joss\_code

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library(outstandR)  
  
data("AC\_IPD\_binY\_contX")  
data("BC\_ALD\_binY\_contX")  
  
# individual-level data  
head(AC\_IPD\_binY\_contX)

## id PF\_cont\_1 PF\_cont\_2 EM\_cont\_1 EM\_cont\_2 trt y true\_eta  
## 1 1 0.0826453 0.71645068 0.66422255 -0.09202652 A 0 -1.58891404  
## 2 2 0.6957433 0.38608723 0.79875530 0.74880584 C 1 0.14986776  
## 3 3 0.6516889 0.50572444 0.39944706 -0.07230380 A 0 -1.43868552  
## 4 4 0.2165975 0.35783123 0.25957984 -0.55405590 A 0 -2.09172428  
## 5 5 0.2605580 -0.05826527 -0.10696235 0.33762456 A 0 -2.13936317  
## 6 6 0.1110818 0.64041589 0.04867791 0.34980415 C 1 -0.07910151

# aggregate-level data  
BC\_ALD\_binY\_contX

## # A tibble: 16 × 4  
## variable statistic value trt   
## <chr> <chr> <dbl> <chr>  
## 1 EM\_cont\_1 mean 0.651 <NA>   
## 2 EM\_cont\_1 sd 0.391 <NA>   
## 3 EM\_cont\_2 mean 0.592 <NA>   
## 4 EM\_cont\_2 sd 0.416 <NA>   
## 5 PF\_cont\_1 mean 0.653 <NA>   
## 6 PF\_cont\_1 sd 0.371 <NA>   
## 7 PF\_cont\_2 mean 0.583 <NA>   
## 8 PF\_cont\_2 sd 0.437 <NA>   
## 9 y mean 0.615 C   
## 10 y sd 0.490 C   
## 11 y sum 40 C   
## 12 y mean 0.274 B   
## 13 y sd 0.448 B   
## 14 y sum 37 B   
## 15 <NA> N 65 C   
## 16 <NA> N 135 B

lin\_form <- as.formula("y ~ PF\_cont\_1 + PF\_cont\_2 + trt + trt:EM\_cont\_1 + trt:EM\_cont\_2")  
  
outstandR\_maic <-  
 outstandR(AC\_IPD\_binY\_contX, BC\_ALD\_binY\_contX,  
 strategy = strategy\_maic(  
 formula = lin\_form,  
 family = binomial(link = "logit")))  
  
str(outstandR\_maic)

## List of 2  
## $ contrasts:List of 3  
## ..$ means :List of 3  
## .. ..$ AB: num 0.651  
## .. ..$ AC: num -0.793  
## .. ..$ BC: num -1.44  
## ..$ variances:List of 3  
## .. ..$ AB: num 0.249  
## .. ..$ AC: num 0.146  
## .. ..$ BC: num 0.102  
## ..$ CI :List of 3  
## .. ..$ AB: num [1:2] -0.327 1.628  
## .. ..$ AC: num [1:2] -1.5433 -0.0436  
## .. ..$ BC: num [1:2] -2.071 -0.817  
## $ absolute :List of 2  
## ..$ means :List of 2  
## .. ..$ A: Named num 0.245  
## .. .. ..- attr(\*, "names")= chr "mean\_A"  
## .. ..$ C: Named num 0.416  
## .. .. ..- attr(\*, "names")= chr "mean\_C"  
## ..$ variances:List of 2  
## .. ..$ A: Named num 0.00204  
## .. .. ..- attr(\*, "names")= chr "mean\_A"  
## .. ..$ C: Named num 0.00554  
## .. .. ..- attr(\*, "names")= chr "mean\_C"  
## - attr(\*, "CI")= num 0.95  
## - attr(\*, "ref\_trt")= chr "C"  
## - attr(\*, "scale")= chr "log\_odds"  
## - attr(\*, "model")= chr "binomial"  
## - attr(\*, "class")= chr [1:2] "outstandR" "list"

print(outstandR\_maic)

## Object of class 'outstandR'   
## Model: binomial   
## Scale: log\_odds   
## Common treatment: C   
## Individual patient data study: AC   
## Aggregate level data study: BC   
## Confidence interval level: 0.95   
##   
## Contrasts:  
##   
## # A tibble: 3 × 5  
## Treatments Estimate Std.Error lower.0.95 upper.0.95  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 AB 0.651 0.249 -0.327 1.63   
## 2 AC -0.793 0.146 -1.54 -0.0436  
## 3 BC -1.44 0.102 -2.07 -0.817   
##   
## Absolute:  
##   
## # A tibble: 2 × 5  
## Treatments Estimate Std.Error lower.0.95 upper.0.95  
## <chr> <dbl> <dbl> <lgl> <lgl>   
## 1 A 0.245 0.00204 NA NA   
## 2 C 0.416 0.00554 NA NA

outstandR\_stc <-  
 outstandR(AC\_IPD\_binY\_contX, BC\_ALD\_binY\_contX,  
 strategy = strategy\_stc(  
 formula = lin\_form,  
 family = binomial(link = "logit")))  
  
outstandR\_gcomp\_ml <-  
 outstandR(AC\_IPD\_binY\_contX, BC\_ALD\_binY\_contX,  
 strategy = strategy\_gcomp\_ml(  
 formula = lin\_form,  
 family = binomial(link = "logit")))  
  
outstandR\_gcomp\_stan <-  
 outstandR(AC\_IPD\_binY\_contX, BC\_ALD\_binY\_contX,  
 refresh = 0, # turns off the iteration updates  
 strategy = strategy\_gcomp\_stan(  
 formula = lin\_form,  
 family = binomial(link = "logit")))  
  
outstandR\_mim <-  
 outstandR(AC\_IPD\_binY\_contX, BC\_ALD\_binY\_contX,  
 refresh = 0,  
 strategy = strategy\_mim(  
 formula = lin\_form,  
 family = binomial(link = "logit")))

data("AC\_IPD\_contY\_mixedX")  
data("BC\_ALD\_contY\_mixedX")  
  
# individual-level data  
head(AC\_IPD\_contY\_mixedX)

## id X1 X2 X3 X4 trt y true\_eta  
## 1 1 0.3066158 0 1.0794085 0 A -2.3321553 -0.9789591  
## 2 2 0.5961703 1 0.6164710 0 A -0.7473152 -0.8840576  
## 3 3 0.1496635 1 0.5737457 0 A -1.2441749 -1.2402780  
## 4 4 0.1393548 0 0.4687338 0 C -0.7905105 -0.1785051  
## 5 5 0.5672248 0 0.5305725 0 A -3.3441703 -1.3985394  
## 6 6 0.4897103 1 0.1289250 1 A -1.2286456 -0.3974177

# aggregate-level data  
BC\_ALD\_contY\_mixedX

## # A tibble: 14 × 4  
## variable statistic value trt   
## <chr> <chr> <dbl> <chr>  
## 1 X1 mean 0.608 <NA>   
## 2 X1 sd 0.436 <NA>   
## 3 X2 prop 0.72 <NA>   
## 4 X3 mean 0.598 <NA>   
## 5 X3 sd 0.385 <NA>   
## 6 X4 prop 0.51 <NA>   
## 7 y mean 0.493 C   
## 8 y sd 1.08 C   
## 9 y sum 36.0 C   
## 10 y mean -0.434 B   
## 11 y sd 1.39 B   
## 12 y sum -55.1 B   
## 13 <NA> N 73 C   
## 14 <NA> N 127 B

lin\_form <- as.formula("y ~ X1 + X2 + X3 + trt + trt:(X1 + X2 + X4)")  
  
outstandR\_maic <-  
 outstandR(AC\_IPD\_contY\_mixedX, BC\_ALD\_contY\_mixedX,  
 strategy = strategy\_maic(  
 formula = lin\_form,  
 family = gaussian(link = "identity")))  
  
str(outstandR\_maic)

## List of 2  
## $ contrasts:List of 3  
## ..$ means :List of 3  
## .. ..$ AB: num -0.209  
## .. ..$ AC: num -1.14  
## .. ..$ BC: num -0.926  
## ..$ variances:List of 3  
## .. ..$ AB: num 0.134  
## .. ..$ AC: num 0.103  
## .. ..$ BC: num 0.0311  
## ..$ CI :List of 3  
## .. ..$ AB: num [1:2] -0.926 0.508  
## .. ..$ AC: num [1:2] -1.764 -0.508  
## .. ..$ BC: num [1:2] -1.272 -0.581  
## $ absolute :List of 2  
## ..$ means :List of 2  
## .. ..$ A: Named num -0.584  
## .. .. ..- attr(\*, "names")= chr "mean\_A"  
## .. ..$ C: Named num 0.551  
## .. .. ..- attr(\*, "names")= chr "mean\_C"  
## ..$ variances:List of 2  
## .. ..$ A: Named num 0.0309  
## .. .. ..- attr(\*, "names")= chr "mean\_A"  
## .. ..$ C: Named num 0.0598  
## .. .. ..- attr(\*, "names")= chr "mean\_C"  
## - attr(\*, "CI")= num 0.95  
## - attr(\*, "ref\_trt")= chr "C"  
## - attr(\*, "scale")= chr "mean\_difference"  
## - attr(\*, "model")= chr "gaussian"  
## - attr(\*, "class")= chr [1:2] "outstandR" "list"

print(outstandR\_maic)

## Object of class 'outstandR'   
## Model: gaussian   
## Scale: mean\_difference   
## Common treatment: C   
## Individual patient data study: AC   
## Aggregate level data study: BC   
## Confidence interval level: 0.95   
##   
## Contrasts:  
##   
## # A tibble: 3 × 5  
## Treatments Estimate Std.Error lower.0.95 upper.0.95  
## <chr> <dbl> <dbl> <dbl> <dbl>  
## 1 AB -0.209 0.134 -0.926 0.508  
## 2 AC -1.14 0.103 -1.76 -0.508  
## 3 BC -0.926 0.0311 -1.27 -0.581  
##   
## Absolute:  
##   
## # A tibble: 2 × 5  
## Treatments Estimate Std.Error lower.0.95 upper.0.95  
## <chr> <dbl> <dbl> <lgl> <lgl>   
## 1 A -0.584 0.0309 NA NA   
## 2 C 0.551 0.0598 NA NA

outstandR\_stc <-  
 outstandR(AC\_IPD\_contY\_mixedX, BC\_ALD\_contY\_mixedX,  
 strategy = strategy\_stc(  
 formula = lin\_form,  
 family = gaussian(link = "identity")))  
  
outstandR\_gcomp\_ml <-  
 outstandR(AC\_IPD\_contY\_mixedX, BC\_ALD\_contY\_mixedX,  
 strategy = strategy\_gcomp\_ml(  
 formula = lin\_form,  
 family = gaussian(link = "identity")))  
  
outstandR\_gcomp\_stan <-  
 outstandR(AC\_IPD\_contY\_mixedX, BC\_ALD\_contY\_mixedX,  
 refresh = 0, # turns off the iteration updates  
 strategy = strategy\_gcomp\_stan(  
 formula = lin\_form,  
 family = gaussian(link = "identity")))  
  
outstandR\_mim <-  
 outstandR(AC\_IPD\_contY\_mixedX, BC\_ALD\_contY\_mixedX,  
 refresh = 0,  
 strategy = strategy\_mim(  
 formula = lin\_form,  
 family = gaussian(link = "identity")))

Scale example