

```
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 [[24 0]  
19 [ 0 25]]  
20 the recall for this model is : 1.0  
21 TP 25  
22 TN 24  
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 24  
30 True 1.00 1.00 1.00 25  
31  
32 micro avg 1.00 1.00 1.00 49  
33 macro avg 1.00 1.00 1.00 49  
34 weighted avg 1.00 1.00 1.00 49  
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 [[25  0]
56 [ 0 21]]
57 the recall for this model is : 1.0
58 TP 21
59 TN 25
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      25
67      True        1.00     1.00      1.00      21
68
69  micro avg     1.00     1.00      1.00      46
70  macro avg     1.00     1.00      1.00      46
71 weighted avg   1.00     1.00      1.00      46
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 [[22  0]
93 [ 0 26]]
94 the recall for this model is : 1.0
95 TP 26
96 TN 22
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      22
104      True         1.00     1.00      1.00      26
105
106  micro avg      1.00     1.00      1.00      48
107  macro avg      1.00     1.00      1.00      48
108 weighted avg    1.00     1.00      1.00      48
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 [[25  0]
130 [ 0 21]]
131 the recall for this model is : 1.0
```

```
132 TP 21
133 TN 25
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      25
141      True         1.00     1.00      1.00      21
142
143  micro avg     1.00     1.00      1.00      46
144  macro avg     1.00     1.00      1.00      46
145 weighted avg   1.00     1.00      1.00      46
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 [[23  0]
167 [ 0 23]]
168 the recall for this model is : 1.0
169 TP 23
170 TN 23
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	[[24 1]			
204	[ 2 21]]			
205	the recall for this model is : 0.9130434782608695			
206	TP 21			
207	TN 24			
208	FP 1			
209	FN 2			
210				
211	-----Classification Report			
212				
213				
214	precision	recall	f1-score	support
215	False	0.92	0.96	0.94
216	True	0.95	0.91	0.93
217	micro avg	0.94	0.94	0.94
218	macro avg	0.94	0.94	0.94

```
219 weighted avg      0.94      0.94      0.94      48
220
221 Precision = 0.9545454545454546
222 Rappel= 0.9130434782608695
223 F_Mesure= 0.9333333333333332
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 [[26  0]
241 [ 1 19]]
242 the recall for this model is : 0.95
243 TP 19
244 TN 26
245 FP 0
246 FN 1
247
248 -----Classification Report
-----
249          precision    recall   f1-score   support
250
251      False      0.96      1.00      0.98      26
252      True       1.00      0.95      0.97      20
253
254  micro avg     0.98      0.98      0.98      46
255  macro avg     0.98      0.97      0.98      46
256 weighted avg   0.98      0.98      0.98      46
257
258 Precision = 1.0
259 Rappel= 0.95
260 F_Mesure= 0.9743589743589743
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 [[28  0]
278 [ 0 20]]
279 the recall for this model is : 1.0
280 TP 20
281 TN 28
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      28
289      True        1.00     1.00      1.00      20
290
291  micro avg     1.00     1.00      1.00      48
292  macro avg     1.00     1.00      1.00      48
293 weighted avg  1.00     1.00      1.00      48
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  1]
315 [ 1 22]]
316 the recall for this model is : 0.9565217391304348
317 TP 22
318 TN 1
319 FP 1
320 FN 1
321
322 -----Classification Report
-----
323              precision    recall   f1-score   support
324
325      False        0.50      0.50      0.50         2
326      True        0.96      0.96      0.96        23
327
328  micro avg     0.92      0.92      0.92        25
329  macro avg     0.73      0.73      0.73        25
330 weighted avg   0.92      0.92      0.92        25
331
332 Precision =  0.9565217391304348
333 Rappel=  0.9565217391304348
334 F_Mesure= 0.9565217391304348
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 [[22  0]
352 [ 0 27]]
353 the recall for this model is : 1.0
354 TP 27
355 TN 22
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      22
363      True        1.00     1.00      1.00      27
364
365  micro avg     1.00     1.00      1.00      49
366  macro avg     1.00     1.00      1.00      49
367 weighted avg   1.00     1.00      1.00      49
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 [[25  0]
389 [ 0 21]]
390 the recall for this model is : 1.0
391 TP 21
392 TN 25
393 FP 0
394 FN 0
```

```
395
396 -----Classification Report
-----
397             precision    recall   f1-score   support
398
399      False       1.00     1.00      1.00      25
400      True        1.00     1.00      1.00      21
401
402  micro avg     1.00     1.00      1.00      46
403  macro avg     1.00     1.00      1.00      46
404 weighted avg   1.00     1.00      1.00      46
405
406 Precision =  1.0
407 Rappel=  1.0
408 F_Mesure= 1.0
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 [[19  0]
426 [ 1 28]]
427 the recall for this model is : 0.9655172413793104
428 TP 28
429 TN 19
430 FP 0
431 FN 1
432
433 -----Classification Report
-----
434             precision    recall   f1-score   support
435
436      False       0.95     1.00      0.97      19
437      True        1.00     0.97      0.98      29
```

```
438
439      micro avg       0.98       0.98       0.98       48
440      macro avg       0.97       0.98       0.98       48
441      weighted avg    0.98       0.98       0.98       48
442
443 Precision = 1.0
444 Rappel= 0.9655172413793104
445 F_Mesure= 0.9824561403508771
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 [[19  3]
463 [ 0 24]]
464 the recall for this model is : 1.0
465 TP 24
466 TN 19
467 FP 3
468 FN 0
469
470 -----Classification Report
-----
471              precision    recall   f1-score   support
472
473      False       1.00      0.86      0.93      22
474      True        0.89      1.00      0.94      24
475
476      micro avg    0.93      0.93      0.93      46
477      macro avg    0.94      0.93      0.93      46
478      weighted avg 0.94      0.93      0.93      46
479
480 Precision = 0.8888888888888888
481 Rappel= 1.0
```

```
482 F_Mesure= 0.9411764705882353
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 [[28  0]
500 [ 0 18]]
501 the recall for this model is : 1.0
502 TP 18
503 TN 28
504 FP 0
505 FN 0
506
507 -----Classification Report
-----
508              precision    recall   f1-score   support
509
510      False       1.00     1.00      1.00      28
511      True        1.00     1.00      1.00      18
512
513  micro avg     1.00     1.00      1.00      46
514  macro avg     1.00     1.00      1.00      46
515 weighted avg   1.00     1.00      1.00      46
516
517 Precision = 1.0
518 Rappel= 1.0
519 F_Mesure= 1.0
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 [[26  0]
537 [ 1 21]]
538 the recall for this model is : 0.9545454545454546
539 TP 21
540 TN 26
541 FP 0
542 FN 1
543
544 -----Classification Report
-----
545             precision    recall   f1-score   support
546
547      False       0.96     1.00      0.98      26
548      True        1.00     0.95      0.98      22
549
550  micro avg     0.98     0.98      0.98      48
551  macro avg     0.98     0.98      0.98      48
552 weighted avg   0.98     0.98      0.98      48
553
554 Precision = 1.0
555 Rappel= 0.9545454545454546
556 F_Mesure= 0.9767441860465117
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 [[25  0]
574 [ 0 21]]
575 the recall for this model is : 1.0
576 TP 21
577 TN 25
578 FP 0
579 FN 0
580
581 -----Classification Report
-----
582          precision    recall   f1-score   support
583
584      False       1.00     1.00      1.00      25
585      True        1.00     1.00      1.00      21
586
587  micro avg     1.00     1.00      1.00      46
588  macro avg     1.00     1.00      1.00      46
589 weighted avg   1.00     1.00      1.00      46
590
591 Precision = 1.0
592 Rappel= 1.0
593 F_Mesure= 1.0
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 [[26  0]
611 [ 0 22]]
612 the recall for this model is : 1.0
613 TP 22
```

```
614 TN 26
615 FP 0
616 FN 0
617
618 -----Classification Report
-----
619             precision    recall   f1-score   support
620
621      False        1.00     1.00      1.00      26
622      True         1.00     1.00      1.00      22
623
624      micro avg     1.00     1.00      1.00      48
625      macro avg     1.00     1.00      1.00      48
626 weighted avg     1.00     1.00      1.00      48
627
628 Precision = 1.0
629 Rappel= 1.0
630 F_Mesure= 1.0
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 [[ 0  3]
648 [ 0 22]]
649 the recall for this model is : 1.0
650 TP 22
651 TN 0
652 FP 3
653 FN 0
654
655 -----Classification Report
-----
656 C:\Users\My PC\AppData\Local\Programs\Python\Python36-32\
```

```
656 lib\site-packages\sklearn\metrics\classification.py:1143
      : UndefinedMetricWarning: Precision and F-score are ill-
      defined and being set to 0.0 in labels with no predicted
      samples.
657     'precision', 'predicted', average, warn_for)
658             precision    recall   f1-score   support
659
660     False        0.00      0.00      0.00       3
661     True        0.88      1.00      0.94      22
662
663     micro avg   0.88      0.88      0.88      25
664     macro avg   0.44      0.50      0.47      25
665 weighted avg  0.77      0.88      0.82      25
666
667 Precision =  0.88
668 Rappel=  1.0
669 F_Mesure= 0.9361702127659575
670
671
672
673 -----Naive Bayes-----
674
675
676
677 dataset/HBR/taken/HBR_del.csv
678
679
680
681 count         97
682 unique        2
683 top           False
684 freq          51
685 Name: is_code_smell, dtype: object
686 [[22  1]
687 [ 0 26]]
688 the recall for this model is : 1.0
689 TP 26
690 TN 22
691 FP 1
692 FN 0
693
694 -----Classification Report
-----
```

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

```
695
696
```

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```

697      False    1.00    0.96    0.98    23
698      True     0.96    1.00    0.98    26
699
700      micro avg    0.98    0.98    0.98    49
701      macro avg    0.98    0.98    0.98    49
702      weighted avg 0.98    0.98    0.98    49
703
704 Precision = 0.9629629629629629
705 Rappel= 1.0
706 F_Mesure= 0.9811320754716981
707
708
709
710 -----Naive Bayes-----
711
712
713
714 dataset/HBR/taken/HBR_RandomUnderSampler.csv
715
716
717
718 count      92
719 unique     2
720 top        True
721 freq       46
722 Name: is_code_smell, dtype: object
723 [[23  1]
724 [ 0 22]]
725 the recall for this model is : 1.0
726 TP 22
727 TN 23
728 FP 1
729 FN 0
730
731 -----Classification Report
-----
732          precision    recall   f1-score   support
733
734      False    1.00    0.96    0.98    24
735      True     0.96    1.00    0.98    22
736
737      micro avg    0.98    0.98    0.98    46
738      macro avg    0.98    0.98    0.98    46
739      weighted avg 0.98    0.98    0.98    46
740

```

```
741 Precision = 0.9565217391304348
742 Rappel= 1.0
743 F_Mesure= 0.9777777777777777
744
745
746
747 -----Naive Bayes-----
748
749
750
751 dataset/HBR/taken/HBR_AllKNN.csv
752
753
754
755 count 95
756 unique 2
757 top False
758 freq 49
759 Name: is_code_smell, dtype: object
760 [[24 0]
761 [ 0 24]]
762 the recall for this model is : 1.0
763 TP 24
764 TN 24
765 FP 0
766 FN 0
767
768 -----Classification Report
-----
769 precision recall f1-score support
770
771 False 1.00 1.00 1.00 24
772 True 1.00 1.00 1.00 24
773
774 micro avg 1.00 1.00 1.00 48
775 macro avg 1.00 1.00 1.00 48
776 weighted avg 1.00 1.00 1.00 48
777
778 Precision = 1.0
779 Rappel= 1.0
780 F_Mesure= 1.0
781
782
783
784 -----Naive Bayes-----
```

```
785  
786  
787  
788 dataset/HBR/taken/HBR_InstanceHardnessThreshold.csv  
789  
790  
791  
792 count         92  
793 unique        2  
794 top           True  
795 freq          46  
796 Name: is_code_smell, dtype: object  
797 [[24  1]  
798 [ 0 21]]  
799 the recall for this model is : 1.0  
800 TP 21  
801 TN 24  
802 FP 1  
803 FN 0  
804  
805 -----Classification Report  
-----  
806              precision    recall   f1-score   support  
807  
808      False       1.00     0.96      0.98      25  
809      True        0.95     1.00      0.98      21  
810  
811      micro avg    0.98     0.98      0.98      46  
812      macro avg    0.98     0.98      0.98      46  
813 weighted avg    0.98     0.98      0.98      46  
814  
815 Precision =  0.9545454545454546  
816 Rappel=  1.0  
817 F_Mesure= 0.9767441860465117  
818  
819  
820  
821 -----Naive Bayes-----  
822  
823  
824  
825 dataset/HBR/taken/HBR_NearMiss.csv  
826  
827  
828
```

File - unknown

```
829 count      92
830 unique     2
831 top        True
832 freq       46
833 Name: is_code_smell, dtype: object
834 [[23  0]
835 [ 3 20]]
836 the recall for this model is : 0.8695652173913043
837 TP 20
838 TN 23
839 FP 0
840 FN 3
841
842 -----Classification Report
-----
843          precision    recall   f1-score   support
844
845      False      0.88      1.00      0.94      23
846      True       1.00      0.87      0.93      23
847
848  micro avg     0.93      0.93      0.93      46
849  macro avg     0.94      0.93      0.93      46
850 weighted avg   0.94      0.93      0.93      46
851
852 Precision = 1.0
853 Rappel= 0.8695652173913043
854 F_Mesure= 0.9302325581395349
855
856
857
858 -----Naive Bayes-----
859
860
861
862 dataset/HBR/taken/HBR_OneSidedSelection.csv
863
864
865
866 count      96
867 unique     2
868 top        False
869 freq       50
870 Name: is_code_smell, dtype: object
871 [[24  3]
872 [ 0 21]]
```

```
873 the recall for this model is : 1.0
874 TP 21
875 TN 24
876 FP 3
877 FN 0
878
879 -----Classification Report
-----
880          precision    recall   f1-score   support
881
882      False       1.00      0.89      0.94      27
883      True        0.88      1.00      0.93      21
884
885  micro avg     0.94      0.94      0.94      48
886  macro avg     0.94      0.94      0.94      48
887 weighted avg   0.95      0.94      0.94      48
888
889 Precision =  0.875
890 Rappel=  1.0
891 F_Mesure= 0.9333333333333333
892
893
894
895 -----Naive Bayes-----
896
897
898
899 dataset/HBR/taken/HBR_RandomUnderSampler_default.csv
900
901
902
903 count         92
904 unique        2
905 top           True
906 freq          46
907 Name: is_code_smell, dtype: object
908 [[23  0]
909 [ 0 23]]
910 the recall for this model is : 1.0
911 TP 23
912 TN 23
913 FP 0
914 FN 0
915
916 -----Classification Report
```

```

916 -----
917             precision    recall   f1-score   support
918
919     False        1.00      1.00      1.00      23
920     True         1.00      1.00      1.00      23
921
922     micro avg    1.00      1.00      1.00      46
923     macro avg    1.00      1.00      1.00      46
924 weighted avg   1.00      1.00      1.00      46
925
926 Precision = 1.0
927 Rappel= 1.0
928 F_Mesure= 1.0
929
930
931
932 -----Naive Bayes-----
933
934
935
936 dataset/HBR/taken/HBR_TomekLinks.csv
937
938
939
940 count         96
941 unique        2
942 top           False
943 freq          50
944 Name: is_code_smell, dtype: object
945 [[25  0]
946 [ 0 23]]
947 the recall for this model is : 1.0
948 TP 23
949 TN 25
950 FP 0
951 FN 0
952
953 -----Classification Report
-----
954             precision    recall   f1-score   support
955
956     False        1.00      1.00      1.00      25
957     True         1.00      1.00      1.00      23
958
959     micro avg    1.00      1.00      1.00      48

```

## File - unknown

```

960     macro avg      1.00      1.00      1.00      48
961 weighted avg      1.00      1.00      1.00      48
962
963 Precision = 1.0
964 Rappel= 1.0
965 F_Mesure= 1.0
966
967
968
969 -----Naive Bayes-----
970
971
972
973 dataset/HBR/taken/HBR_CondensedNearestNeighbour.csv
974
975
976
977 count      49
978 unique      2
979 top      True
980 freq      46
981 Name: is_code_smell, dtype: object
982 [[ 0  1]
983 [ 0 24]]
984 the recall for this model is : 1.0
985 TP 24
986 TN 0
987 FP 1
988 FN 0
989 C:\Users\My PC\AppData\Local\Programs\Python\Python36-32
  \lib\site-packages\sklearn\metrics\classification.py:
1143: UndefinedMetricWarning: Precision and F-score are
  ill-defined and being set to 0.0 in labels with no
  predicted samples.
990 'precision', 'predicted', average, warn_for)
991
992 -----Classification Report
-----
993
994
995          precision      recall      f1-score      support
996
997
998
999

```

	precision	recall	f1-score	support
995 False	0.00	0.00	0.00	1
996 True	0.96	1.00	0.98	24
998 micro avg	0.96	0.96	0.96	25
999 macro avg	0.48	0.50	0.49	25

```

1000 weighted avg      0.92      0.96      0.94      25
1001
1002 Precision = 0.96
1003 Rappel= 1.0
1004 F_Mesure= 0.9795918367346939
1005
1006
1007
1008 -----SVM-----
1009
1010
1011
1012 dataset/HBR/taken/HBR_del.csv
1013
1014
1015
1016 count      97
1017 unique      2
1018 top      False
1019 freq      51
1020 Name: is_code_smell, dtype: object
1021 [[22 0]
1022 [ 3 24]]
1023 the recall for this model is : 0.8888888888888888
1024 TP 24
1025 TN 22
1026 FP 0
1027 FN 3
1028
1029 -----Classification Report
-----
1030          precision      recall      f1-score      support
1031
1032      False      0.88      1.00      0.94      22
1033      True      1.00      0.89      0.94      27
1034
1035      micro avg      0.94      0.94      0.94      49
1036      macro avg      0.94      0.94      0.94      49
1037      weighted avg      0.95      0.94      0.94      49
1038
1039 Precision = 1.0
1040 Rappel= 0.8888888888888888
1041 F_Mesure= 0.9411764705882353
1042
1043

```

```
1044
1045 -----SVM-----
1046
1047
1048
1049 dataset/HBR/taken/HBR_RandomUnderSampler.csv
1050
1051
1052
1053 count         92
1054 unique        2
1055 top           True
1056 freq          46
1057 Name: is_code_smell, dtype: object
1058 [[21  0]
1059 [ 6 19]]
1060 the recall for this model is : 0.76
1061 TP 19
1062 TN 21
1063 FP 0
1064 FN 6
1065
1066 -----Classification Report
-----
1067             precision    recall   f1-score   support
1068
1069      False       0.78      1.00      0.88       21
1070      True        1.00      0.76      0.86       25
1071
1072  micro avg     0.87      0.87      0.87       46
1073  macro avg     0.89      0.88      0.87       46
1074 weighted avg   0.90      0.87      0.87       46
1075
1076 Precision =  1.0
1077 Rappel=  0.76
1078 F_Mesure= 0.8636363636363636
1079
1080
1081
1082 -----SVM-----
1083
1084
1085
1086 dataset/HBR/taken/HBR_AllKNN.csv
1087
```

```
1088
1089
1090 count      95
1091 unique     2
1092 top        False
1093 freq       49
1094 Name: is_code_smell, dtype: object
1095 [[25  0]
1096 [ 1 22]]
1097 the recall for this model is : 0.9565217391304348
1098 TP 22
1099 TN 25
1100 FP 0
1101 FN 1
1102
1103 -----Classification Report
-----
1104          precision    recall   f1-score   support
1105
1106      False      0.96      1.00      0.98      25
1107      True       1.00      0.96      0.98      23
1108
1109  micro avg     0.98      0.98      0.98      48
1110  macro avg     0.98      0.98      0.98      48
1111 weighted avg   0.98      0.98      0.98      48
1112
1113 Precision = 1.0
1114 Rappel= 0.9565217391304348
1115 F_Mesure= 0.9777777777777777
1116
1117
1118
1119 -----SVM-----
1120
1121
1122
1123 dataset/HBR/taken/HBR_InstanceHardnessThreshold.csv
1124
1125
1126
1127 count      92
1128 unique     2
1129 top        True
1130 freq       46
1131 Name: is_code_smell, dtype: object
```

```
1132 [[23  0]
1133 [ 1 22]]
1134 the recall for this model is : 0.9565217391304348
1135 TP 22
1136 TN 23
1137 FP 0
1138 FN 1
1139
1140 -----Classification Report
-----
1141             precision    recall   f1-score   support
1142
1143      False        0.96     1.00      0.98      23
1144      True         1.00     0.96      0.98      23
1145
1146  micro avg     0.98     0.98      0.98      46
1147  macro avg     0.98     0.98      0.98      46
1148 weighted avg   0.98     0.98      0.98      46
1149
1150 Precision = 1.0
1151 Rappel= 0.9565217391304348
1152 F_Mesure= 0.9777777777777777
1153
1154
1155
1156 -----SVM-----
1157
1158
1159
1160 dataset/HBR/taken/HBR_NearMiss.csv
1161
1162
1163
1164 count        92
1165 unique       2
1166 top          True
1167 freq          46
1168 Name: is_code_smell, dtype: object
1169 [[24  0]
1170 [ 1 21]]
1171 the recall for this model is : 0.9545454545454546
1172 TP 21
1173 TN 24
1174 FP 0
1175 FN 1
```

```
1176
1177 -----Classification Report
-----
1178             precision    recall   f1-score   support
1179
1180      False        0.96     1.00      0.98      24
1181      True         1.00     0.95      0.98      22
1182
1183  micro avg       0.98     0.98      0.98      46
1184  macro avg       0.98     0.98      0.98      46
1185 weighted avg     0.98     0.98      0.98      46
1186
1187 Precision = 1.0
1188 Rappel= 0.9545454545454546
1189 F_Mesure= 0.9767441860465117
1190
1191
1192
1193 -----SVM-----
1194
1195
1196
1197 dataset/HBR/taken/HBR_OneSidedSelection.csv
1198
1199
1200
1201 count         96
1202 unique        2
1203 top           False
1204 freq          50
1205 Name: is_code_smell, dtype: object
1206 [[28  0]
1207 [ 3 17]]
1208 the recall for this model is : 0.85
1209 TP 17
1210 TN 28
1211 FP 0
1212 FN 3
1213
1214 -----Classification Report
-----
1215             precision    recall   f1-score   support
1216
1217      False        0.90     1.00      0.95      28
1218      True         1.00     0.85      0.92      20
```

```

1219
1220     micro avg      0.94      0.94      0.94      48
1221     macro avg      0.95      0.93      0.93      48
1222 weighted avg      0.94      0.94      0.94      48
1223
1224 Precision = 1.0
1225 Rappel= 0.85
1226 F_Mesure= 0.9189189189189189
1227
1228
1229
1230 -----SVM-----
1231
1232
1233
1234 dataset/HBR/taken/HBR_RandomUnderSampler_default.csv
1235
1236
1237
1238 count      92
1239 unique      2
1240 top      True
1241 freq      46
1242 Name: is_code_smell, dtype: object
1243 [[21  0]
1244 [ 5 20]]
1245 the recall for this model is : 0.8
1246 TP 20
1247 TN 21
1248 FP 0
1249 FN 5
1250
1251 -----Classification Report
-----
1252
1253
1254
1255
1256
1257
1258
1259
1260
1261
1262

```

	precision	recall	f1-score	support
False	0.81	1.00	0.89	21
True	1.00	0.80	0.89	25
micro avg	0.89	0.89	0.89	46
macro avg	0.90	0.90	0.89	46
weighted avg	0.91	0.89	0.89	46

```
1263 F_Mesure= 0.888888888888889
1264
1265
1266
1267 -----SVM-----
1268
1269
1270
1271 dataset/HBR/taken/HBR_TomekLinks.csv
1272
1273
1274
1275 count         96
1276 unique        2
1277 top           False
1278 freq          50
1279 Name: is_code_smell, dtype: object
1280 [[26  0]
1281 [ 3 19]]
1282 the recall for this model is : 0.8636363636363636
1283 TP 19
1284 TN 26
1285 FP 0
1286 FN 3
1287
1288 -----Classification Report
-----
1289             precision    recall   f1-score   support
1290
1291      False       0.90      1.00      0.95       26
1292      True        1.00      0.86      0.93       22
1293
1294  micro avg     0.94      0.94      0.94       48
1295  macro avg     0.95      0.93      0.94       48
1296 weighted avg   0.94      0.94      0.94       48
1297
1298 Precision = 1.0
1299 Rappel= 0.8636363636363636
1300 F_Mesure= 0.9268292682926829
1301
1302 Process finished with exit code 0
1303
```