

Measurement error model for correlation coefficient estimation

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Introduction

The `MeasurementError.cor` package fits a two-stage measurement error model for estimating correlation between two random variables under bivariate normality. It's application is perhaps most relevant for the gene expression data where both point and standard estimates are available. We have shown that the proposed measurement error corrected correlation estimate has lower bias compared with the usual sample pearson correlation. For details, refer to ? as well as R help pages associated with each function.

The `cor.me.vector` and `cor.me.matrix` functions

The `cor.me.vector` calculates the measurement error model estimate of correlation between two observed vectors whereas `cor.me.matrix` calculates all pairwise measurement error model estimate of correlation in the matrix.

```
> library(MeasurementError.cor)
> exp <- matrix(abs(rnorm(100,1000,20))),ncol=10)
> se <- matrix(abs(rnorm(100,50,5))),ncol=10)
> cor.me.vector(exp[1,],se[1,],exp[2,],se[2,])
```

\$estimate

corr.me	corr.true	mu1	mu2	s1	s2
-0.8343005	-0.4124395	1005.6677920	1000.7182202	0.3512970	0.7813666

```

$counts
function gradient
      34      32

$convergence
[1] 0

> cor.me.matrix(exp,se)

$corr.true
      [,1]      [,2]      [,3]      [,4]      [,5]      [,6]
[1,] 1.0000000 -0.4124395  0.7531516 -0.2017485 -0.8346466 -0.8730839
[2,] -0.4124395  1.0000000 -0.2881524  0.2011383  0.8973965 -0.3192389
[3,]  0.7531516 -0.2881524  1.0000000  0.7245284 -0.7298362 -0.5934589
[4,] -0.2017485  0.2011383  0.7245284  1.0000000 -0.8038038  0.4512185
[5,] -0.8346466  0.8973965 -0.7298362 -0.8038038  1.0000000  0.9298773
[6,] -0.8730839 -0.3192389 -0.5934589  0.4512185  0.9298773  1.0000000
[7,]  0.7660677  0.3297595  0.6851039  0.7963559 -0.7122229 -0.4074466
[8,] -0.3263786  0.6727123 -0.8541765  0.7816395  0.5330368 -0.1799387
[9,] -0.7916846  0.7589821  0.8783875 -0.5816376  0.2373187 -0.5521411
[10,] 0.7427206  0.9121217  0.8148245 -0.8094837  0.4164403 -0.3636071
      [,7]      [,8]      [,9]      [,10]
[1,] 0.7660677 -0.3263786 -0.7916846  0.7427206
[2,] 0.3297595  0.6727123  0.7589821  0.9121217
[3,] 0.6851039 -0.8541765  0.8783875  0.8148245
[4,] 0.7963559  0.7816395 -0.5816376 -0.8094837
[5,] -0.7122229  0.5330368  0.2373187  0.4164403
[6,] -0.4074466 -0.1799387 -0.5521411 -0.3636071
[7,] 1.0000000 -0.7762459 -0.5081126  0.5787438
[8,] -0.7762459  1.0000000 -0.6071266 -0.7121547
[9,] -0.5081126 -0.6071266  1.0000000  0.7487672
[10,] 0.5787438 -0.7121547  0.7487672  1.0000000

>

```

the quantity of interest, i.e. the model estimate of the correlation between the true value of two random variables whereas `cor.me` is the model estimate of correlation between the measurement errors of the two random variables. The second quantity may not be of interest. `mu1,mu2` and `s1, s2` are the estimated mean and standard deviation of the two random variables. `cor.me.matrix` only returns the estimated correlation matrix.