T2D

2024-10-18

Monte Carlo approximation

```
B1 <- 10
N1 <- 2 * 10^5
N2 <- 2 * 10^5
tau <- 2

set.seed(927)
MC_ests_T2D <- matrix(nrow = B1, ncol = 2)
for(b in 1:B1){
  print(b)
  # Simulate
  data <- simT2D(N = N1,
                 eta = c(0.1, 0.3, 0.1),
                 nu = c(1.1, 1.3, 1.1),
                 cens = 0,
                 beta_L0_D = 0.3,
                 beta_L0_L = 2,
                 beta_L_D = 1,
                 beta_A0_D = -0.1,
                 beta_A0_L = - 2.5)

  # Format data for inference
  data <- IntFormatData(data, N_cols = 6)

  # Group data based on treatment
  no_treat_group <- data[A0 == 0]
  treat_group <- data[A0 == 1]

  # Fit Weibull
  survfit <- survreg(Surv(Time, Delta == 2) ~ 1,
                     data = no_treat_group[L == 0],
                     dist='weibull')

  # Estimates in no treatment group
  nu_est <- 1/survfit$scale
  eta_est <- 1/(exp(survfit$coefficients[1]))^nu_est

  # Generate large data set under the intervened intensity
  data_new <- simT2D(N = N2,
                     eta = c(0.1, 0.3, eta_est),
                     nu = c(1.1, 1.3, nu_est),
                     cens = 0,
                     beta_L0_D = 0.3,
```

```
                    beta_L0_L = 2,
                    beta_L_D = 1,
                    beta_A0_D = -0.1,
                    beta_A0_L = - 2.5)

  # Generate large data set without intervened intensity
  data_new_no_int <- simT2D(N = N2,
                            eta = c(0.1, 0.3, 0.1),
                            nu = c(1.1, 1.3, 1.1),
                            cens = 0,
                            beta_L0_D = 0.3,
                            beta_L0_L = 2,
                            beta_L_D = 1,
                            beta_A0_D = -0.1,
                            beta_A0_L = - 2.5)

  #Proportion of subjects dying before some time $\tau$ in treatment group
  MC_ests_T2D[b,] <- c(mean(data_new[Delta == 1 & A0 == 1, Time] < tau),  # with intervention
  prop_no_int <- mean(data_new_no_int[Delta == 1 & A0 == 1, Time] < tau)) # without intervention
}
```

```
## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
## [1] 6
## [1] 7
## [1] 8
## [1] 9
## [1] 10
```

```
beta_true <- mean(MC_ests_T2D[,2]-MC_ests_T2D[,1])
beta_true
```

```
## [1] -0.0198728
```

```
var(MC_ests_T2D[,2]-MC_ests_T2D[,1])
```

```
## [1] 1.859544e-06
```

Intervention effects

Estimations procedure:

```
#int_effect <- function(N1,
#                        N2,
#                        eta = c(0.1, 0.3, 0.1),
#                        nu = c(1.1, 1.3, 1.1),
#                        beta_L0_D = 0.3,
#                        beta_L0_L = 2,
#                        beta_L_D = 1,
#                        beta_A0_D = -0.1,
#                        beta_A0_L = - 2.5) {
#
```

```
#  # Generate large data
#  data0 <- simT2D(N1,
#                  eta = eta,
#                  nu = nu,
#                  cens = 1,
#                  beta_A0_D = beta_A0_D,
#                  beta_L0_L = beta_L0_L,
#                  beta_A0_L = beta_A0_L,
#                  beta_L_D = beta_L_D,
#                  beta_L0_D = beta_L0_D)
#
#  # Format data for inference
#  data0 <- IntFormatData(data0, N_cols = 6)
#
#  # Fit Weibull
#  survfit1 <- survreg(Surv(Time, Delta == 1) ~ L0 + A0 + L,
#                      data = data0,
#                      dist='weibull')
#
#  survfit2 <- survreg(Surv(Time, Delta == 2) ~ L0 + A0,
#                       data = data0[L == 0],
#                       dist='weibull')
#
#  # Shape and scale estimates
#  nu_est1 <- 1/survfit1$scale
#  eta_est1 <- 1/(exp(survfit1$coefficients[1]))^nu_est1
#
#  nu_est2 <- 1/survfit2$scale
#  eta_est2 <- 1/(exp(survfit2$coefficients[1]))^nu_est2
#
#  # Coeffecients
#  beta_L0_D_est <- - survfit1$coefficients[2] / nu_est1
#  beta_A0_D_est <- - survfit1$coefficients[3] / nu_est1
#  beta_L_D_est <- - survfit1$coefficients[4] / nu_est1
#  beta_L0_L_est <- - survfit2$coefficients[2] / nu_est2
#  beta_A0_L_est <- - survfit2$coefficients[3] / nu_est2
#
#  # Intervention intensity
#  survfit3 <- survreg(Surv(Time, Delta == 2) ~ 1,
#                       data = data0[L == 0 & A0 == 0],
#                       dist='weibull')
#
#  # Estimates in no treatment group
#  nu_est3 <- 1/survfit3$scale
#  eta_est3 <- 1/(exp(survfit3$coefficients[1]))^nu_est3
#
#  # Generate large data set under the intervened intensity
#  data_new <- simT2D(N = N2,
#                      cens = 0,
#                      eta = c(0, eta_est1, eta_est3),
#                      nu = c(0, nu_est1, nu_est3),
#                      beta_A0_D = beta_A0_D_est,
#                      beta_L_D = beta_L_D_est,
```

```
#                     beta_L0_D = beta_L0_D_est,
#                     beta_L0_L = 0,
#                     beta_A0_L = 0)
#
#  # Generate large data set without intervened intensity
#  data_new_no_int <- simT2D(N = N2,
#                            cens = 0,
#                            eta = c(0, eta_est1, eta_est2),
#                            nu = c(0, nu_est1, nu_est2),
#                            beta_A0_D = beta_A0_D_est,
#                            beta_L_D = beta_L_D_est,
#                            beta_L0_D = beta_L0_D_est,
#                            beta_L0_L = beta_L0_L_est,
#                            beta_A0_L = beta_A0_L_est)
#
#  #Proportion of subjects dying before some time $\tau$ in treatment group
#  prop_int <- mean(data_new[Delta == 1 & A0 == 1, Time] < tau) # with intervention
#  prop_no_int <- mean(data_new_no_int[Delta == 1 & A0 == 1, Time] < tau) # without intervention
#
#  return(c(prop_int, prop_no_int))
#}
```

Gentagne estimationer:

```
#B <- 300
#simres <- matrix(nrow = B, ncol = 2)
#
#for(b in 1:B){
#  simres[b,] <- int_effect(N1 = 10^3, N2 = 10^4)
#}
```

```
#betas <- simres[,2] - simres[,1]
#mean(betas)
#var(betas)
#
#ggplot()+
#  geom_histogram(aes(x = betas, y = ..density..), binwidth = 0.004)+
#  geom_vline(xintercept = beta_true)
```

```
#survfit <- stpm2(Surv(tstart, tstop, Delta == 1) ~ L0 + A0 + L,
#                 data = data,
#                 df = 1)
#survfit2 <- stpm2(Surv(tstart, tstop, Delta == 2) ~ L0 + A0,
#                 data = data[L == 0],
#                 df = 1)
```