every respective performance measure. Let’s look at the Accuracy table for it given below:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **WIN,TIE,LOSE** | **-** | **Accuracy** |  |  |  |  |
|  | Bagging with DT | Random Forest | AdaBoost | 3NN | Linear SVM | RBF SVM | Naive Bayes | Decision Tree | Stacking |
| Bagging with DT | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [1, 0, 9] | [4, 0, 6] | [5, 1, 4] | [2, 0, 8] | [2, 0, 8] | [6, 0, 4] | [9, 0, 1] | [6, 1, 3] |
| p | 0 | 0.931567424 | 0.952917065 | 0.70768 | 0.79315 | 0.894076 | 0.18540932 | 0.630540914 | 0.690089 |
| t | 0 | -0.08708245 | 0.059872313 | 0.38098 | -0.266148 | 0.135044 | 1.376961716 | 0.489296571 | 0.405223 |
| Random Forest | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [6, 1, 3] | [7, 2, 1] | [2, 0, 8] | [2, 1, 7] | [6, 1, 3] | [9, 0, 1] | [7, 2, 1] |
| p | 0 | 0 | 0.882898669 | 0.6456 | 0.8666985 | 0.831084 | 0.162659223 | 0.572712831 | 0.629766 |
| t | 0 | 0 | 0.149400693 | 0.46771 | -0.170268 | 0.216433 | 1.455834155 | 0.574541347 | 0.490413 |
| AdaBoost |  |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [7, 1, 2] | [2, 1, 7] | [1, 1, 8] | [6, 1, 3] | [8, 0, 2] | [7, 1, 2] |
| p | 0 | 0 | 0 | 0.7443 | 0.7365132 | 0.935246 | 0.1940659 | 0.66320049 | 0.725404 |
| t | 0 | 0 | 0 | 0.33122 | -0.341728 | 0.082389 | 1.348993812 | 0.442779265 | 0.356781 |
| 3NN |  |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [1, 0, 9] | [2, 0, 8] | [5, 1, 4] | [6, 1, 3] | [3, 5, 2] |
| p | 0 | 0 | 0 | 0 | 0.5046252 | 0.825907 | 0.318492462 | 0.910455711 | 0.976016 |
| t | 0 | 0 | 0 | 0 | -0.68086 | -0.22318 | 1.025979314 | 0.114056333 | 0.030484 |
| Linear SVM | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [3, 5, 2] | [6, 2, 2] | [7, 1, 2] | [9, 0, 1] |
| p | 0 | 0 | 0 | 0 | 0 | 0.700223 | 0.105779614 | 0.43918603 | 0.492916 |
| t | 0 | 0 | 0 | 0 | 0 | 0.391225 | 1.702963385 | 0.791099843 | 0.699935 |
| RBF SVM |  |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [7, 1, 2] | [7, 1, 2] | [8, 0, 2] |
| p | 0 | 0 | 0 | 0 | 0 | 0 | 0.249726581 | 0.746585062 | 0.806312 |
| t | 0 | 0 | 0 | 0 | 0 | 0 | 1.189424167 | 0.328149469 | 0.248826 |
| Naive Bayes | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [4, 0, 6] | [4, 1, 5] |
| p | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.375288684 | 0.33732 |
| t | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.90914083 | -0.98575 |
| Decision Tree | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [3, 1, 6] |
| p | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.935312 |
| t | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.08231 |
|  |  |  |  |  |  |  |  |  |  |

**Table 4:** WIN-TIE-LOSE (s) with p and t values (from the t-test) of 9 classifiers accuracies for 10 different datasets.

From the table above, we can see the similar results. Linear and RBF again outperforming the rest of the classifiers yet again the remaining classifier performance are far beyond average and mostly near the state top two classifiers.

Let’s evaluate the WIN-TIE-LOSE table for F1-measure now:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | | **WIN,TIE,LOSE** | **-** | **FMeasure** |  |  |  |  |
|  | Bagging with DT | | Random Forest | AdaBoost | 3NN | Linear SVM | RBF SVM | Naive Bayes | Decision Tree | Stacking |
| Bagging with DT | |  | |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [1, 1, 8] | | [5, 0, 5] | [5, 1, 4] | [2, 0, 8] | [2, 0, 8] | [6, 1, 3] | [9, 0, 1] | [6, 1, 3] |
| p | 0 | 0.927809326 | | 0.856021805 | 0.75233 | 0.9361335 | 0.956836 | 0.18197714 | 0.619373755 | 0.726752 |
| t | 0 | -0.091878588 | | 0.184062924 | 0.32044 | -0.081258 | -0.05488 | 1.388340658 | 0.505453227 | 0.35495 |
| Random Forest | |  | |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | | [5, 1, 4] | [6, 3, 1] | [2, 1, 7] | [2, 1, 7] | [6, 1, 3] | [9, 0, 1] | [6, 3, 1] |
| p | 0 | 0 | | 0.790166462 | 0.68595 | 0.9986753 | 0.975766 | 0.161727858 | 0.559546323 | 0.662111 |
| t | 0 | 0 | | 0.27008582 | 0.41096 | 0.0016835 | 0.030802 | 1.459249965 | 0.594546843 | 0.444315 |
| AdaBoost |  |  | |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | | [0, 0, 0] | [6, 1, 3] | [2, 2, 6] | [1, 2, 7] | [6, 1, 3] | [8, 0, 2] | [6, 1, 3] |
| p | 0 | 0 | | 0 | 0.90576 | 0.8086829 | 0.824251 | 0.24735818 | 0.768847001 | 0.878467 |
| t | 0 | 0 | | 0 | 0.12006 | -0.245715 | -0.22534 | 1.195622446 | 0.298357616 | 0.155103 |
| 3NN |  |  | |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | | [0, 0, 0] | [0, 0, 0] | [1, 1, 8] | [1, 1, 8] | [5, 1, 4] | [6, 1, 3] | [3, 6, 1] |
| p | 0 | 0 | | 0 | 0 | 0.7140433 | 0.726729 | 0.274903791 | 0.853380401 | 0.97021 |
| t | 0 | 0 | | 0 | 0 | -0.372264 | -0.35498 | 1.126123896 | 0.187481353 | 0.037868 |
| Linear SVM | |  | |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [3, 5, 2] | [5, 2, 3] | [7, 1, 2] | [8, 1, 1] |
| p | 0 | 0 | | 0 | 0 | 0 | 0.979122 | 0.18388881 | 0.594359239 | 0.691192 |
| t | 0 | 0 | | 0 | 0 | 0 | 0.026536 | 1.381981705 | 0.54215717 | 0.403695 |
| RBF SVM |  |  | |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [7, 1, 2] | [7, 1, 2] | [8, 1, 1] |
| p | 0 | 0 | | 0 | 0 | 0 | 0 | 0.183453337 | 0.602860655 | 0.703024 |
| t | 0 | 0 | | 0 | 0 | 0 | 0 | 1.383425569 | 0.529600224 | 0.387371 |
| Naive Bayes | |  | |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [5, 0, 5] | [4, 1, 5] |
| p | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0.347243646 | 0.29076 |
| t | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | -0.96518084 | -1.08844 |
| Decision Tree | |  | |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [3, 1, 6] |
| p | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0.883864 |
| t | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | -0.14816 |

**Table 5:** WIN-TIE-LOSE (s) with p and t values (from the t-test) of 9 classifiers F-measures for 10 different datasets.

The above table illustrates similar results as that obtained from the Accuracy WIN-TIE-LOSE table that is Linear and RBF SVM are consistently correct in classifying the positive cases. Yet other classifiers like Naïve Bayes etc. are also very close to the best classifiers and thus, they all can be regarded as very good classifiers again.

Let’s evaluate the WIN-TIE-LOSE table for AUC now:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **WIN,TIE,LOSE** | **-** | **AUC** |  |  |  |  |
|  | Bagging with DT | Random Forest | AdaBoost | 3NN | Linear SVM | RBF SVM | Naive Bayes | Decision Tree | Stacking |
| Bagging with DT | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [4, 2, 4] | [6, 0, 4] | [8, 0, 2] | [7, 1, 2] | [7, 1, 2] | [5, 0, 5] | [7, 0, 3] | [9, 0, 1] |
| p | 0 | 0.989908748 | 0.861331092 | 0.68959 | 0.6448041 | 0.504177 | 0.867871115 | 0.885355715 | 0.674897 |
| t | 0 | 0.012824674 | 0.177198602 | 0.40591 | 0.4688516 | 0.681586 | 0.168755116 | 0.146241998 | 0.426365 |
| Random Forest | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [6, 1, 3] | [7, 0, 3] | [8, 1, 1] | [9, 1, 0] | [4, 2, 4] | [7, 0, 3] | [7, 1, 2] |
| p | 0 | 0 | 0.872130451 | 0.70149 | 0.6564462 | 0.514592 | 0.878681784 | 0.896265163 | 0.686762 |
| t | 0 | 0 | 0.163262956 | 0.38948 | 0.4523144 | 0.664823 | 0.15482546 | 0.132235274 | 0.409837 |
| AdaBoost |  |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [5, 1, 4] | [6, 1, 3] | [6, 1, 3] | [5, 1, 4] | [6, 0, 4] | [5, 1, 4] |
| p | 0 | 0 | 0 | 0.83073 | 0.7808967 | 0.621064 | 0.992952472 | 0.973275865 | 0.814857 |
| t | 0 | 0 | 0 | 0.2169 | 0.2823492 | 0.503 | -0.00895636 | -0.03396882 | 0.237623 |
| 3NN |  |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [6, 1, 3] | [7, 1, 2] | [5, 0, 5] | [4, 0, 6] | [4, 5, 1] |
| p | 0 | 0 | 0 | 0 | 0.9432092 | 0.757902 | 0.822930283 | 0.80018781 | 0.982419 |
| t | 0 | 0 | 0 | 0 | 0.0722379 | 0.312968 | -0.22706737 | -0.25687592 | 0.022344 |
| Linear SVM | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [2, 5, 3] | [0, 2, 8] | [2, 1, 7] | [3, 1, 6] |
| p | 0 | 0 | 0 | 0 | 0 | 0.812199 | 0.773206893 | 0.750580842 | 0.960609 |
| t | 0 | 0 | 0 | 0 | 0 | 0.241104 | -0.29255631 | -0.3227804 | -0.05008 |
| RBF SVM |  |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [2, 1, 7] | [2, 1, 7] | [2, 1, 7] |
| p | 0 | 0 | 0 | 0 | 0 | 0 | 0.614002711 | 0.592750965 | 0.774036 |
| t | 0 | 0 | 0 | 0 | 0 | 0 | -0.51327297 | -0.54454262 | -0.29145 |
| Naive Bayes | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [8, 0, 2] | [5, 0, 5] |
| p | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.980358354 | 0.807068 |
| t | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.0249640 | 0.247834 |
| Decision Tree | |  |  |  |  |  |  |  |  |
| s | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [0, 0, 0] | [6, 0, 4] |
| p | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.784276 |
| t | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.277874 |

**Table 6:** WIN-TIE-LOSE (s) with p and t values (from the t-test) of 9 classifiers AUC for 10 different datasets.

The above table illustrates and compliments the interesting find back in the AUC table 3. There are new faces here, like Bagging, Random Forest and Naïve Bayes which are performing more than average over the 10 datasets. Even AdaBoost, 3NN, Decision Tree and Stacked (5Means and 3NN) are performing better than Linear and RBF SVM. Thus, as stated prior, all classifiers are performing great.