Probabilities of significance for false null-hypotheses

Mc

March 14, 2014

Introduction

In simulations we checked the propability of an indicator (continuous or media-split) as the probability (frequency of runs) of being nonsignificant when it should not be (latent effect size is greater than zero) and then the probability of being significant when it should be .

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 $r_pe = r(\eta, x)$ and $r_pb = r(\eta, c)$ are computed, their p-value and significance (at .05) is recorded.

Design

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

Propabilities of nonsignificant tests for ρ>0

Here we compute the proportions of runs in which we have a nonsignificant result on either or both of the tests and ρ>0 The probabilities are the following: f_1 is the number of times the indicator was the only one nonsignificant (so the other was) for a given ρ, f_t is the number of runs for a given ρ. The probability P is $P = f_1/f_t$)

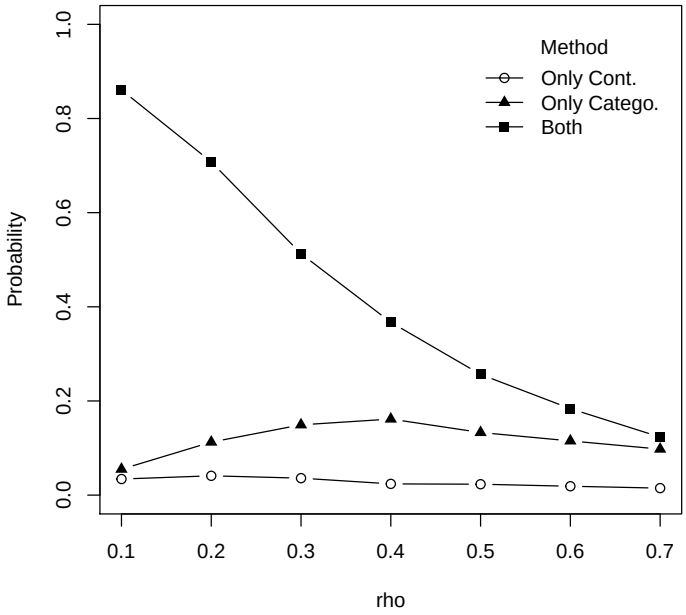
```
Probability of only Categorical as nonsignificant
```

```
[1] 0.05500000 0.11257143 0.14928571 0.16157143 0.13300000 0.11514286 0.09771429
```

```
Probability of  only Continuous was nonsignificant
```

```
Probability of  both  nonsignificant
```

Figure 1: Probabilities of nonsignificant tests under false null-hypothesis



Propabilities of being significant as a functions of ρ

The probabilities are the following: f_1 is the number of times the indicator was the only one significant (so the other was not) for a given ρ, f_t is the number of runs for a given ρ. The probability P is $P = f_1/f_t$)

```
Probabilites only Continuous was significant under the null hypothesis

[1] 0.05500000 0.11257143 0.14928571 0.16157143 0.13300000 0.11514286 0.09771429

Probabilites of only Categorical significant under true hypotheses

[1] 0.03414286 0.04100000 0.03600000 0.02385714 0.02314286 0.01885714 0.01485714

Probability of  both  significant
```

Figure 2: Probability of being significant