Generating Synthetic Data

2022-10-28

```
source("../function/gen_syn_data.R")
source("../function/disc_gamma.R")
source("../constant/constant.R")
source("../function/get_iwt.R")
source("../function/disc_gamma.R")
```

Creating & Visualizing synthetic dataset

All synthetic data stored in "../data/processed"

- Data contain three columns:

1. r: Synthetic reproduction number
2. y: Daily case count, generated from r
3. idx: Index of indicating time
4. iwt: $\sum_{a=1} I_{t-a} w_a$

- Daily case counts all generated r, with serial interval distribution of EBOLA. SID of covid and other diseases are in "../constant/constant.R"

Create new folder to generate results

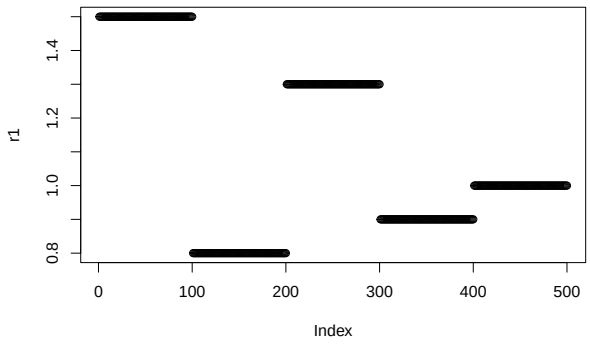
```
current_t <- Sys.time()
dir.create(file.path("..", "data", "processed", current_t))
```

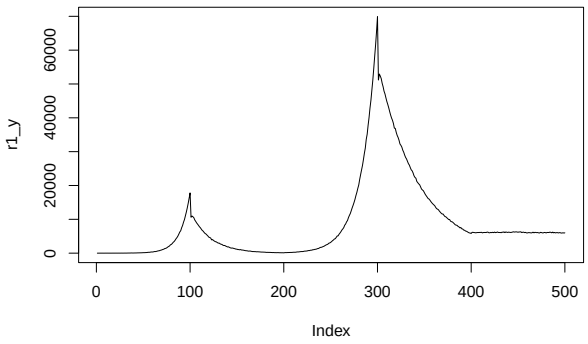
D1

With cyclic effect

```
r1 <- c(rep(1.5, 100), rep(0.8, 100), rep(1.3, 100), rep(0.9, 100), rep(1, 100))
r1_y <- gen_with_rt(r1, init_i = 2, g_shape= sid_covid_shape, g_scale = sid_covid_scale, cyc_amp = 0)
r1_iwt <- get_iwt(r1_y, disc_gamma(1:length(r1_y), shape=sid_covid_shape, scale=sid_covid_scale))

d1 = data.frame(idx = 1:length(r1), r = r1, y = r1_y, iwt = r1_iwt)

plot(r1)
plot(r1_y, type = "l")
```

```
# write.csv(d1, "../data/processed/d1.csv", row.names = FALSE)

write.csv(d1, file.path("..", "data", "processed", current_t, "d1.csv"), row.names = FALSE)
```

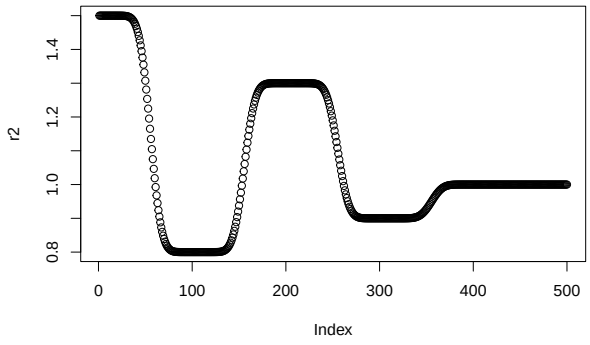


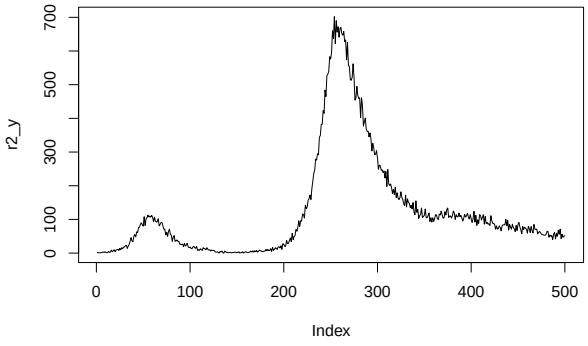


D2

With cyclic effect, smoothed 10 times

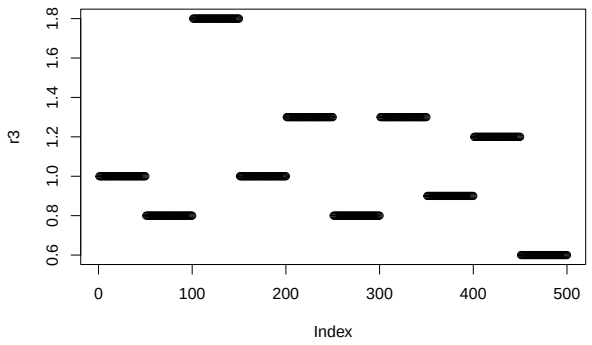
```
r2 <- c(rep(1.5, 100), rep(0.8, 100), rep(1.3, 100), rep(0.9, 100), rep(1, 100))
r2 <- smooth_rt(r2, 10)
r2_y <- gen_with_rt(r2, init_i = 2, g_shape= sid_covid_shape, g_scale = sid_covid_scale, cyc_amp = 0)
r2_iwt <- get_iwt(r2_y, disc_gamma(1:length(r2_y), shape=sid_covid_shape, scale=sid_covid_scale))

d2 = data.frame(idx = 1:length(r2), r = r2, y = r2_y, iwt = r2_iwt)

plot(r2)
plot(r2_y, type = "l")

# write.csv(d2, "../data/processed/d2.csv", row.names = FALSE)
write.csv(d2, file.path("..", "data", "processed", current_t, "d2.csv"), row.names = FALSE)
```

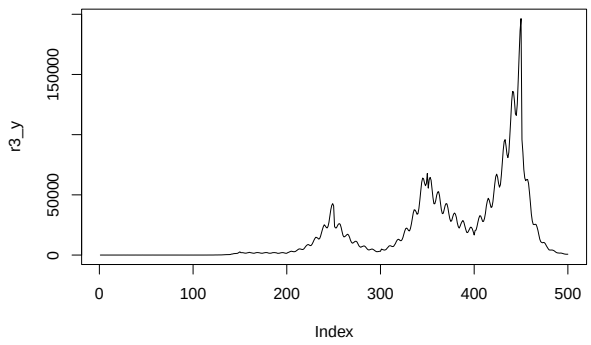




D3

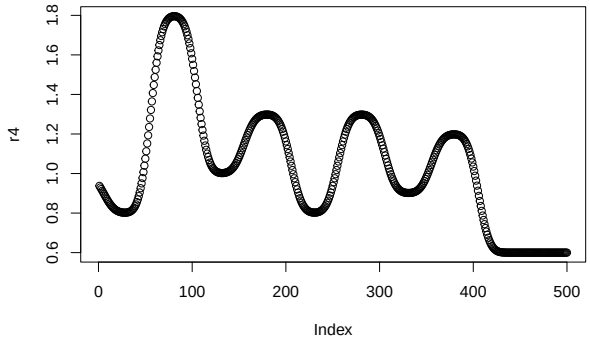
```
r3 <- c(rep(1, 50), rep(0.8, 50), rep(1.8, 50), rep(1, 50), rep(1.3, 50), rep(0.8, 50),
        rep(1.3, 50), rep(0.9, 50), rep(1.2, 50), rep(0.6, 50))
r3_y <- gen_with_rt(r3, init_i = 2, g_shape= sid_covid_shape, g_scale = sid_covid_scale, cyc_amp = 5)
r3_iwt <- get_iwt(r3_y, disc_gamma(1:length(r3_y), shape=sid_covid_shape, scale=sid_covid_scale))

plot(r3)
plot(r3_y, type = "l")
```

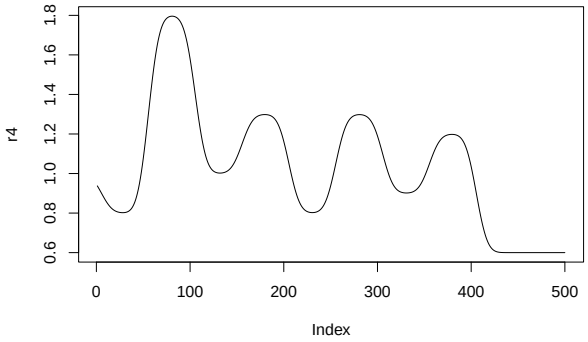




D4

```
source("../function/gen_syn_data.R")
r4 <- c(rep(1, 50), rep(0.8, 50), rep(1.8, 50), rep(1, 50), rep(1.3, 50), rep(0.8, 50), rep(1.3, 50), r
r4 <- smooth_rt(r4, 10)
r4_y <- gen_with_rt(r4, init_i = 2, g_shape= sid_covid_shape, g_scale = sid_covid_scale, cyc_amp = 5)

r4_iwt <- get_iwt(r4_y, disc_gamma(1:length(r4_y), shape=sid_covid_shape, scale=sid_covid_scale))

d4 = data.frame(idx = 1:length(r4), r = r4, y = r4_y, iwt = r4_iwt)

# write.csv(d4, "../data/processed/d4.csv", row.names = FALSE)


plot(r4)
plot(r4, type = "l")
```





D5

```
x <- 1:100
r5 <- 5*sin(7*x)
for(i in 1:length(x)){
  r5[i] = max(0.5, r5[i])
}

d5_y <- gen_with_rt(r5, init_i = 10, g_shape= sid_covid_shape, g_scale = sid_covid_scale, cyc_amp = 0)

# r5_iwt <- get_iwt(r5_y, disc_gamma(1:length(r5_y), shape=sid_covid_shape, scale=sid_covid_scale))



plot(d5_y, type = "l")
```