Accuracy

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Introduction

In plots we recast the results of simulations in terms of accuracy. We compute the accuracy of each method (continous or categorical), for each level of ρ (see below) by computing the the following quantities:

- false positive (FP) runs with with a significant test under a true null hypothesis

- true positive (TP) runs with a significant test under a false null-hypothesis

- true negative (TN) runs with a nonsignificant result under a true null-hypothesis

- false negative (FN) runs with a nonsignificant result under a false null-hypothesis

Plots to be produced:

- Sensitivity for all 4 of the decision possibilities (continuous ignoring categorical, categorical ignoring continuous, both, either), with X axis being rho (Figure 1)

- PPV for the 4 decision possibilities, with X axis being rho (Figure 2)

- Bar chart with the specificity for the 4 decision possibilities

- Bar chart with the NPV (aggregated over rho) for the 4 decision possibilities

Setup

Model

Two continuous latent variables (η and ξ) are created with N cases, sharing a correlation equal to ρ. A measure x of ξ is created with reliability rel, and then is dichotomized accordingly to p $1-p$ into c. The correlations $r_p e = r(\eta, x)$ and $r_p b = r(\eta, c)$ are computed, their p-value and significance (at .05) is recorded.

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Design

$\rho = (0, .1, .2, .3, .4, .5, .6, .7) \ rel = (0.3, 0.4, 0.5, 0.6, 0.7, 0.80.9)$

Computation of quantities

- Continuous false positive (FP_C) freq of runs with continuous test p.<.05 and ρ=0

- Continuous true positive (TP_C) freq of runs with continuous test p.<.05 and ρ>0

- Continuous true negative (TN_C) freq of runs with continuous test p.>=.05 and ρ=0

- false negative (FN_C) freq of runs with continuous test p.>=.05 and ρ>0

The same quantities are computed for the categorical indicator (*_S).

```
Accuracy for continuous indicator

  rho     SENS_C     SPEC_C
1 0.1 0.1050000 0.9507143
2 0.2 0.2511429 0.9507143
3 0.3 0.4511429 0.9507143
4 0.4 0.6090000 0.9507143
5 0.5 0.7204286 0.9507143
6 0.6 0.7974286 0.9507143
7 0.7 0.8618571 0.9507143


Accuracy for categorical indicator

  rho      SENS_S      SPEC_S
1 0.1 0.08414286 0.9498571
2 0.2 0.17957143 0.9498571
3 0.3 0.33785714 0.9498571
4 0.4 0.47128571 0.9498571
5 0.5 0.61057143 0.9498571
6 0.6 0.70114286 0.9498571
7 0.7 0.77900000 0.9498571


  con.sig cat.sig rho freq
1       0       0 0.0 6438
2       1       0 0.0  211
3       0       1 0.0  217
4       1       1 0.0  134
5       0       0 0.1 6026
6       1       0 0.1  385
7       0       1 0.1  239
```

```
8         1         1 0.1  350
9         0         0 0.2 4955
10        1         0 0.2  788
11        0         1 0.2  287
12        1         1 0.2  970
13        0         0 0.3 3590
14        1         0 0.3 1045
15        0         1 0.3  252
16        1         1 0.3 2113
17        0         0 0.4 2570
18        1         0 0.4 1131
19        0         1 0.4  167
20        1         1 0.4 3132
21        0         0 0.5 1795
22        1         0 0.5  931
23        0         1 0.5  162
24        1         1 0.5 4112
25        0         0 0.6 1286
26        1         0 0.6  806
27        0         1 0.6  132
28        1         1 0.6 4776
29        0         0 0.7  863
30        1         0 0.7  684
31        0         1 0.7  104
32        1         1 0.7 5349
```

Accuracy for BOTH indicators significant

```
  rho      SENS_B     SPEC_B
1 0.1 0.04761905 0.9808571
2 0.2 0.12170640 0.9808571
3 0.3 0.23186656 0.9808571
4 0.4 0.30911962 0.9808571
5 0.5 0.37005040 0.9808571
6 0.6 0.40557065 0.9808571
7 0.7 0.43315248 0.9808571
```

Accuracy for EITHER indicators significant

```
  rho     SENS_E    SPEC_E
1 0.1 0.1391429 0.9197143
2 0.2 0.2921429 0.9197143
3 0.3 0.4871429 0.9197143
4 0.4 0.6328571 0.9197143
5 0.5 0.7435714 0.9197143
6 0.6 0.8162857 0.9197143
7 0.7 0.8767143 0.9197143
```

Figure 1: Sensitivity of the two methods