

Earthquake Forecasting

Dissertation Project 2

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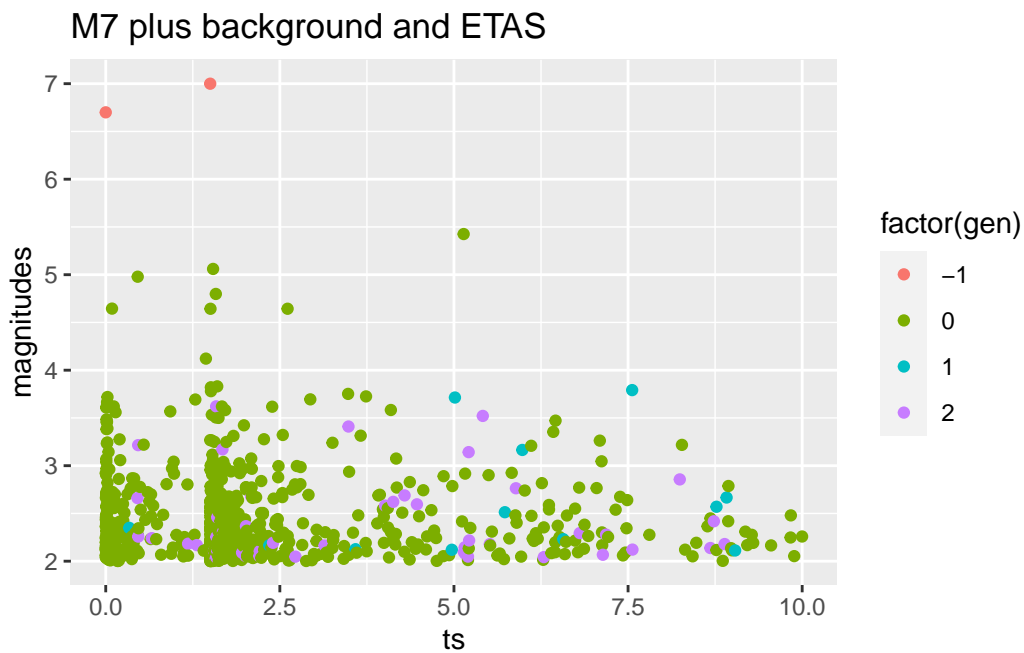
July 2023

```
1 suppressMessages({
2   library(ETAS.inlabru)
3   library(ggplot2)
4   library(dplyr)
5   library(magrittr)
6   library(tidyquant)
7 })
8
9 # Increase num.threads if you have more cores on your computer
10 INLA::inla.setOption(num.threads = 2)
11
12 mu <- 1070. / 365
13 K <- 0.089
14 alpha <- 2.29
15 c <- 0.011
16 p <- 1.08
17
18 modelledDuration <- 10 # [days]
19
20 M0 <- 2
21
22 theta_etas <- data.frame(mu = mu, K = K, alpha = alpha, c = c, p = p)
23
24 Ht <- data.frame(ts = c(0., 1.5), magnitudes = c(6.7, 7.))
25
26 combined.M7.ETAS.cat <-
27   generate_temporal_ETAS_synthetic(
28     theta = theta_etas,
29     beta.p = log(10),
```

```

30     M0 = M0,
31     T1 = 0,
32     T2 = modelledDuration,
33     Ht = Ht,
34     format = 'df'
35   )
36   combined.M7.ETAS.cat$ID <- seq_len(nrow(combined.M7.ETAS.cat))
37
38   ggplot(combined.M7.ETAS.cat) +
39     geom_point(aes(x = ts, y = magnitudes, color = factor(gen))) +
40     xlim(0, modelledDuration) +
41     ggtitle('M7 plus background and ETAS')

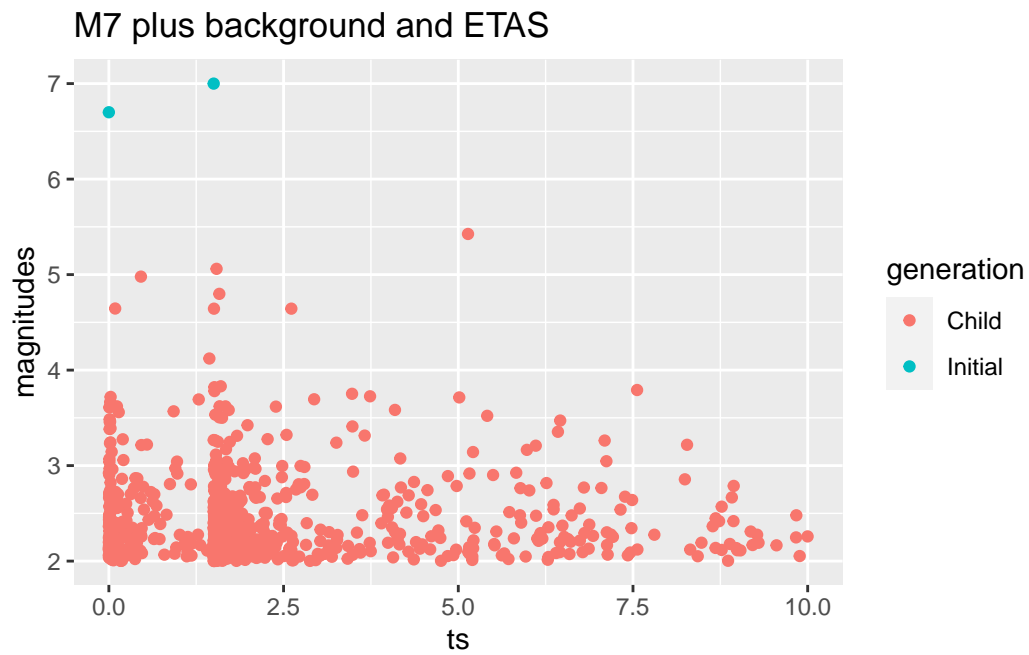
```



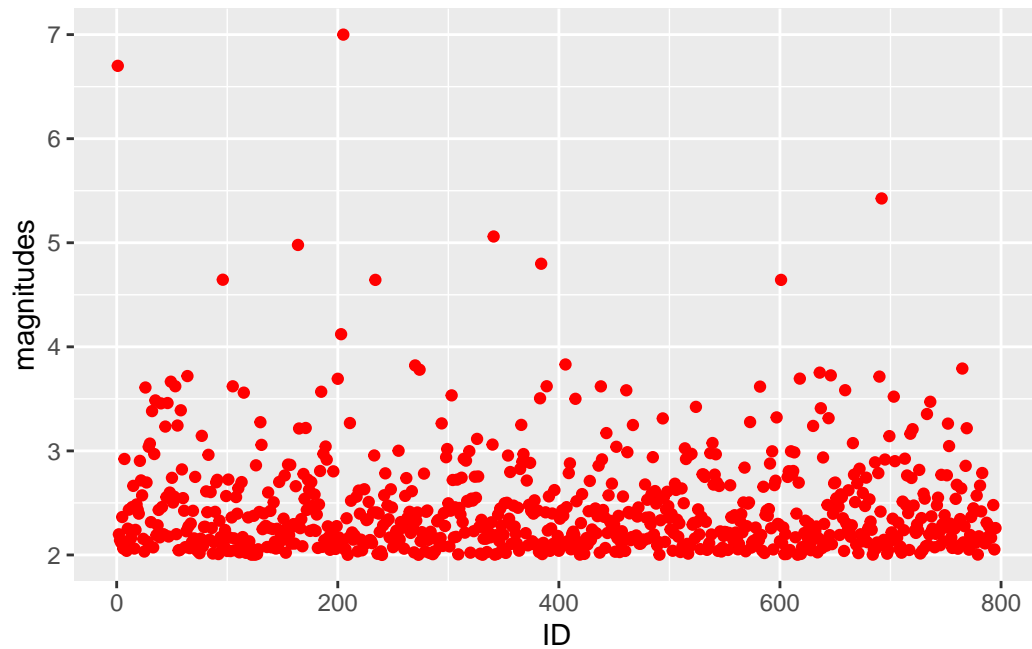
```

1   ggplot(combined.M7.ETAS.cat %>%
2     mutate(generation = if_else(gen == -1, 'Initial', 'Child')) +
3     geom_point(aes(x = ts, y = magnitudes, color = generation)) +
4     xlim(0, modelledDuration) +
5     ggtitle('M7 plus background and ETAS')

```



```
1 ggplot() +  
2   geom_point(data = combined.M7.ETAS.cat,  
3             aes(x = ID, y = magnitudes),  
4             color = 'red') #+
```



```

1 geom_ma(data = combined.M7.ETAS.cat,
2         aes(x = ID, y = magnitudes),
3         ma_fun = SMA, n = 10)

```

mapping: x = ~ID, y = ~magnitudes

geom_ma: na.rm = TRUE

stat_sma: ma_fun = SMA, n = 10, na.rm = TRUE, wilder = FALSE, ratio = NULL, v = 1, wts = 1:10

position_identity