

```
1 "C:\Users\My PC\AppData\Local\Programs\Python\Python36-32\  
2 python.exe" D:/pfe/Projets/pfe/apprentissage_HAS.py  
3  
4  
5 -----Decision Tree-----  
6  
7  
8  
9 dataset/HAS/taken/HAS_del.csv  
10  
11  
12  
13 count      285  
14 unique     2  
15 top        False  
16 freq       248  
17 Name: is_code_smell, dtype: object  
18 [[72  1]  
19 [ 0 13]]  
20 the recall for this model is : 1.0  
21 TP 13  
22 TN 72  
23 FP 1  
24 FN 0  
25  
26 -----Classification Report  
-----  
27          precision    recall   f1-score   support  
28  
29      False      1.00      0.99      0.99      73  
30      True       0.93      1.00      0.96      13  
31  
32  micro avg     0.99      0.99      0.99      86  
33  macro avg     0.96      0.99      0.98      86  
34 weighted avg   0.99      0.99      0.99      86  
35  
36 Precision =  0.9285714285714286  
37 Rappel= 1.0  
38 F_Mesure= 0.962962962962963  
39  
40  
41  
42 -----Decision Tree-----  
43
```

```
44
45
46 dataset/HAS/taken/HAS_RandomUnderSampler.csv
47
48
49
50 count      74
51 unique      2
52 top        True
53 freq       37
54 Name: is_code_smell, dtype: object
55 [[13  0]
56 [ 0 10]]
57 the recall for this model is : 1.0
58 TP 10
59 TN 13
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      13
67      True      1.00      1.00      1.00      10
68
69  micro avg     1.00      1.00      1.00      23
70  macro avg     1.00      1.00      1.00      23
71 weighted avg   1.00      1.00      1.00      23
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/HAS/taken/HAS_AllKNN.csv
84
85
86
87 count      275
```

```
88 unique          2
89 top      False
90 freq       238
91 Name: is_code_smell, dtype: object
92 [[71  0]
93 [ 0 12]]
94 the recall for this model is : 1.0
95 TP 12
96 TN 71
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      71
104      True         1.00     1.00      1.00      12
105
106  micro avg      1.00     1.00      1.00      83
107  macro avg      1.00     1.00      1.00      83
108 weighted avg    1.00     1.00      1.00      83
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/HAS/taken/HAS_InstanceHardnessThreshold.csv
121
122
123
124 count          271
125 unique          2
126 top      False
127 freq       234
128 Name: is_code_smell, dtype: object
129 [[66  0]
130 [ 0 16]]
131 the recall for this model is : 1.0
```

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```
132 TP 16
133 TN 66
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       66
141      True         1.00     1.00      1.00       16
142
143  micro avg     1.00     1.00      1.00       82
144  macro avg     1.00     1.00      1.00       82
145 weighted avg   1.00     1.00      1.00       82
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/HAS/taken/HAS_NearMiss.csv
158
159
160
161 count        74
162 unique       2
163 top          True
164 freq          37
165 Name: is_code_smell, dtype: object
166 [[14  0]
167 [ 0  9]]
168 the recall for this model is : 1.0
169 TP 9
170 TN 14
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/HAS/taken/HAS_OneSidedSelection.csv			
195				
196				
197				
198	count	68		
199	unique	2		
200	top	True		
201	freq	37		
202	Name: is_code_smell, dtype: object			
203	[[10 1]			
204	[ 0 10]]			
205	the recall for this model is : 1.0			
206	TP 10			
207	TN 10			
208	FP 1			
209	FN 0			
210				
211	-----Classification Report			
212				
213				
214	precision	recall	f1-score	support
215	False	1.00	0.91	0.95
216	True	0.91	1.00	0.95
217	micro avg	0.95	0.95	0.95
218	macro avg	0.95	0.95	0.95

```
219 weighted avg      0.96      0.95      0.95      21
220
221 Precision = 0.9090909090909091
222 Rappel= 1.0
223 F_Mesure= 0.9523809523809523
224
225
226
227 -----Decision Tree-----
228
229
230
231 dataset/HAS/taken/HAS_RandomUnderSampler_default.csv
232
233
234
235 count      74
236 unique     2
237 top        True
238 freq       37
239 Name: is_code_smell, dtype: object
240 [[12  0]
241 [ 0 11]]
242 the recall for this model is : 1.0
243 TP 11
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      11
253
254  micro avg     1.00      1.00      1.00      23
255  macro avg     1.00      1.00      1.00      23
256 weighted avg   1.00      1.00      1.00      23
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/HAS/taken/HAS_TomekLinks.csv
269
270
271
272 count      284
273 unique     2
274 top        False
275 freq       247
276 Name: is_code_smell, dtype: object
277 [[75  0]
278 [ 0 11]]
279 the recall for this model is : 1.0
280 TP 11
281 TN 75
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      75
289      True       1.00      1.00      1.00      11
290
291  micro avg     1.00      1.00      1.00      86
292  macro avg     1.00      1.00      1.00      86
293 weighted avg   1.00      1.00      1.00      86
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/HAS/taken/HAS_CondensedNearestNeighbour.csv
306
```

```
307
308
309 count      45
310 unique     2
311 top        True
312 freq       37
313 Name: is_code_smell, dtype: object
314 [[ 3  0]
315 [ 0 11]]
316 the recall for this model is : 1.0
317 TP 11
318 TN 3
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       3
326      True      1.00      1.00      1.00      11
327
328  micro avg      1.00      1.00      1.00      14
329  macro avg      1.00      1.00      1.00      14
330 weighted avg      1.00      1.00      1.00      14
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/HAS/taken/HAS_del.csv
343
344
345
346 count      285
347 unique     2
348 top        False
349 freq       248
350 Name: is_code_smell, dtype: object
```

```
351 [[77  0]
352 [ 0  9]]
353 the recall for this model is : 1.0
354 TP 9
355 TN 77
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      77
363      True        1.00     1.00      1.00       9
364
365  micro avg     1.00     1.00      1.00      86
366  macro avg     1.00     1.00      1.00      86
367 weighted avg   1.00     1.00      1.00      86
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/HAS/taken/HAS_RandomUnderSampler.csv
380
381
382
383 count         74
384 unique        2
385 top           True
386 freq          37
387 Name: is_code_smell, dtype: object
388 [[12  0]
389 [ 0 11]]
390 the recall for this model is : 1.0
391 TP 11
392 TN 12
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      12
400      True        1.00     1.00      1.00      11
401
402  micro avg     1.00     1.00      1.00      23
403  macro avg     1.00     1.00      1.00      23
404 weighted avg   1.00     1.00      1.00      23
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/HAS/taken/HAS_AllKNN.csv
417
418
419
420 count         275
421 unique        2
422 top           False
423 freq          238
424 Name: is_code_smell, dtype: object
425 [[74  0]
426 [ 0  9]]
427 the recall for this model is : 1.0
428 TP 9
429 TN 74
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      74
437      True        1.00     1.00      1.00       9
```

```
438
439      micro avg       1.00       1.00       1.00       83
440      macro avg       1.00       1.00       1.00       83
441      weighted avg    1.00       1.00       1.00       83
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/HAS/taken/HAS_InstanceHardnessThreshold.csv
454
455
456
457 count       271
458 unique      2
459 top        False
460 freq        234
461 Name: is_code_smell, dtype: object
462 [[72  0]
463 [ 0 10]]
464 the recall for this model is : 1.0
465 TP 10
466 TN 72
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       72
474      True        1.00       1.00       1.00       10
475
476      micro avg    1.00       1.00       1.00       82
477      macro avg    1.00       1.00       1.00       82
478      weighted avg 1.00       1.00       1.00       82
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/HAS/taken/HAS_NearMiss.csv
491
492
493
494 count      74
495 unique     2
496 top        True
497 freq       37
498 Name: is_code_smell, dtype: object
499 [[13  0]
500 [ 0 10]]
501 the recall for this model is : 1.0
502 TP 10
503 TN 13
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      13
511      True       1.00      1.00      1.00      10
512
513  micro avg     1.00      1.00      1.00      23
514  macro avg     1.00      1.00      1.00      23
515 weighted avg   1.00      1.00      1.00      23
516
517 Precision = 1.0
518 Rappel= 1.0
519 F_Mesure= 1.0
520
521
522
523 -----Random Forest-----
524
525
```

```
526
527 dataset/HAS/taken/HAS_OneSidedSelection.csv
528
529
530
531 count      68
532 unique     2
533 top        True
534 freq       37
535 Name: is_code_smell, dtype: object
536 [[10  0]
537 [ 0 11]]
538 the recall for this model is : 1.0
539 TP 11
540 TN 10
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      10
548      True        1.00     1.00      1.00      11
549
550  micro avg     1.00     1.00      1.00      21
551  macro avg     1.00     1.00      1.00      21
552 weighted avg   1.00     1.00      1.00      21
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/HAS/taken/HAS_RandomUnderSampler_default.csv
565
566
567
568 count      74
569 unique     2
```

```
570 top      True
571 freq      37
572 Name: is_code_smell, dtype: object
573 [[13  0]
574 [ 0 10]]
575 the recall for this model is : 1.0
576 TP 10
577 TN 13
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      13
585      True        1.00     1.00      1.00      10
586
587  micro avg     1.00     1.00      1.00      23
588  macro avg     1.00     1.00      1.00      23
589 weighted avg   1.00     1.00      1.00      23
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/HAS/taken/HAS_TomekLinks.csv
602
603
604
605 count      284
606 unique     2
607 top        False
608 freq       247
609 Name: is_code_smell, dtype: object
610 [[75  0]
611 [ 0 11]]
612 the recall for this model is : 1.0
613 TP 11
```

```
614 TN 75
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      75
622      True         1.00     1.00      1.00      11
623
624      micro avg     1.00     1.00      1.00      86
625      macro avg     1.00     1.00      1.00      86
626 weighted avg     1.00     1.00      1.00      86
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/HAS/taken/HAS_CondensedNearestNeighbour.csv
639
640
641
642 count        45
643 unique       2
644 top          True
645 freq          37
646 Name: is_code_smell, dtype: object
647 [[ 2  0]
648 [ 0 12]]
649 the recall for this model is : 1.0
650 TP 12
651 TN 2
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      2
659      True       1.00      1.00      1.00     12
660
661      micro avg    1.00      1.00      1.00     14
662      macro avg    1.00      1.00      1.00     14
663      weighted avg 1.00      1.00      1.00     14
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/HAS/taken/HAS_del.csv
676
677
678
679 count      285
680 unique      2
681 top        False
682 freq       248
683 Name: is_code_smell, dtype: object
684 [[45 24]
685 [ 0 17]]
686 the recall for this model is : 1.0
687 TP 17
688 TN 45
689 FP 24
690 FN 0
691
692 -----Classification Report
-----
693          precision    recall   f1-score   support
694
695      False      1.00      0.65      0.79      69
696      True       0.41      1.00      0.59      17
697
698      micro avg    0.72      0.72      0.72      86
699      macro avg    0.71      0.83      0.69      86
700      weighted avg 0.88      0.72      0.75      86

```

```
701
702 Precision = 0.4146341463414634
703 Rappel= 1.0
704 F_Mesure= 0.5862068965517241
705
706
707
708 -----Naive Bayes-----
709
710
711
712 dataset/HAS/taken/HAS_RandomUnderSampler.csv
713
714
715
716 count 74
717 unique 2
718 top True
719 freq 37
720 Name: is_code_smell, dtype: object
721 [[10 4]
722 [ 0 9]]
723 the recall for this model is : 1.0
724 TP 9
725 TN 10
726 FP 4
727 FN 0
728
729 -----Classification Report
-----
730 precision recall f1-score support
731
732 False 1.00 0.71 0.83 14
733 True 0.69 1.00 0.82 9
734
735 micro avg 0.83 0.83 0.83 23
736 macro avg 0.85 0.86 0.83 23
737 weighted avg 0.88 0.83 0.83 23
738
739 Precision = 0.6923076923076923
740 Rappel= 1.0
741 F_Mesure= 0.8181818181818181
742
743
744
```

```
745 -----Naive Bayes-----
746
747
748
749 dataset/HAS/taken/HAS_AllKNN.csv
750
751
752
753 count      275
754 unique      2
755 top        False
756 freq       238
757 Name: is_code_smell, dtype: object
758 [[64  8]
759 [ 0 11]]
760 the recall for this model is : 1.0
761 TP 11
762 TN 64
763 FP 8
764 FN 0
765
766 -----Classification Report
-----
767
768
769          precision    recall   f1-score   support
770
771
772      False      1.00      0.89      0.94      72
773      True      0.58      1.00      0.73      11
774
775
776      micro avg     0.90      0.90      0.90      83
777      macro avg     0.79      0.94      0.84      83
778      weighted avg    0.94      0.90      0.91      83
779
780
781
782 -----Naive Bayes-----
783
784
785
786 dataset/HAS/taken/HAS_InstanceHardnessThreshold.csv
787
788
```

```
789
790 count      271
791 unique     2
792 top        False
793 freq       234
794 Name: is_code_smell, dtype: object
795 [[60  8]
796 [ 0 14]]
797 the recall for this model is : 1.0
798 TP 14
799 TN 60
800 FP 8
801 FN 0
802
803 -----Classification Report
-----
804          precision    recall   f1-score   support
805
806      False      1.00      0.88      0.94      68
807      True       0.64      1.00      0.78      14
808
809  micro avg     0.90      0.90      0.90      82
810  macro avg     0.82      0.94      0.86      82
811 weighted avg   0.94      0.90      0.91      82
812
813 Precision =  0.6363636363636364
814 Rappel= 1.0
815 F_Mesure= 0.7777777777777778
816
817
818
819 -----Naive Bayes-----
820
821
822
823 dataset/HAS/taken/HAS_NearMiss.csv
824
825
826
827 count      74
828 unique     2
829 top        True
830 freq       37
831 Name: is_code_smell, dtype: object
832 [[ 5  5]]
```

```
833 [ 0 13]
834 the recall for this model is : 1.0
835 TP 13
836 TN 5
837 FP 5
838 FN 0
839
840 -----Classification Report
-----
841 precision recall f1-score support
842
843 False 1.00 0.50 0.67 10
844 True 0.72 1.00 0.84 13
845
846 micro avg 0.78 0.78 0.78 23
847 macro avg 0.86 0.75 0.75 23
848 weighted avg 0.84 0.78 0.76 23
849
850 Precision = 0.7222222222222222
851 Rappel= 1.0
852 F_Mesure= 0.8387096774193548
853
854
855
856 -----Naive Bayes-----
857
858
859
860 dataset/HAS/taken/HAS_OneSidedSelection.csv
861
862
863
864 count 68
865 unique 2
866 top True
867 freq 37
868 Name: is_code_smell, dtype: object
869 [[6 6]
870 [0 9]]
871 the recall for this model is : 1.0
872 TP 9
873 TN 6
874 FP 6
875 FN 0
876
```

```
877 -----Classification Report
-----
878          precision    recall   f1-score   support
879
880      False       1.00     0.50      0.67      12
881      True        0.60     1.00      0.75       9
882
883  micro avg     0.71     0.71      0.71      21
884  macro avg     0.80     0.75      0.71      21
885 weighted avg   0.83     0.71      0.70      21
886
887 Precision =  0.6
888 Rappel=  1.0
889 F_Mesure= 0.7499999999999999
890
891
892
893 -----Naive Bayes-----
894
895
896
897 dataset/HAS/taken/HAS_RandomUnderSampler_default.csv
898
899
900
901 count       74
902 unique      2
903 top         True
904 freq         37
905 Name: is_code_smell, dtype: object
906 [[ 6  2]
907 [ 0 15]]
908 the recall for this model is : 1.0
909 TP 15
910 TN 6
911 FP 2
912 FN 0
913
914 -----Classification Report
-----
915          precision    recall   f1-score   support
916
917      False       1.00     0.75      0.86       8
918      True        0.88     1.00      0.94      15
919
```

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```
920     micro avg      0.91      0.91      0.91      23
921     macro avg      0.94      0.88      0.90      23
922 weighted avg      0.92      0.91      0.91      23
923
924 Precision = 0.8823529411764706
925 Rappel= 1.0
926 F_Mesure= 0.9375
927
928
929
930 -----Naive Bayes-----
931
932
933
934 dataset/HAS/taken/HAS_TomekLinks.csv
935
936
937
938 count      284
939 unique      2
940 top        False
941 freq       247
942 Name: is_code_smell, dtype: object
943 [[43 27]
944 [ 0 16]]
945 the recall for this model is : 1.0
946 TP 16
947 TN 43
948 FP 27
949 FN 0
950
951 -----Classification Report
-----
952
953
954     precision      recall      f1-score      support
955
956
957     False          1.00      0.61      0.76      70
958     True           0.37      1.00      0.54      16
959
960
961     micro avg      0.69      0.69      0.69      86
962     macro avg      0.69      0.81      0.65      86
963 weighted avg      0.88      0.69      0.72      86
964
965 Precision = 0.37209302325581395
966 Rappel= 1.0
967 F_Mesure= 0.5423728813559322
```

```
964
965
966
967 -----Naive Bayes-----
968
969
970
971 dataset/HAS/taken/HAS_CondensedNearestNeighbour.csv
972
973
974
975 count          45
976 unique         2
977 top            True
978 freq           37
979 Name: is_code_smell, dtype: object
980 [[ 1  0]
981 [ 0 13]]
982 the recall for this model is : 1.0
983 TP 13
984 TN 1
985 FP 0
986 FN 0
987
988 -----Classification Report
-----
989             precision    recall   f1-score   support
990
991      False       1.00     1.00      1.00        1
992      True       1.00     1.00      1.00      13
993
994  micro avg     1.00     1.00      1.00      14
995  macro avg     1.00     1.00      1.00      14
996 weighted avg   1.00     1.00      1.00      14
997
998 Precision = 1.0
999 Rappel= 1.0
1000 F_Mesure= 1.0
1001
1002
1003
1004 -----SVM-----
1005
1006
1007
```

```
1008 dataset/HAS/taken/HAS_del.csv
1009
1010
1011
1012 count      285
1013 unique     2
1014 top        False
1015 freq       248
1016 Name: is_code_smell, dtype: object
1017 [[71  2]
1018 [ 2 11]]
1019 the recall for this model is : 0.8461538461538461
1020 TP 11
1021 TN 71
1022 FP 2
1023 FN 2
1024
1025 -----Classification Report
-----
1026          precision    recall   f1-score   support
1027
1028      False      0.97      0.97      0.97      73
1029      True      0.85      0.85      0.85      13
1030
1031  micro avg      0.95      0.95      0.95      86
1032  macro avg      0.91      0.91      0.91      86
1033 weighted avg      0.95      0.95      0.95      86
1034
1035 Precision = 0.8461538461538461
1036 Rappel= 0.8461538461538461
1037 F_Mesure= 0.8461538461538461
1038
1039
1040
1041 -----SVM-----
1042
1043
1044
1045 dataset/HAS/taken/HAS_RandomUnderSampler.csv
1046
1047
1048
1049 count      74
1050 unique     2
1051 top        True
```

```
1052 freq         37
1053 Name: is_code_smell, dtype: object
1054 [[12  0]
1055 [ 0 11]]
1056 the recall for this model is : 1.0
1057 TP 11
1058 TN 12
1059 FP 0
1060 FN 0
1061
1062 -----Classification Report
-----
1063             precision    recall   f1-score   support
1064
1065      False        1.00     1.00      1.00      12
1066      True        1.00     1.00      1.00      11
1067
1068  micro avg     1.00     1.00      1.00      23
1069  macro avg     1.00     1.00      1.00      23
1070 weighted avg   1.00     1.00      1.00      23
1071
1072 Precision = 1.0
1073 Rappel= 1.0
1074 F_Mesure= 1.0
1075
1076
1077
1078 -----SVM-----
1079
1080
1081
1082 dataset/HAS/taken/HAS_AllKNN.csv
1083
1084
1085
1086 count         275
1087 unique        2
1088 top           False
1089 freq          238
1090 Name: is_code_smell, dtype: object
1091 [[77  0]
1092 [ 1  5]]
1093 the recall for this model is : 0.8333333333333334
1094 TP 5
1095 TN 77
```

File - unknown

```
1096 FP 0
1097 FN 1
1098
1099 -----Classification Report
-----
1100          precision    recall   f1-score   support
1101
1102      False       0.99     1.00      0.99      77
1103      True        1.00     0.83      0.91       6
1104
1105  micro avg     0.99     0.99      0.99      83
1106  macro avg     0.99     0.92      0.95      83
1107 weighted avg   0.99     0.99      0.99      83
1108
1109 Precision = 1.0
1110 Rappel= 0.8333333333333334
1111 F_Mesure= 0.9090909090909091
1112
1113
1114
1115 -----SVM-----
1116
1117
1118
1119 dataset/HAS/taken/HAS_InstanceHardnessThreshold.csv
1120
1121
1122
1123 count         271
1124 unique        2
1125 top           False
1126 freq          234
1127 Name: is_code_smell, dtype: object
1128 [[68  0]
1129 [ 0 14]]
1130 the recall for this model is : 1.0
1131 TP 14
1132 TN 68
1133 FP 0
1134 FN 0
1135
1136 -----Classification Report
-----
1137          precision    recall   f1-score   support
1138
```

## File - unknown

```

1139      False      1.00      1.00      1.00      68
1140      True       1.00      1.00      1.00      14
1141
1142      micro avg     1.00      1.00      1.00      82
1143      macro avg     1.00      1.00      1.00      82
1144      weighted avg    1.00      1.00      1.00      82
1145
1146 Precision = 1.0
1147 Rappel= 1.0
1148 F_Mesure= 1.0
1149
1150
1151
1152 -----SVM-----
1153
1154
1155
1156 dataset/HAS/taken/HAS_NearMiss.csv
1157
1158
1159
1160 count      74
1161 unique      2
1162 top        True
1163 freq        37
1164 Name: is_code_smell, dtype: object
1165 [[11  0]
1166 [ 2 10]]
1167 the recall for this model is : 0.8333333333333334
1168 TP 10
1169 TN 11
1170 FP 0
1171 FN 2
1172
1173 -----Classification Report
-----
1174          precision      recall      f1-score      support
1175
1176      False      0.85      1.00      0.92      11
1177      True       1.00      0.83      0.91      12
1178
1179      micro avg     0.91      0.91      0.91      23
1180      macro avg     0.92      0.92      0.91      23
1181      weighted avg    0.93      0.91      0.91      23
1182

```

```
1183 Precision = 1.0
1184 Rappel= 0.833333333333334
1185 F_Mesure= 0.9090909090909091
1186
1187
1188
1189 -----SVM-----
1190
1191
1192
1193 dataset/HAS/taken/HAS_OneSidedSelection.csv
1194
1195
1196
1197 count      68
1198 unique     2
1199 top        True
1200 freq       37
1201 Name: is_code_smell, dtype: object
1202 [[8 0]
1203 [4 9]]
1204 the recall for this model is : 0.6923076923076923
1205 TP 9
1206 TN 8
1207 FP 0
1208 FN 4
1209
1210 -----Classification Report
-----
1211          precision    recall   f1-score   support
1212
1213      False      0.67      1.00      0.80         8
1214      True       1.00      0.69      0.82        13
1215
1216  micro avg     0.81      0.81      0.81        21
1217  macro avg     0.83      0.85      0.81        21
1218 weighted avg   0.87      0.81      0.81        21
1219
1220 Precision = 1.0
1221 Rappel= 0.6923076923076923
1222 F_Mesure= 0.8181818181818181
1223
1224
1225
1226 -----SVM-----
```

```
1227
1228
1229
1230 dataset/HAS/taken/HAS_RandomUnderSampler_default.csv
1231
1232
1233
1234 count      74
1235 unique      2
1236 top        True
1237 freq       37
1238 Name: is_code_smell, dtype: object
1239 [[13  0]
1240 [ 0 10]]
1241 the recall for this model is : 1.0
1242 TP 10
1243 TN 13
1244 FP 0
1245 FN 0
1246
1247 -----Classification Report
-----
1248             precision    recall   f1-score   support
1249
1250     False       1.00      1.00      1.00      13
1251     True       1.00      1.00      1.00      10
1252
1253   micro avg     1.00      1.00      1.00      23
1254   macro avg     1.00      1.00      1.00      23
1255 weighted avg     1.00      1.00      1.00      23
1256
1257 Precision = 1.0
1258 Rappel= 1.0
1259 F_Mesure= 1.0
1260
1261
1262
1263 -----SVM-----
1264
1265
1266
1267 dataset/HAS/taken/HAS_TomekLinks.csv
1268
1269
1270
```

```
1271 count      284
1272 unique      2
1273 top        False
1274 freq       247
1275 Name: is_code_smell, dtype: object
1276 [[71  1]
1277 [ 0 14]]
1278 the recall for this model is : 1.0
1279 TP 14
1280 TN 71
1281 FP 1
1282 FN 0
1283
1284 -----Classification Report
-----
1285          precision    recall   f1-score   support
1286
1287      False      1.00      0.99      0.99      72
1288      True      0.93      1.00      0.97      14
1289
1290  micro avg      0.99      0.99      0.99      86
1291  macro avg      0.97      0.99      0.98      86
1292 weighted avg      0.99      0.99      0.99      86
1293
1294 Precision =  0.9333333333333333
1295 Rappel= 1.0
1296 F_Mesure= 0.9655172413793104
1297
1298
1299
1300 -----SVM-----
1301
1302
1303
1304 dataset/HAS/taken/HAS_CondensedNearestNeighbour.csv
1305
1306
1307
1308 count      45
1309 unique      2
1310 top        True
1311 freq       37
1312 Name: is_code_smell, dtype: object
1313 [[ 0  3]
1314 [ 0 11]]
```

```
1315 the recall for this model is : 1.0
1316 TP 11
1317 TN 0
1318 FP 3
1319 FN 0
1320
1321 -----Classification Report
-----
1322 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.
1323     'precision', 'predicted', average, warn_for)
1324             precision      recall    f1-score   support
1325
1326     False        0.00      0.00      0.00       3
1327     True        0.79      1.00      0.88      11
1328
1329     micro avg    0.79      0.79      0.79      14
1330     macro avg    0.39      0.50      0.44      14
1331 weighted avg   0.62      0.79      0.69      14
1332
1333 Precision =  0.7857142857142857
1334 Rappel= 1.0
1335 F_Mesure= 0.88
1336
1337 Process finished with exit code 0
1338
```