Package `mactivate`
Tutorial I

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1 Simple Example

Let's simulate a tiny data set:

```
library(mactivate)
set.seed(777)
## tiny
d <- 11
N <- 3000
X <- matrix(rnorm(N*d, 1, 1), N, d)
colnames(X) <- paste0("x", I(1:d))
b <- rep_len( c(-1, 1), d )
ystar <-
  X %*% b +
  1/3 * X[ , 1] * X[ , 2] * X[ , 3] -
  1/3 * X[ , 3] * X[ , 4] * X[ , 5] * X[ , 6] +
  1/2 * X[ , 8] * X[ , 9] -
  2   * X[ , 1] * X[ , 2] * X[ , 7] * X[ , 11]
xtrue_formula <- eval(parse(text="y ~ . + x1:x2:x3 + x3:x4:x5:x6 + x8:x9 + x1:x2:x7:x11"))
xnoint_formula <- eval(parse(text="y ~ ."))
errs <- rnorm(N, 0, 3)
y <- ystar + errs
Xall <- X
yall <- y
```

```
Nall <- N
dfx <- data.frame("y"=yall, Xall)
```

Let's predict from primary effects only.

```
xlm <- lm(y ~ . , data=dfx)
yhat <- predict(xlm, newdata=dfx)
sqrt( mean( (yall - yhat)^2 ) )
```

```
[1] 6.715759
```

Now let us predict from true model.

```
xlm <- lm(xtrue_formula , data=dfx)
yhat <- predict(xlm, newdata=dfx)
sqrt( mean( (yall - yhat)^2 ) )
```

```
[1] 2.984564
```

Configure hybrid fit control.

```
xcmact_hybrid <-
  f_control_mactivate(
  param_sensitivity = 10^10,
  w0_seed           = 0.1,
  w_col_search      = "one",
  bool_headStart    = FALSE, ### gradient
  max_internal_iter = 500, ##### small -- exits automatically, don't set this too small
  ss_stop           = 10^(-8), ### small
  escape_rate       = 1.01,
  Wadj              = 1/1,
  tol               = 10^(-8)
  )
```

Now fit using hybrid algorithm.

```
m_tot <- 5
Uall <- Xall
xxnow <- Sys.time()
xxls_out <-
  f_fit_hybrid_01(
  X = Xall,
  y = yall,
  m_tot = m_tot,
  U = Uall,
  m_start = 1,
  mact_control = xcmact_hybrid,
  verbosity = 5
  )
cat( difftime(Sys.time(), xxnow, units="mins"), "\n" )
```

Now predict from our hybrid fitted model.

```
class(xxls_out)
```

```
[1] "mactivate_fit_hybrid_01"
[2] "list"
```

```
yhatall <- predict(object=xxls_out, X0=Xall, U0=Uall, mcols=m_tot)
sqrt( mean( (yall - yhatall)^2 ) )
```

```
[1] 2.972347
```