**CSE 512 Project**

| Tools | Numerical | Image |  |
| --- | --- | --- | --- |
| SVM-Poly |  | TIME |  |
| SVM-RBF |  | TIME |  |
| SVM-Sigmoid |  | TIME |  |
| Random Forest |  | TIME |  |
| ANN | TIME | TIME | It is hard to find the hyperparameters |

Remarks:

1.Parameters (different for numerical and for image)

2.It takes quite a lot of time to run on mages!

3.CSV or TXT? It seems like CSV is better? If so, we use CSV.

To-do list:

1.Code to calculate Accuracy, F1-Score, and AUC/ROC

Input: CSV file (or TXT) containing classification results of each tool with each modality, 10 in total.

2.Code to grid search for SVM. Need to run once for numerical and once for **image**.

3.Code to grid search for Random Forest. Need to run once for numerical and once for image.

4.Code to grid search for ANN. How many hidden layers? How many nodes in each hidden layer? Need to run once for numerical and once for image.

5.Code to train and test for SVM with parameters found in 2. Need to run once for numerical and once for image. Need to write the final classification (numerical) score for each sample into a CSV file such that we can analyze the false positive, false negative, and efficiency of the features.

6.Code to train and test for Random Forest with parameters found in 3. Need to run once for numerical and once for image. Need to write the final classification (numerical) score for each sample into a CSV file such that we can analyze the false positive, false negative, and efficiency of the features.

7.Code to train and test for ANN with parameters found in 4. Need to run once for numerical and once for image. Need to write the final classification (numerical) score for each sample into a CSV file such that we can analyze the false positive, false negative, and efficiency of the features.

8.Analysis.

9.Poster:

1).Sample images

2).Feature explanation

The following is about results:

A.One table to show the numerical results, including

A1).Accuracy, F1-Score, AUC/ROC

A2).Numerical and Image

A3).SVM-poly, SVM-Sigmoid, SVM-RBF, Random Forest, ANN

|  |  | SVM-Poly | SVM-BRF | SVM-SIG | Random Forest | ANN |
| --- | --- | --- | --- | --- | --- | --- |
| Numerical Feature | Accuracy |  |  |  | 0.9740 |  |
| F1-Score |  |  |  | 0.9736 |  |
| AUC/ROC |  |  |  | 0.9943 |  |
| Image | Accuracy |  |  |  | 0.8646 |  |
| F1-Score |  |  |  | 0.8684 |  |
| AUC/ROC |  |  |  | 0.9362 |  |

B.ROC curves:

B1).All ROC curves of Numerical tests (five in total) on one plot

B2).All ROC curves of Image tests (Five in total) on one plot

B3).ROC curve Random Forest: Numerical vs Image on one plot

B4).ROC curve SVM Poly: Numerical vs Image on one plot

B5).ROC curve SVM RBF: Numerical vs Image on one plot

B6).ROC curve SVM Sigmoid: Numerical vs Image on one plot

B7).ROC curve CNN: Numerical vs Image on one plot

10.Final report.