**Bagging**: For the mushroom dataset, used self-implemented bagging and boosting algorithm that uses id3 and computed the confusion matrix on the test set for tree depths 3, 5 and bag size 5, 10.

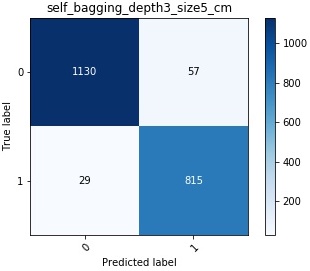
**Scikit Learner**: For mushroom, used scikit-learn’s BaggingClassifier and AdaBoostClassifier that use DecisionTreeClassifier to learn a tree using criterion=’entropy’ and computed the confusion matrix on the test set for stump depths 1, 2 and ensemble size 5, 10.

***Self-implementation on mushroom***

**Bagging**

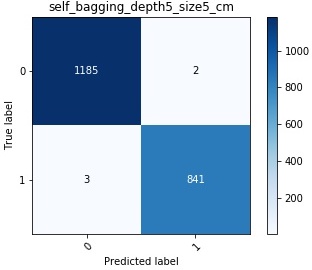
Bag Size 5 | Tree Depth 3

(tn, fp, fn, tp) = (1130, 57, 29, 815)



Bag Size 5 | Tree Depth 5

(tn, fp, fn, tp) = (1185, 2, 3, 841)

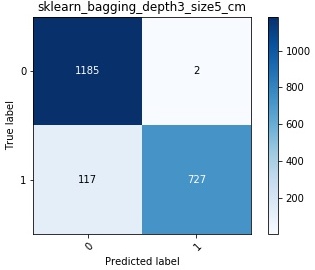


***Scikit-learn's implementation on mushroom***

**Bagging**

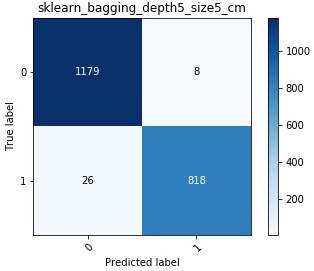
Bag Size 5 | Tree Depth 3

(tn, fp, fn, tp) = (1185, 2, 117, 727)



Bag Size 5 | Tree Depth 5

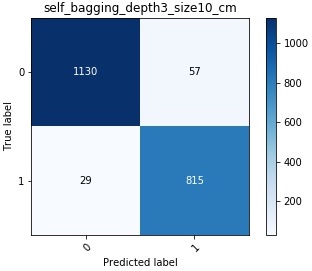
(tn, fp, fn, tp) = (1179, 8, 26, 818)



***Self-implementation on mushroom***

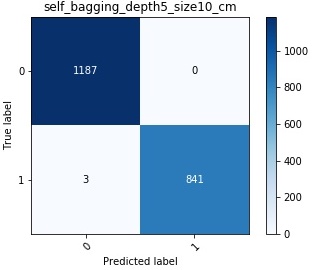
Bag Size 10 | Tree Depth 3

(tn, fp, fn, tp) = (1130, 57, 29, 815)



Bag Size 10 | Tree Depth 5

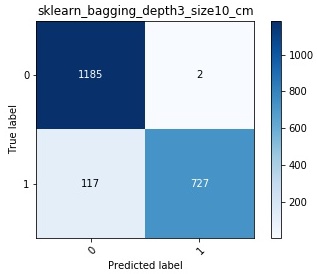
(tn, fp, fn, tp) = (1187, 0, 3, 841)



***Scikit-learn's implementation on mushroom***

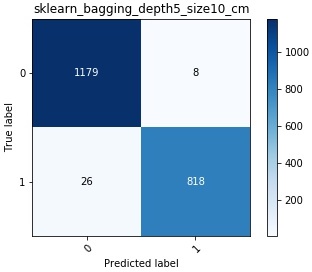
Bag Size 10 | Tree Depth 3

(tn, fp, fn, tp) = (1185, 2, 117, 727)



Bag Size 10 | Tree Depth 5

(tn, fp, fn, tp) = (1179, 8, 26, 818)

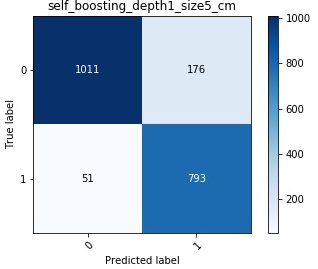


***Self-implementation on mushroom***

**Boosting**

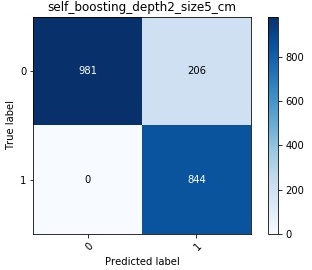
Ensemble Size 5 | Stump Depth 1

(tn, fp, fn, tp) = (1011, 176, 51, 793)



Ensemble Size 5 | Stump Depth 2

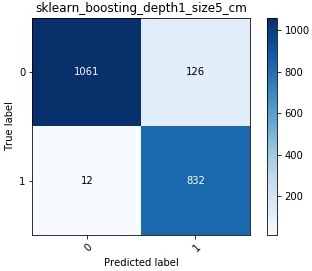
(tn, fp, fn, tp) = (981, 206, 0, 844)

  
***Scikit-learn's implementation on mushroom***

**Boosting**

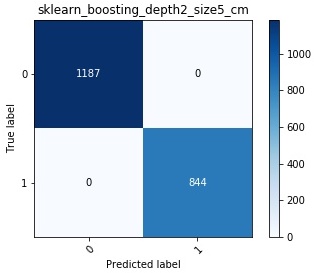
Ensemble Size 5 | Stump Depth 1

(tn, fp, fn, tp) = (1061, 126, 12, 832)



Ensemble Size 5 | Stump Depth 2

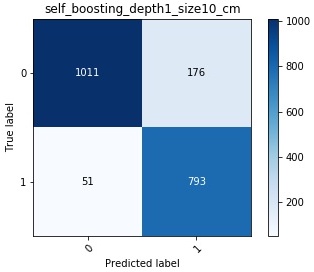
(tn, fp, fn, tp) = (1187, 0, 0, 844)



***Self-implementation on mushroom***

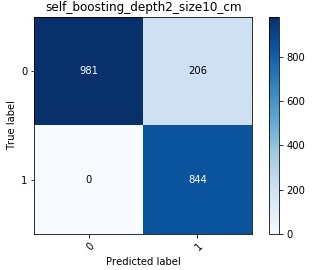
Ensemble Size 10 | Stump Depth 1

(tn, fp, fn, tp) = (1011, 176, 51, 793)



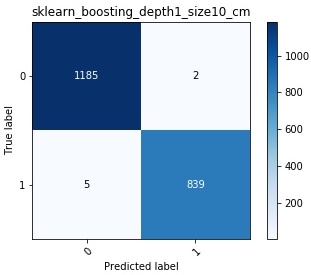
Ensemble Size 10 | Stump Depth 2

(tn, fp, fn, tp) = (981, 206, 0, 844)

  
***Scikit-learn's implementation on mushroom***

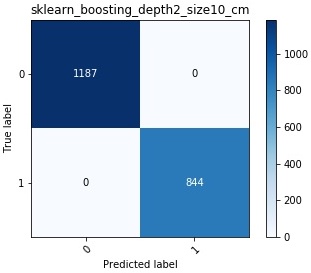
Ensemble Size 10 | Stump Depth 1

(tn, fp, fn, tp) = (1185, 2, 5, 839)



Ensemble Size 10 | Stump Depth 2

(tn, fp, fn, tp) = (1187, 0, 0, 844)



***Bagging*** on mushroom dataset

﻿Bag Size 5 | Tree Depth 3

**tn fp fn tp Accuracy Remarks**

**Self** 1130 57 29 815 95.76% classifies Positives better

**Scikit** 1185 2 117 727 94.14% classifies Negatives better

Bag Size 5 | Tree Depth 5:

**tn fp fn tp Accuracy Remarks**

**Self** 1185 2 3 841 99.75% classifies both Positives and negatives better

**Scikit** 1179 8 26 818 98.32% -

Bag Size 10 | Tree Depth 3:

**tn fp fn tp Accuracy Remarks**

**Self** 1130 57 29 815 95.76% classifies Positives better

**Scikit** 1185 2 117 727 94.14% classifies Negatives better

Bag Size 10 | Tree Depth 5: ()

**tn fp fn tp Accuracy Remarks**

**Self** 1187 0 3 841 99.85% classifies both Positives and negatives better

**Scikit** 1179 8 26 818 98.32% -

***Boosting*** on mushroom dataset

Ensemble Size 5 | Stump Depth 1:

**tn fp fn tp Accuracy Remarks**

**Self** 1011 176 51 793 88.82% -

**Scikit** 1061 126 12 832 93.20% classifies both Positives and negatives better

Ensemble Size 5 | Stump Depth 2:

**tn fp fn tp Accuracy Remarks**

**Self** 981 206 0 844 89.85% classifies negatives accurately

**Scikit** 1187 0 0 844 100% 100% accurate overall classification

Ensemble Size 10 | Stump Depth 1:

**tn fp fn tp Accuracy Remarks**

**Self** 1011 176 51 793 88.82% -

**Scikit** 1185 2 5 839 99.65% classifies both Positives and negatives better

Ensemble Size 10 | Stump Depth 2: ()

**tn fp fn tp Accuracy Remarks**

**Self** 981 206 0 844 89.86% classifies negatives accurately

**Scikit** 1187 0 0 844 100% 100% accurate overall classification