F_x-measure

2DMI20 Software security

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The F_x-measure is given by the following equation:

In[1]:=
```
Fx[x_, recall_, precision_] := ((1 + x^2) * recall * precision) / (recall + (x^2 * precision))
```

We have that recall is valued twice as high as precision. This probably suggests we have $x = 2$, since, according to the slides, we have that

> "*Two commonly used values for x are* 2, *which weighs recall higher than precision...*"

Also, we have that

> "*The F_x-measure was derived so that it measures the effectiveness with respect to a user who attaches x times as much importance to recall as precision*"

Thus, we can indeed set

In[2]:=
```
x = 2;
```

Analyser A1

For the first analyser, we have that the precision is 50%, while the recall is 90%. This gives us the following:

In[3]:=
```
precision1 = 50 / 100 (* % *);
recall1 = 90 / 100 (* % *);
Fx[x, recall1, precision1] // N
```

Out[5]=
```
0.775862
```

Analyser A2

For the second analyser, we have that the precision is 70%, while the recall is 80%. This gives us the following:

In[6]:=
```
precision2 = 70/(100 (* % *));
recall2 = 80/(100 (* % *));
Fx[x, recall2, precision2] // N
```

Out[8]= 0.777778

Results

We can see that the F_x-measure is higher (and thus better) for the second analyser. This is somewhat unexpected; given that we found recall twice as important as precision, the first analyser is expected to perform better due to its higher recall. However, the first analyser's recall is so much lower that it still performs worse than the second analyser.