

```
1 "C:\Users\My PC\AppData\Local\Programs\Python\Python36-32\  
2 python.exe" D:/pfe/Projets/pfe/apprentissage_HBR.py  
3  
4  
5 -----Decision Tree-----  
6  
7  
8  
9 dataset/HBR/taken/HBR_del.csv  
10  
11  
12  
13 count 97  
14 unique 2  
15 top False  
16 freq 51  
17 Name: is_code_smell, dtype: object  
18 [[18 0]  
19 [ 0 12]]  
20 the recall for this model is : 1.0  
21 TP 12  
22 TN 18  
23 FP 0  
24 FN 0  
25  
26 -----Classification Report  
-----  
27 precision recall f1-score support  
28  
29 False 1.00 1.00 1.00 18  
30 True 1.00 1.00 1.00 12  
31  
32 micro avg 1.00 1.00 1.00 30  
33 macro avg 1.00 1.00 1.00 30  
34 weighted avg 1.00 1.00 1.00 30  
35  
36 Precision = 1.0  
37 Rappel= 1.0  
38 F_Mesure= 1.0  
39  
40  
41  
42 -----Decision Tree-----  
43
```

```
44
45
46 dataset/HBR/taken/HBR_RandomUnderSampler.csv
47
48
49
50 count         92
51 unique        2
52 top           True
53 freq          46
54 Name: is_code_smell, dtype: object
55 [[16  0]
56 [ 0 12]]
57 the recall for this model is : 1.0
58 TP 12
59 TN 16
60 FP 0
61 FN 0
62
63 -----Classification Report
-----
64              precision    recall   f1-score   support
65
66      False       1.00     1.00      1.00      16
67      True        1.00     1.00      1.00      12
68
69  micro avg     1.00     1.00      1.00      28
70  macro avg     1.00     1.00      1.00      28
71 weighted avg   1.00     1.00      1.00      28
72
73 Precision =  1.0
74 Rappel=  1.0
75 F_Mesure= 1.0
76
77
78
79 -----Decision Tree-----
80
81
82
83 dataset/HBR/taken/HBR_AllKNN.csv
84
85
86
87 count         95
```

```
88 unique      2
89 top        False
90 freq       49
91 Name: is_code_smell, dtype: object
92 [[15  0]
93 [ 0 14]]
94 the recall for this model is : 1.0
95 TP 14
96 TN 15
97 FP 0
98 FN 0
99
100 -----Classification Report
-----
101              precision    recall   f1-score   support
102
103      False       1.00     1.00      1.00      15
104      True       1.00     1.00      1.00      14
105
106  micro avg     1.00     1.00      1.00      29
107  macro avg     1.00     1.00      1.00      29
108 weighted avg   1.00     1.00      1.00      29
109
110 Precision = 1.0
111 Rappel= 1.0
112 F_Mesure= 1.0
113
114
115
116 -----Decision Tree-----
117
118
119
120 dataset/HBR/taken/HBR_InstanceHardnessThreshold.csv
121
122
123
124 count      92
125 unique      2
126 top        True
127 freq       46
128 Name: is_code_smell, dtype: object
129 [[13  0]
130 [ 0 15]]
131 the recall for this model is : 1.0
```

```
132 TP 15
133 TN 13
134 FP 0
135 FN 0
136
137 -----Classification Report
-----
138             precision    recall   f1-score   support
139
140      False        1.00     1.00      1.00      13
141      True         1.00     1.00      1.00      15
142
143  micro avg     1.00     1.00      1.00      28
144  macro avg     1.00     1.00      1.00      28
145 weighted avg   1.00     1.00      1.00      28
146
147 Precision =  1.0
148 Rappel=  1.0
149 F_Mesure= 1.0
150
151
152
153 -----Decision Tree-----
154
155
156
157 dataset/HBR/taken/HBR_NearMiss.csv
158
159
160
161 count         92
162 unique        2
163 top           True
164 freq          46
165 Name: is_code_smell, dtype: object
166 [[13  0]
167 [ 0 15]]
168 the recall for this model is : 1.0
169 TP 15
170 TN 13
171 FP 0
172 FN 0
173
174 -----Classification Report
-----
```

	precision	recall	f1-score	support
175				
176				
177	False	1.00	1.00	1.00
178	True	1.00	1.00	1.00
179				
180	micro avg	1.00	1.00	1.00
181	macro avg	1.00	1.00	1.00
182	weighted avg	1.00	1.00	1.00
183				
184	Precision = 1.0			
185	Rappel= 1.0			
186	F_Mesure= 1.0			
187				
188				
189				
190	-----Decision Tree-----			
191				
192				
193				
194	dataset/HBR/taken/HBR_OneSidedSelection.csv			
195				
196				
197				
198	count	96		
199	unique	2		
200	top	False		
201	freq	50		
202	Name: is_code_smell, dtype: object			
203	[[12 0]			
204	[1 16]]			
205	the recall for this model is : 0.9411764705882353			
206	TP 16			
207	TN 12			
208	FP 0			
209	FN 1			
210				
211	-----Classification Report			
212				
213				
214	precision	recall	f1-score	support
215	False	0.92	1.00	0.96
216	True	1.00	0.94	0.97
217	micro avg	0.97	0.97	0.97
218	macro avg	0.96	0.97	0.96

```
219 weighted avg      0.97      0.97      0.97      29
220
221 Precision = 1.0
222 Rappel= 0.9411764705882353
223 F_Mesure= 0.9696969696969697
224
225
226
227 -----Decision Tree-----
228
229
230
231 dataset/HBR/taken/HBR_RandomUnderSampler_default.csv
232
233
234
235 count      92
236 unique     2
237 top        True
238 freq       46
239 Name: is_code_smell, dtype: object
240 [[12  0]
241 [ 0 16]]
242 the recall for this model is : 1.0
243 TP 16
244 TN 12
245 FP 0
246 FN 0
247
248 -----Classification Report
-----
249          precision    recall   f1-score   support
250
251      False      1.00      1.00      1.00      12
252      True       1.00      1.00      1.00      16
253
254  micro avg     1.00      1.00      1.00      28
255  macro avg     1.00      1.00      1.00      28
256 weighted avg   1.00      1.00      1.00      28
257
258 Precision = 1.0
259 Rappel= 1.0
260 F_Mesure= 1.0
261
262
```

```
263
264 -----Decision Tree-----
265
266
267
268 dataset/HBR/taken/HBR_TomekLinks.csv
269
270
271
272 count         96
273 unique        2
274 top          False
275 freq          50
276 Name: is_code_smell, dtype: object
277 [[16  0]
278 [ 0 13]]
279 the recall for this model is : 1.0
280 TP 13
281 TN 16
282 FP 0
283 FN 0
284
285 -----Classification Report
-----
286             precision    recall   f1-score   support
287
288      False       1.00     1.00      1.00      16
289      True        1.00     1.00      1.00      13
290
291  micro avg     1.00     1.00      1.00      29
292  macro avg     1.00     1.00      1.00      29
293 weighted avg  1.00     1.00      1.00      29
294
295 Precision =  1.0
296 Rappel=  1.0
297 F_Mesure= 1.0
298
299
300
301 -----Decision Tree-----
302
303
304
305 dataset/HBR/taken/HBR_CondensedNearestNeighbour.csv
306
```

```
307
308
309 count        49
310 unique       2
311 top          True
312 freq          46
313 Name: is_code_smell, dtype: object
314 [[ 1  0]
315 [ 0 14]]
316 the recall for this model is : 1.0
317 TP 14
318 TN 1
319 FP 0
320 FN 0
321
322 -----Classification Report
-----
323              precision    recall   f1-score   support
324
325      False       1.00     1.00     1.00       1
326      True        1.00     1.00     1.00      14
327
328  micro avg     1.00     1.00     1.00      15
329  macro avg     1.00     1.00     1.00      15
330 weighted avg   1.00     1.00     1.00      15
331
332 Precision =  1.0
333 Rappel=  1.0
334 F_Mesure= 1.0
335
336
337
338 -----Random Forest-----
339
340
341
342 dataset/HBR/taken/HBR_del.csv
343
344
345
346 count        97
347 unique       2
348 top          False
349 freq          51
350 Name: is_code_smell, dtype: object
```

```
351 [[18  0]
352 [ 0 12]]
353 the recall for this model is : 1.0
354 TP 12
355 TN 18
356 FP 0
357 FN 0
358
359 -----Classification Report
-----
360          precision    recall   f1-score   support
361
362      False       1.00     1.00      1.00      18
363      True        1.00     1.00      1.00      12
364
365  micro avg     1.00     1.00      1.00      30
366  macro avg     1.00     1.00      1.00      30
367 weighted avg   1.00     1.00      1.00      30
368
369 Precision =  1.0
370 Rappel=  1.0
371 F_Mesure= 1.0
372
373
374
375 -----Random Forest-----
376
377
378
379 dataset/HBR/taken/HBR_RandomUnderSampler.csv
380
381
382
383 count         92
384 unique        2
385 top           True
386 freq          46
387 Name: is_code_smell, dtype: object
388 [[13  0]
389 [ 2 13]]
390 the recall for this model is : 0.8666666666666667
391 TP 13
392 TN 13
393 FP 0
394 FN 2
```

```
395
396 -----Classification Report
-----
397          precision    recall   f1-score   support
398
399      False       0.87     1.00      0.93      13
400      True        1.00     0.87      0.93      15
401
402  micro avg     0.93     0.93      0.93      28
403  macro avg     0.93     0.93      0.93      28
404 weighted avg   0.94     0.93      0.93      28
405
406 Precision = 1.0
407 Rappel= 0.8666666666666667
408 F_Mesure= 0.9285714285714286
409
410
411
412 -----Random Forest-----
413
414
415
416 dataset/HBR/taken/HBR_AllKNN.csv
417
418
419
420 count         95
421 unique        2
422 top           False
423 freq          49
424 Name: is_code_smell, dtype: object
425 [[13  0]
426 [ 0 16]]
427 the recall for this model is : 1.0
428 TP 16
429 TN 13
430 FP 0
431 FN 0
432
433 -----Classification Report
-----
434          precision    recall   f1-score   support
435
436      False       1.00     1.00      1.00      13
437      True        1.00     1.00      1.00      16
```

```
438
439      micro avg       1.00       1.00       1.00       29
440      macro avg       1.00       1.00       1.00       29
441      weighted avg    1.00       1.00       1.00       29
442
443 Precision = 1.0
444 Rappel= 1.0
445 F_Mesure= 1.0
446
447
448
449 -----Random Forest-----
450
451
452
453 dataset/HBR/taken/HBR_InstanceHardnessThreshold.csv
454
455
456
457 count         92
458 unique        2
459 top           True
460 freq          46
461 Name: is_code_smell, dtype: object
462 [[13  0]
463 [ 0 15]]
464 the recall for this model is : 1.0
465 TP 15
466 TN 13
467 FP 0
468 FN 0
469
470 -----Classification Report
-----
471              precision     recall   f1-score   support
472
473      False       1.00       1.00       1.00       13
474      True        1.00       1.00       1.00       15
475
476      micro avg    1.00       1.00       1.00       28
477      macro avg    1.00       1.00       1.00       28
478      weighted avg 1.00       1.00       1.00       28
479
480 Precision = 1.0
481 Rappel= 1.0
```

```
482 F_Mesure= 1.0
483
484
485
486 -----Random Forest-----
487
488
489
490 dataset/HBR/taken/HBR_NearMiss.csv
491
492
493
494 count         92
495 unique        2
496 top           True
497 freq          46
498 Name: is_code_smell, dtype: object
499 [[13  0]
500 [ 1 14]]
501 the recall for this model is : 0.9333333333333333
502 TP 14
503 TN 13
504 FP 0
505 FN 1
506
507 -----Classification Report
-----
508
509
510      precision    recall   f1-score   support
511      False        0.93     1.00      0.96       13
512      True         1.00     0.93      0.97       15
513      micro avg   0.96     0.96      0.96       28
514      macro avg   0.96     0.97      0.96       28
515 weighted avg  0.97     0.96      0.96       28
516
517 Precision = 1.0
518 Rappel= 0.9333333333333333
519 F_Mesure= 0.9655172413793104
520
521
522
523 -----Random Forest-----
```

```
526
527 dataset/HBR/taken/HBR_OneSidedSelection.csv
528
529
530
531 count         96
532 unique        2
533 top          False
534 freq          50
535 Name: is_code_smell, dtype: object
536 [[11  0]
537 [ 0 18]]
538 the recall for this model is : 1.0
539 TP 18
540 TN 11
541 FP 0
542 FN 0
543
544 -----Classification Report
-----
545             precision    recall   f1-score   support
546
547      False       1.00     1.00      1.00      11
548      True        1.00     1.00      1.00      18
549
550  micro avg     1.00     1.00      1.00      29
551  macro avg     1.00     1.00      1.00      29
552 weighted avg   1.00     1.00      1.00      29
553
554 Precision =  1.0
555 Rappel= 1.0
556 F_Mesure= 1.0
557
558
559
560 -----Random Forest-----
561
562
563
564 dataset/HBR/taken/HBR_RandomUnderSampler_default.csv
565
566
567
568 count         92
569 unique        2
```

```
570 top      True
571 freq      46
572 Name: is_code_smell, dtype: object
573 [[12  1]
574 [ 0 15]]
575 the recall for this model is : 1.0
576 TP 15
577 TN 12
578 FP 1
579 FN 0
580
581 -----Classification Report
-----
582          precision    recall   f1-score   support
583
584      False       1.00     0.92      0.96      13
585      True        0.94     1.00      0.97      15
586
587  micro avg     0.96     0.96      0.96      28
588  macro avg     0.97     0.96      0.96      28
589 weighted avg   0.97     0.96      0.96      28
590
591 Precision =  0.9375
592 Rappel= 1.0
593 F_Mesure= 0.967741935483871
594
595
596
597 -----Random Forest-----
598
599
600
601 dataset/HBR/taken/HBR_TomekLinks.csv
602
603
604
605 count      96
606 unique     2
607 top        False
608 freq       50
609 Name: is_code_smell, dtype: object
610 [[14  0]
611 [ 2 13]]
612 the recall for this model is : 0.8666666666666667
613 TP 13
```

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```
614 TN 14
615 FP 0
616 FN 2
617
618 -----Classification Report
-----
619             precision    recall   f1-score   support
620
621      False        0.88      1.00      0.93       14
622      True         1.00      0.87      0.93       15
623
624      micro avg     0.93      0.93      0.93       29
625      macro avg     0.94      0.93      0.93       29
626 weighted avg     0.94      0.93      0.93       29
627
628 Precision = 1.0
629 Rappel= 0.8666666666666667
630 F_Mesure= 0.9285714285714286
631
632
633
634 -----Random Forest-----
635
636
637
638 dataset/HBR/taken/HBR_CondensedNearestNeighbour.csv
639
640
641
642 count        49
643 unique        2
644 top          True
645 freq          46
646 Name: is_code_smell, dtype: object
647 [[ 1  0]
648 [ 0 14]]
649 the recall for this model is : 1.0
650 TP 14
651 TN 1
652 FP 0
653 FN 0
654
655 -----Classification Report
-----
656             precision    recall   f1-score   support
```

```

657
658      False      1.00      1.00      1.00      1
659      True       1.00      1.00      1.00     14
660
661      micro avg    1.00      1.00      1.00     15
662      macro avg    1.00      1.00      1.00     15
663      weighted avg 1.00      1.00      1.00     15
664
665 Precision = 1.0
666 Rappel= 1.0
667 F_Mesure= 1.0
668
669
670
671 -----Naive Bayes-----
672
673
674
675 dataset/HBR/taken/HBR_del.csv
676
677
678
679 count      97
680 unique      2
681 top        False
682 freq        51
683 Name: is_code_smell, dtype: object
684 [[14  1]
685 [ 0 15]]
686 the recall for this model is : 1.0
687 TP 15
688 TN 14
689 FP 1
690 FN 0
691
692 -----Classification Report
-----
693          precision    recall   f1-score   support
694
695      False      1.00      0.93      0.97      15
696      True       0.94      1.00      0.97      15
697
698      micro avg    0.97      0.97      0.97      30
699      macro avg    0.97      0.97      0.97      30
700      weighted avg 0.97      0.97      0.97      30

```

```
701
702 Precision = 0.9375
703 Rappel= 1.0
704 F_Mesure= 0.967741935483871
705
706
707
708 -----Naive Bayes-----
709
710
711
712 dataset/HBR/taken/HBR_RandomUnderSampler.csv
713
714
715
716 count 92
717 unique 2
718 top True
719 freq 46
720 Name: is_code_smell, dtype: object
721 [[14 0]
722 [ 0 14]]
723 the recall for this model is : 1.0
724 TP 14
725 TN 14
726 FP 0
727 FN 0
728
729 -----Classification Report
-----
730 precision recall f1-score support
731
732 False 1.00 1.00 1.00 14
733 True 1.00 1.00 1.00 14
734
735 micro avg 1.00 1.00 1.00 28
736 macro avg 1.00 1.00 1.00 28
737 weighted avg 1.00 1.00 1.00 28
738
739 Precision = 1.0
740 Rappel= 1.0
741 F_Mesure= 1.0
742
743
744
```

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```
745 -----Naive Bayes-----
746
747
748
749 dataset/HBR/taken/HBR_AllKNN.csv
750
751
752
753 count         95
754 unique        2
755 top           False
756 freq          49
757 Name: is_code_smell, dtype: object
758 [[15  0]
759 [ 0 14]]
760 the recall for this model is : 1.0
761 TP 14
762 TN 15
763 FP 0
764 FN 0
765
766 -----Classification Report
-----
767
768
769      precision    recall   f1-score   support
770
771
772      False        1.00     1.00      1.00       15
773      True         1.00     1.00      1.00       14
774
775
776      micro avg    1.00     1.00      1.00       29
777      macro avg    1.00     1.00      1.00       29
778      weighted avg 1.00     1.00      1.00       29
779
780
781
782 -----Naive Bayes-----
783
784
785
786 dataset/HBR/taken/HBR_InstanceHardnessThreshold.csv
787
788
```

```
789
790 count      92
791 unique     2
792 top        True
793 freq       46
794 Name: is_code_smell, dtype: object
795 [[16  0]
796 [ 0 12]]
797 the recall for this model is : 1.0
798 TP 12
799 TN 16
800 FP 0
801 FN 0
802
803 -----Classification Report
-----
804          precision    recall   f1-score   support
805
806      False       1.00     1.00      1.00      16
807      True        1.00     1.00      1.00      12
808
809  micro avg     1.00     1.00      1.00      28
810  macro avg     1.00     1.00      1.00      28
811 weighted avg   1.00     1.00      1.00      28
812
813 Precision = 1.0
814 Rappel= 1.0
815 F_Mesure= 1.0
816
817
818
819 -----Naive Bayes-----
820
821
822
823 dataset/HBR/taken/HBR_NearMiss.csv
824
825
826
827 count      92
828 unique     2
829 top        True
830 freq       46
831 Name: is_code_smell, dtype: object
832 [[14  0]]
```

```
833 [ 1 13]
834 the recall for this model is : 0.9285714285714286
835 TP 13
836 TN 14
837 FP 0
838 FN 1
839
840 -----Classification Report
-----
841 precision      recall   f1-score   support
842
843    False        0.93      1.00      0.97      14
844    True         1.00      0.93      0.96      14
845
846    micro avg   0.96      0.96      0.96      28
847    macro avg   0.97      0.96      0.96      28
848 weighted avg  0.97      0.96      0.96      28
849
850 Precision = 1.0
851 Rappel= 0.9285714285714286
852 F_Mesure= 0.962962962962963
853
854
855
856 -----Naive Bayes-----
857
858
859
860 dataset/HBR/taken/HBR_OneSidedSelection.csv
861
862
863
864 count       96
865 unique      2
866 top         False
867 freq        50
868 Name: is_code_smell, dtype: object
869 [[16  0]
870 [ 0 13]]
871 the recall for this model is : 1.0
872 TP 13
873 TN 16
874 FP 0
875 FN 0
876
```

```
877 -----Classification Report
-----
878             precision    recall   f1-score   support
879
880       False        1.00     1.00      1.00      16
881       True        1.00     1.00      1.00      13
882
883   micro avg     1.00     1.00      1.00      29
884   macro avg     1.00     1.00      1.00      29
885 weighted avg   1.00     1.00      1.00      29
886
887 Precision =  1.0
888 Rappel=  1.0
889 F_Mesure= 1.0
890
891
892
893 -----Naive Bayes-----
894
895
896
897 dataset/HBR/taken/HBR_RandomUnderSampler_default.csv
898
899
900
901 count         92
902 unique        2
903 top           True
904 freq          46
905 Name: is_code_smell, dtype: object
906 [[13  0]
907 [ 0 15]]
908 the recall for this model is : 1.0
909 TP 15
910 TN 13
911 FP 0
912 FN 0
913
914 -----Classification Report
-----
915             precision    recall   f1-score   support
916
917       False        1.00     1.00      1.00      13
918       True        1.00     1.00      1.00      15
919
```

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```
920     micro avg      1.00      1.00      1.00      28
921     macro avg      1.00      1.00      1.00      28
922 weighted avg      1.00      1.00      1.00      28
923
924 Precision = 1.0
925 Rappel= 1.0
926 F_Mesure= 1.0
927
928
929
930 -----Naive Bayes-----
931
932
933
934 dataset/HBR/taken/HBR_TomekLinks.csv
935
936
937
938 count          96
939 unique         2
940 top            False
941 freq           50
942 Name: is_code_smell, dtype: object
943 [[16  1]
944 [ 0 12]]
945 the recall for this model is : 1.0
946 TP 12
947 TN 16
948 FP 1
949 FN 0
950
951 -----Classification Report
-----
952
953
954     precision      recall    f1-score   support
955
956
957     False          1.00      0.94      0.97      17
958     True           0.92      1.00      0.96      12
959
960
961     micro avg      0.97      0.97      0.97      29
962     macro avg      0.96      0.97      0.96      29
963 weighted avg      0.97      0.97      0.97      29
964
965 Precision = 0.9230769230769231
966 Rappel= 1.0
967 F_Mesure= 0.9600000000000001
```

```
964
965
966
967 -----Naive Bayes-----
968
969
970
971 dataset/HBR/taken/HBR_CondensedNearestNeighbour.csv
972
973
974
975 count          49
976 unique         2
977 top            True
978 freq           46
979 Name: is_code_smell, dtype: object
980 [[ 0  0]
981 [ 1 14]]
982 the recall for this model is : 0.9333333333333333
983 TP 14
984 TN 0
985 FP 0
986 FN 1
987
988 C:\Users\My PC\AppData\Local\Programs\Python\Python36-32
  \lib\site-packages\sklearn\metrics\classification.py:
1145: UndefinedMetricWarning: Recall and F-score are ill
-defined and being set to 0.0 in labels with no true
samples.
989 -----Classification Report
-----
990 'recall', 'true', average, warn_for)
991             precision    recall   f1-score   support
992
993      False       0.00      0.00      0.00        0
994      True       1.00      0.93      0.97      15
995
996  micro avg     0.93      0.93      0.93      15
997  macro avg     0.50      0.47      0.48      15
998 weighted avg   1.00      0.93      0.97      15
999
1000 Precision = 1.0
1001 Rappel= 0.9333333333333333
1002 F_Mesure= 0.9655172413793104
1003
```

```
1004  
1005  
1006 -----SVM-----  
1007  
1008  
1009  
1010 dataset/HBR/taken/HBR_del.csv  
1011  
1012  
1013  
1014 count         97  
1015 unique        2  
1016 top           False  
1017 freq          51  
1018 Name: is_code_smell, dtype: object  
1019 [[15  1]  
1020 [ 2 12]]  
1021 the recall for this model is : 0.8571428571428571  
1022 TP 12  
1023 TN 15  
1024 FP 1  
1025 FN 2  
1026  
1027 -----Classification Report  
-----  
1028              precision    recall   f1-score   support  
1029  
1030      False       0.88      0.94      0.91      16  
1031      True        0.92      0.86      0.89      14  
1032  
1033      micro avg    0.90      0.90      0.90      30  
1034      macro avg    0.90      0.90      0.90      30  
1035 weighted avg    0.90      0.90      0.90      30  
1036  
1037 Precision = 0.9230769230769231  
1038 Rappel= 0.8571428571428571  
1039 F_Mesure= 0.8888888888888889  
1040  
1041  
1042  
1043 -----SVM-----  
1044  
1045  
1046  
1047 dataset/HBR/taken/HBR_RandomUnderSampler.csv
```

```
1048
1049
1050
1051 count         92
1052 unique        2
1053 top           True
1054 freq          46
1055 Name: is_code_smell, dtype: object
1056 [[13  1]
1057 [ 2 12]]
1058 the recall for this model is : 0.8571428571428571
1059 TP 12
1060 TN 13
1061 FP 1
1062 FN 2
1063
1064 -----Classification Report
-----
1065             precision    recall   f1-score   support
1066
1067      False       0.87      0.93      0.90      14
1068      True       0.92      0.86      0.89      14
1069
1070  micro avg     0.89      0.89      0.89      28
1071  macro avg     0.89      0.89      0.89      28
1072 weighted avg   0.89      0.89      0.89      28
1073
1074 Precision =  0.9230769230769231
1075 Rappel=  0.8571428571428571
1076 F_Mesure= 0.8888888888888889
1077
1078
1079
1080 -----SVM-----
1081
1082
1083
1084 dataset/HBR/taken/HBR_AllKNN.csv
1085
1086
1087
1088 count         95
1089 unique        2
1090 top           False
1091 freq          49
```

File - unknown

```
1092 Name: is_code_smell, dtype: object
1093 [[17  0]
1094 [ 1 11]]
1095 the recall for this model is : 0.9166666666666666
1096 TP 11
1097 TN 17
1098 FP 0
1099 FN 1
1100
1101 -----Classification Report
-----
1102          precision    recall   f1-score   support
1103
1104      False        0.94     1.00      0.97      17
1105      True         1.00     0.92      0.96      12
1106
1107  micro avg       0.97     0.97      0.97      29
1108  macro avg       0.97     0.96      0.96      29
1109 weighted avg     0.97     0.97      0.97      29
1110
1111 Precision = 1.0
1112 Rappel= 0.9166666666666666
1113 F_Mesure= 0.9565217391304348
1114
1115
1116
1117 -----SVM-----
1118
1119
1120
1121 dataset/HBR/taken/HBR_InstanceHardnessThreshold.csv
1122
1123
1124
1125 count         92
1126 unique        2
1127 top           True
1128 freq          46
1129 Name: is_code_smell, dtype: object
1130 [[16  0]
1131 [ 1 11]]
1132 the recall for this model is : 0.9166666666666666
1133 TP 11
1134 TN 16
1135 FP 0
```

```
1136 FN 1
1137
1138 -----Classification Report
-----
1139             precision    recall   f1-score   support
1140
1141      False        0.94     1.00      0.97      16
1142      True         1.00     0.92      0.96      12
1143
1144  micro avg       0.96     0.96      0.96      28
1145  macro avg       0.97     0.96      0.96      28
1146 weighted avg     0.97     0.96      0.96      28
1147
1148 Precision = 1.0
1149 Rappel= 0.9166666666666666
1150 F_Mesure= 0.9565217391304348
1151
1152
1153
1154 -----SVM-----
1155
1156
1157
1158 dataset/HBR/taken/HBR_NearMiss.csv
1159
1160
1161
1162 count        92
1163 unique        2
1164 top          True
1165 freq          46
1166 Name: is_code_smell, dtype: object
1167 [[13  0]
1168 [ 2 13]]
1169 the recall for this model is : 0.8666666666666667
1170 TP 13
1171 TN 13
1172 FP 0
1173 FN 2
1174
1175 -----Classification Report
-----
1176             precision    recall   f1-score   support
1177
1178      False        0.87     1.00      0.93      13
```

File - unknown

```

1179      True    1.00    0.87    0.93    15
1180
1181      micro avg    0.93    0.93    0.93    28
1182      macro avg    0.93    0.93    0.93    28
1183 weighted avg    0.94    0.93    0.93    28
1184
1185 Precision = 1.0
1186 Rappel= 0.8666666666666667
1187 F_Mesure= 0.9285714285714286
1188
1189
1190
1191 -----SVM-----
1192
1193
1194
1195 dataset/HBR/taken/HBR_OneSidedSelection.csv
1196
1197
1198
1199 count      96
1200 unique     2
1201 top        False
1202 freq       50
1203 Name: is_code_smell, dtype: object
1204 [[16  0]
1205 [ 3 10]]
1206 the recall for this model is : 0.7692307692307693
1207 TP 10
1208 TN 16
1209 FP 0
1210 FN 3
1211
1212 -----Classification Report
-----
1213          precision    recall   f1-score   support
1214
1215      False      0.84    1.00      0.91      16
1216      True       1.00    0.77      0.87      13
1217
1218      micro avg    0.90    0.90      0.90      29
1219      macro avg    0.92    0.88      0.89      29
1220 weighted avg    0.91    0.90      0.89      29
1221
1222 Precision = 1.0

```

```
1223 Rappel= 0.7692307692307693
1224 F_Mesure= 0.8695652173913044
1225
1226
1227
1228 -----SVM-----
1229
1230
1231
1232 dataset/HBR/taken/HBR_RandomUnderSampler_default.csv
1233
1234
1235
1236 count 92
1237 unique 2
1238 top True
1239 freq 46
1240 Name: is_code_smell, dtype: object
1241 [[12 0]
1242 [ 2 14]]
1243 the recall for this model is : 0.875
1244 TP 14
1245 TN 12
1246 FP 0
1247 FN 2
1248
1249 -----Classification Report
-----
1250 precision recall f1-score support
1251
1252 False 0.86 1.00 0.92 12
1253 True 1.00 0.88 0.93 16
1254
1255 micro avg 0.93 0.93 0.93 28
1256 macro avg 0.93 0.94 0.93 28
1257 weighted avg 0.94 0.93 0.93 28
1258
1259 Precision = 1.0
1260 Rappel= 0.875
1261 F_Mesure= 0.9333333333333333
1262
1263
1264
1265 -----SVM-----
1266
```

```
1267
1268
1269 dataset/HBR/taken/HBR_TomekLinks.csv
1270
1271
1272
1273 count      96
1274 unique     2
1275 top        False
1276 freq       50
1277 Name: is_code_smell, dtype: object
1278 [[13  0]
1279 [ 2 14]]
1280 the recall for this model is : 0.875
1281 TP 14
1282 TN 13
1283 FP 0
1284 FN 2
1285
1286 -----Classification Report
-----
1287          precision    recall   f1-score   support
1288
1289      False      0.87      1.00      0.93      13
1290      True      1.00      0.88      0.93      16
1291
1292  micro avg      0.93      0.93      0.93      29
1293  macro avg      0.93      0.94      0.93      29
1294 weighted avg     0.94      0.93      0.93      29
1295
1296 Precision = 1.0
1297 Rappel= 0.875
1298 F_Mesure= 0.9333333333333333
1299
1300 Process finished with exit code 0
1301
```