

Probabilities of significance

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Reference

Based on Meetings note

("Meetings for Significance & Accuracy", 24-02-06

What's new

We plot the probabilities of an indicator to be significant as follows:

- 1 a. Either continuous or categorical are significant
 b. Continuous significant (ignoring categorical)
 c. Categorical significant (ignoring continuous)
- 2 a. Only continuous significant
 b. Only categorical significant
 c. Both continuous and categorical are significant
 d. Neither continuous and categorical are significant

Introduction

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

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 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

$\rho = (0, .1, .2, .3, .4, .5, .6, .7)$ $rel = (0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9)$

Probabilities as a functions of ρ

The computation follows Jamie's computation at the last meeting. The probabilities are the following: f_0 is the number of times the indicator was significant when the null hypothesis was true, f_1 is the probability of being the only one significant for a given $\rho > 0$. The probability P is $\frac{P=f_1}{(f_1+f_0)}$

Number of times Either Continuos or Categorical was significant under the null hypothesis

[1] 562

Number of times Continuous was significant under the null hypothesis

[1] 345

P of Continuos significant under true hypotheses

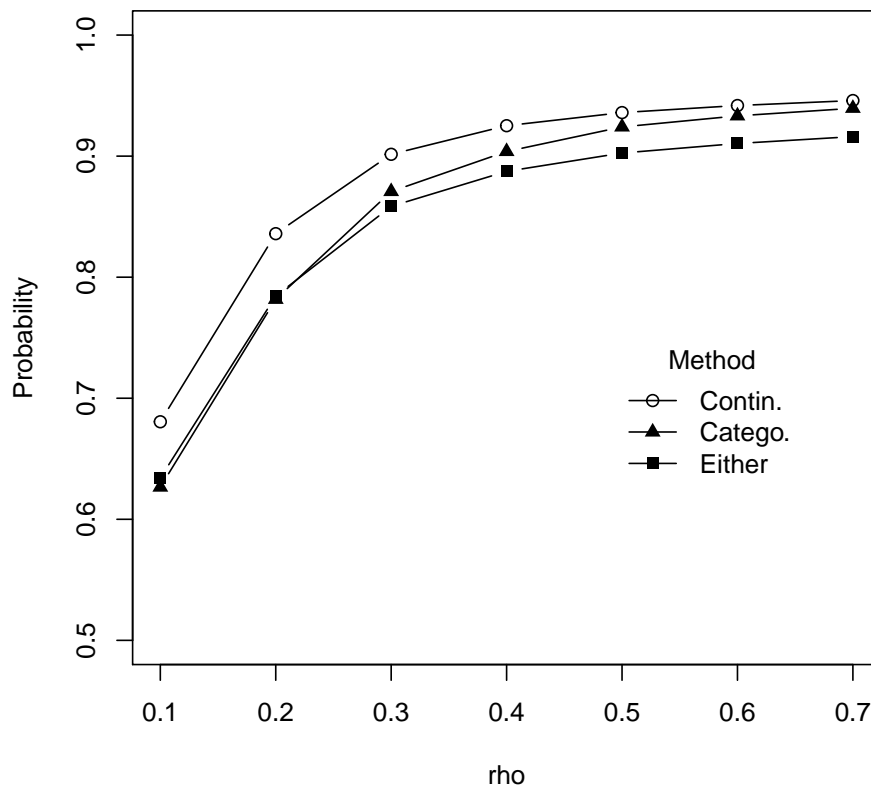
Number of times Categorical was significant under the null hypothesis

[1] 351

P of categorical significant under true hypotheses

	rho	continuous	categorical	either
1	0.1	0.6805556	0.6265957	0.6341146
2	0.2	0.8359486	0.7817164	0.7844265
3	0.3	0.9015130	0.8707658	0.8585096
4	0.4	0.9251302	0.9038356	0.8874199
5	0.5	0.9359688	0.9241081	0.9025490
6	0.6	0.9417918	0.9332573	0.9104525
7	0.7	0.9459078	0.9395245	0.9161069

Figure 1: Probability of being significance



Number of times both Continuos and Categorical were significant under the null hypothesis

[1] 134

Number of times only Continuos was significant under the null hypothesis

[1] 211

Number of times only Categorical was significant under the null hypothesis

[1] 217

Odds of only Continuos significant under true hypotheses

	rho	continuous	categorical	both
1	0.1	0.6459732	0.5241228	0.7231405
2	0.2	0.7887888	0.5694444	0.8786232
3	0.3	0.8320064	0.5373134	0.9403649
4	0.4	0.8427720	0.4348958	0.9589712
5	0.5	0.8152364	0.4274406	0.9684409
6	0.6	0.7925270	0.3782235	0.9727088
7	0.7	0.7642458	0.3239875	0.9755608

Figure 2: Probs. of being significant

