semmcci: Staging

Ivan Jacob Agaloos Pesigan

```r
library(semmcci)
library(lavaan)

# Data ------------------------------------------------------------------------
data("Tal.Or", package = "psych")
df <- mice::ampute(Tal.Or)$amp

# Monte Carlo -----------------------------------------------------------------
## Fit Model in lavaan --------------------------------------------------------
model <- "
  reaction ~ cp * cond + b * pmi
  pmi ~ a * cond
  cond ~~ cond
  indirect := a * b
  direct := cp
  total := cp + (a * b)
"
fit <- sem(data = df, model = model, missing = "fiml")

## MC() ------------------------------------------------------------------------
unstd <- MC(
  fit,
  R = 100L, # use a large value e.g., 20000L for actual research
  alpha = 0.05
)

## Standardized Monte Carlo ----------------------------------------------------
MCStd(unstd, alpha = 0.05)
```

```
#> Standardized Monte Carlo Confidence Intervals
#>                       est     se   R    2.5%  97.5%
#> cp                 0.1072 0.0943 100 -0.0542 0.2871
#> b                  0.4249 0.0888 100  0.2523 0.5952
#> a                  0.1928 0.0950 100  0.0139 0.3703
#> cond~~cond         1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.7904 0.0757 100  0.6371 0.9060
```

```
#> pmi~~pmi           0.9628 0.0379 100  0.8629 0.9998
#> indirect           0.3620 0.0480 100  0.0063 0.1878
#> direct             4.0857 0.0943 100 -0.0542 0.2871
#> total              0.8881 0.0942 100  0.0294 0.3815
```

```
# Monte Carlo (Multiple Imputation) ----------------------------------------
## Multiple Imputation ------------------------------------------------------
mi <- mice::mice(
  data = df,
  print = FALSE,
  m = 5L, # use a large value e.g., 100L for actual research,
  seed = 42
)

## Fit Model in lavaan ------------------------------------------------------
fit <- sem(data = df, model = model) # use default listwise deletion

## MCMI() -------------------------------------------------------------------
unstd <- MCMI(
  fit,
  mi = mi,
  R = 100L, # use a large value e.g., 20000L for actual research
  alpha = 0.05
)

## Standardized Monte Carlo -------------------------------------------------
MCStd(unstd, alpha = 0.05)
```

```
#> Standardized Monte Carlo Confidence Intervals
#>                        est     se   R    2.5%  97.5%
#> cp                  0.0506 0.0909 100 -0.0969 0.2703
#> b                   0.4106 0.0843 100  0.2500 0.5704
#> a                   0.1645 0.0804 100  0.0157 0.3535
#> cond~~cond          1.0000 0.0000 100  1.0000 1.0000
#> reaction~~reaction 0.8220 0.0725 100  0.6595 0.9208
#> pmi~~pmi            0.9730 0.0305 100  0.8750 0.9996
#> indirect            0.0675 0.0360 100  0.0050 0.1404
#> direct              0.0506 0.0909 100 -0.0969 0.2703
#> total               0.1181 0.0916 100 -0.0065 0.3349
```

References

Pesigan, I. J. A., & Cheung, S. F. (2023). Monte Carlo confidence intervals for the indirect effect with missing data. *Behavior Research Methods*. https://doi.org/10.3758/s13428-023-02114-4

R Core Team. (2023). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/