# Energy norm 1

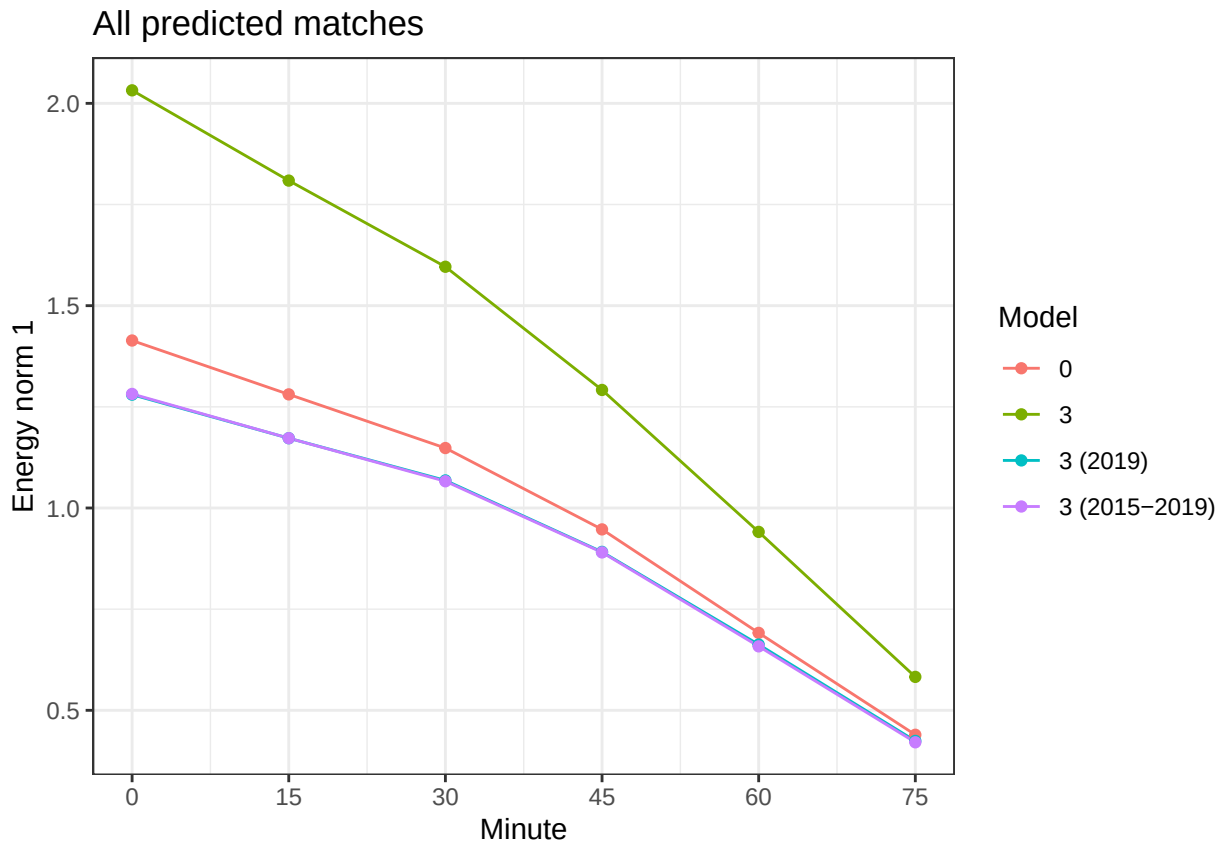
```
library(dplyr)
library(ggplot2)
library(tidyr)
library(knitr)

load("data/HDA2.RData")

nrow(HDA2)
```

```
## [1] 350
```

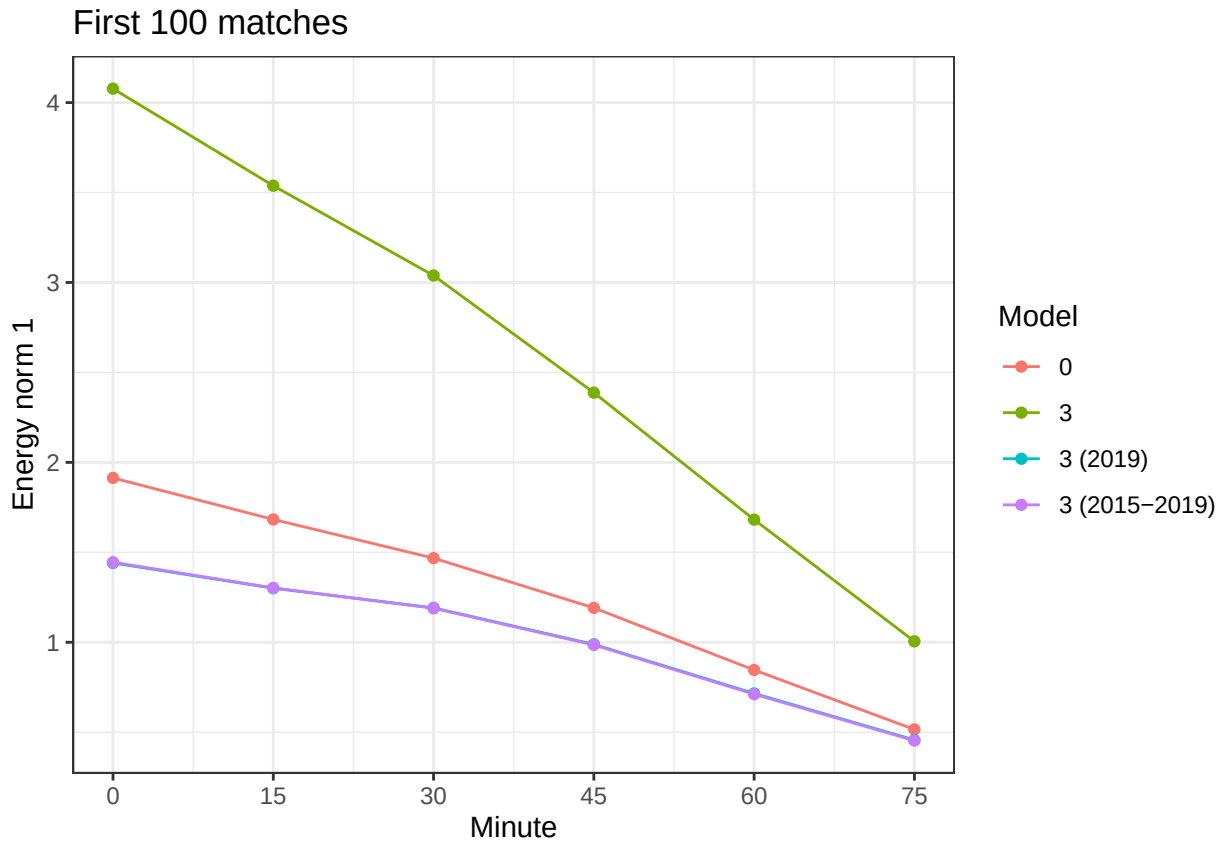
```
all = tibble(ENERG1 = apply(HDA2[,c(129:152)], 2, mean),
             Minute = as.integer(rep(c(0, 15, 30, 45, 60, 75), 4)),
             Model = factor(c(rep("0", 6), rep("3", 6), rep("3 (2019)", 6),
                              rep("3 (2015-2019)", 6)),
                            levels = c("0", "3", "3 (2019)", "3 (2015-2019)")))
all %>%
  ggplot(aes(x = Minute, y = ENERG1, col = Model)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(0, 15, 30, 45, 60, 75)) +
  theme_bw() +
  ggtitle("All predicted matches") +
  ylab("Energy norm 1")
```




```
all %>%
  pivot_wider(id_cols = "Model", values_from = "ENERG1", names_from = "Minute",
              names_prefix = "Minute ") %>%
  kable()
```

| Model | Minute 0 | Minute 15 | Minute 30 | Minute 45 | Minute 60 | Minute 75 |
|---|---|---|---|---|---|---|
| 0 | 1.413889 | 1.280787 | 1.148170 | 0.9471197 | 0.6913628 | 0.4395433 |
| 3 | 2.032166 | 1.809111 | 1.596189 | 1.2917321 | 0.9409045 | 0.5826451 |
| 3 (2019) | 1.280100 | 1.172497 | 1.068202 | 0.8915050 | 0.6625769 | 0.4243988 |
| 3 (2015-2019) | 1.281863 | 1.172506 | 1.066042 | 0.8902523 | 0.6581016 | 0.4209641 |

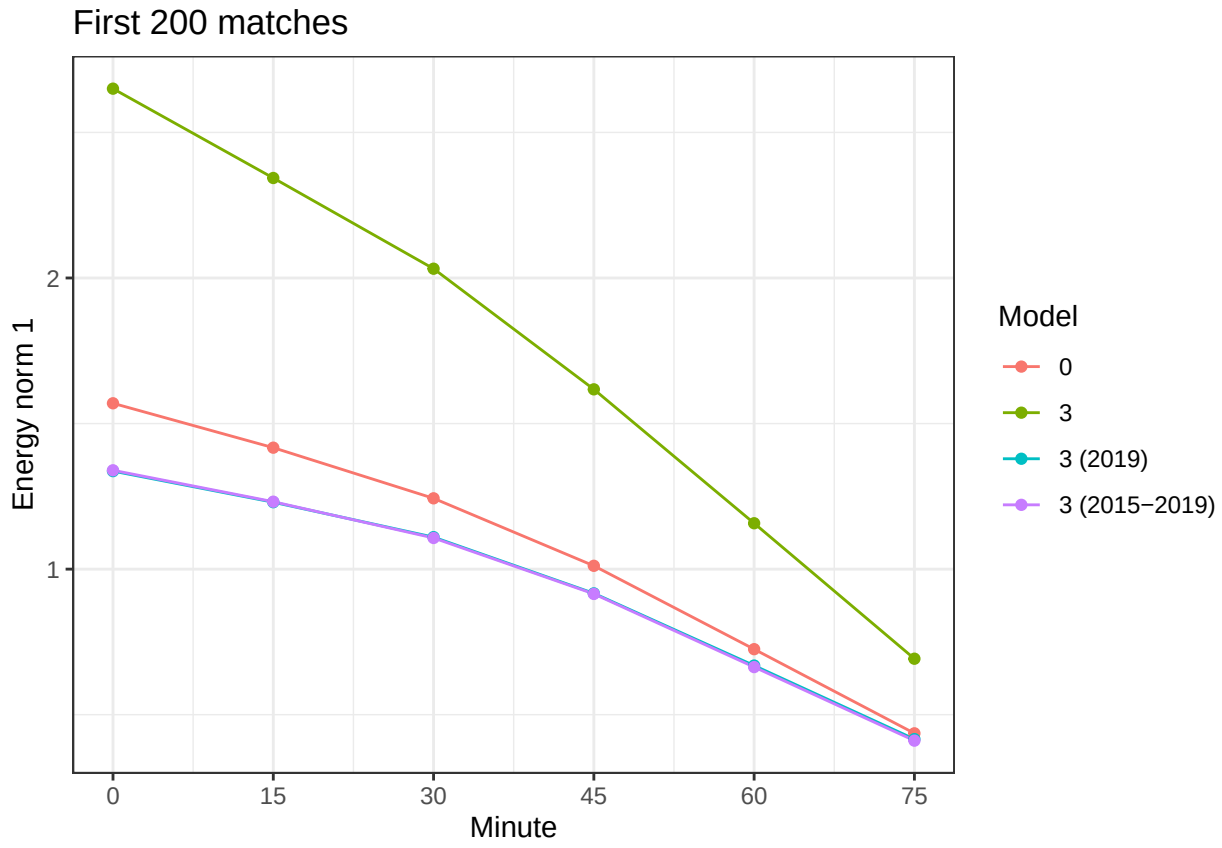
```
first_100 = tibble(ENERG1 = apply(HDA2[c(1:100),c(129:152)], 2, mean),
                   Minute = as.integer(rep(c(0, 15, 30, 45, 60, 75), 4)),
                   Model = factor(c(rep("0", 6), rep("3", 6), rep("3 (2019)", 6),
                                    rep("3 (2015-2019)", 6)),
                                  levels = c("0", "3", "3 (2019)", "3 (2015-2019)")))
first_100 %>%
  ggplot(aes(x = Minute, y = ENERG1, col = Model)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(0, 15, 30, 45, 60, 75)) +
  theme_bw() +
  ggtitle("First 100 matches") +
  ylab("Energy norm 1")
```




```
first_100 %>%
  pivot_wider(id_cols = "Model", values_from = "ENERG1", names_from = "Minute",
              names_prefix = "Minute ") %>%
  kable()
```

| Model | Minute 0 | Minute 15 | Minute 30 | Minute 45 | Minute 60 | Minute 75 |
|---|---|---|---|---|---|---|
| 0 | 1.913572 | 1.682882 | 1.467901 | 1.1912632 | 0.8459941 | 0.5154858 |
| 3 | 4.077350 | 3.537944 | 3.038763 | 2.3875396 | 1.6816936 | 1.0052600 |
| 3 (2019) | 1.441090 | 1.300585 | 1.191173 | 0.9882505 | 0.7155420 | 0.4568041 |
| 3 (2015-2019) | 1.444800 | 1.302207 | 1.189115 | 0.9853901 | 0.7113288 | 0.4532563 |

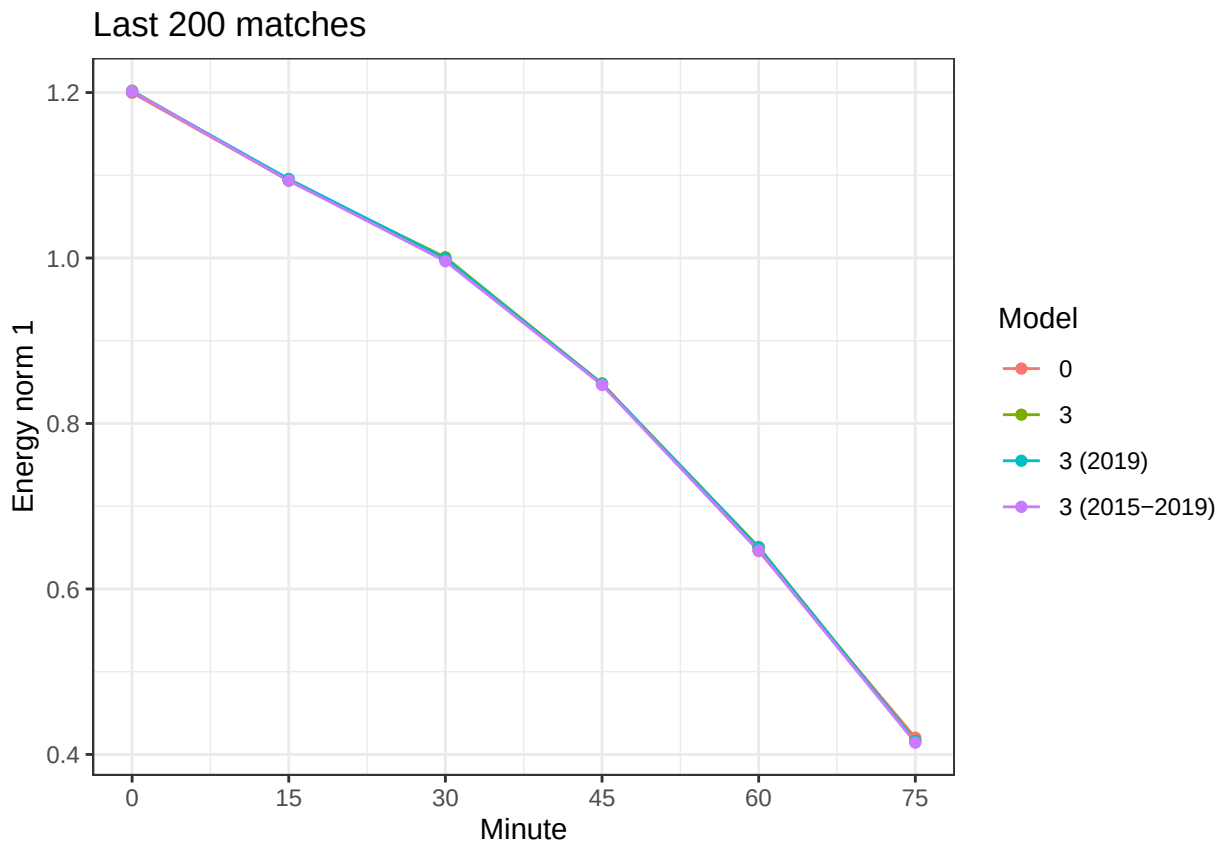
```
first_200 = tibble(ENERG1 = apply(HDA2[c(1:200),c(129:152)], 2, mean),
                   Minute = as.integer(rep(c(0, 15, 30, 45, 60, 75), 4)),
                   Model = factor(c(rep("0", 6), rep("3", 6), rep("3 (2019)", 6),
                                    rep("3 (2015-2019)", 6)),
                                  levels = c("0", "3", "3 (2019)", "3 (2015-2019)")))
first_200 %>%
  ggplot(aes(x = Minute, y = ENERG1, col = Model)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(0, 15, 30, 45, 60, 75)) +
  theme_bw() +
  ggtitle("First 200 matches") +
  ylab("Energy norm 1")
```




```
first_200 %>%
  pivot_wider(id_cols = "Model", values_from = "ENERG1", names_from = "Minute",
              names_prefix = "Minute ") %>%
  kable()
```

| Model | Minute 0 | Minute 15 | Minute 30 | Minute 45 | Minute 60 | Minute 75 |
|---|---|---|---|---|---|---|
| 0 | 1.569655 | 1.417147 | 1.243202 | 1.0114213 | 0.7250087 | 0.4360063 |
| 3 | 2.650309 | 2.343438 | 2.031892 | 1.6176121 | 1.1575615 | 0.6922483 |
| 3 (2019) | 1.336664 | 1.229819 | 1.109912 | 0.9168002 | 0.6688078 | 0.4161206 |
| 3 (2015-2019) | 1.339505 | 1.231608 | 1.107028 | 0.9148526 | 0.6636143 | 0.4108717 |

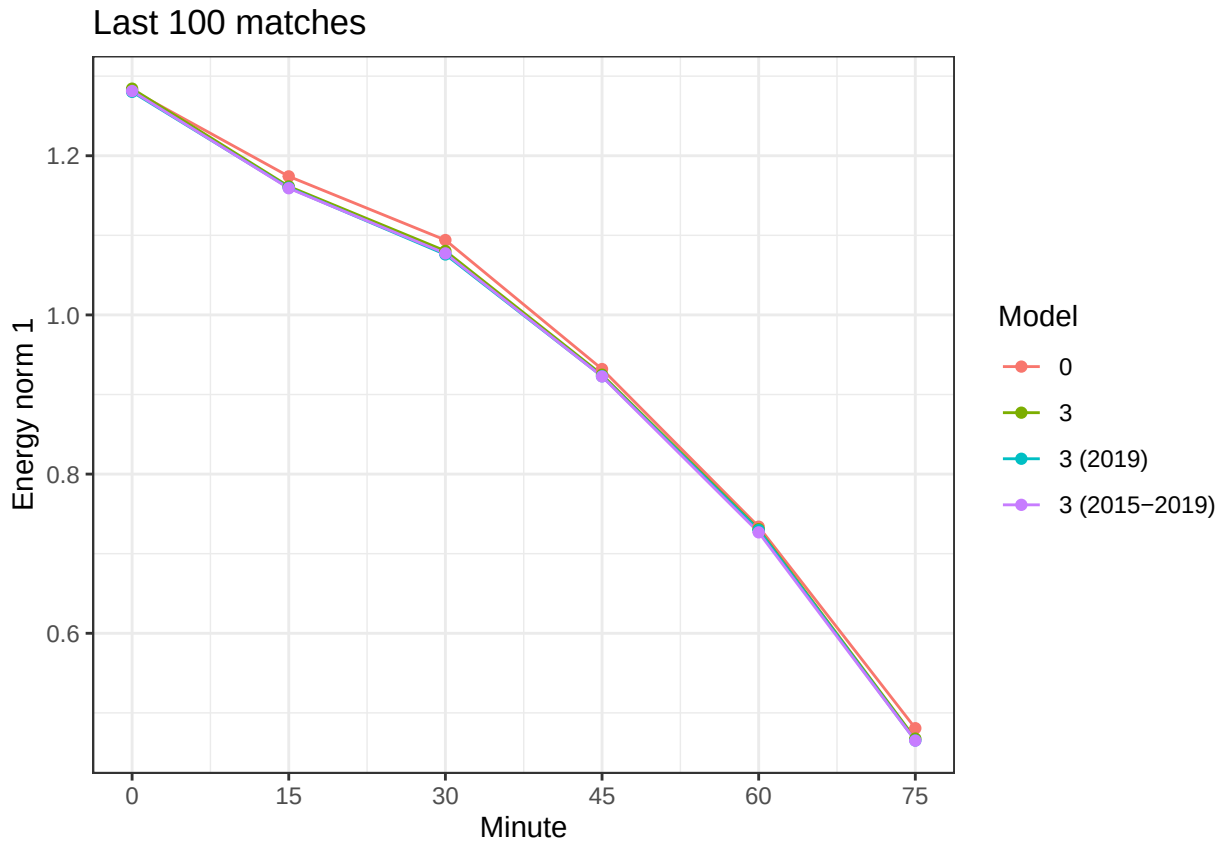
```
last_200 = tibble(ENERG1 = apply(HDA2[c(151:350),c(129:152)], 2, mean),
                  Minute = as.integer(rep(c(0, 15, 30, 45, 60, 75), 4)),
                  Model = factor(c(rep("0", 6), rep("3", 6), rep("3 (2019)", 6),
                                   rep("3 (2015-2019)", 6)),
                                 levels = c("0", "3", "3 (2019)", "3 (2015-2019)")))
last_200 %>%
  ggplot(aes(x = Minute, y = ENERG1, col = Model)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(0, 15, 30, 45, 60, 75)) +
  theme_bw() +
  ggtitle("Last 200 matches") +
  ylab("Energy norm 1")
```




```
last_200 %>%
  pivot_wider(id_cols = "Model", values_from = "ENERG1", names_from = "Minute",
              names_prefix = "Minute ") %>%
  kable()
```

| Model | Minute 0 | Minute 15 | Minute 30 | Minute 45 | Minute 60 | Minute 75 |
|---|---|---|---|---|---|---|
| 0 | 1.199740 | 1.093587 | 0.9988229 | 0.8484661 | 0.6458453 | 0.4202597 |
| 3 | 1.202249 | 1.093629 | 1.0009214 | 0.8480467 | 0.6506939 | 0.4165175 |
| 3 (2019) | 1.201426 | 1.095549 | 0.9994293 | 0.8476170 | 0.6500180 | 0.4159326 |
| 3 (2015-2019) | 1.201581 | 1.093604 | 0.9961427 | 0.8465197 | 0.6465564 | 0.4142636 |

```
last_100 = tibble(ENERG1 = apply(HDA2[c(251:350),c(129:152)], 2, mean),
                  Minute = as.integer(rep(c(0, 15, 30, 45, 60, 75), 4)),
                  Model = factor(c(rep("0", 6), rep("3", 6), rep("3 (2019)", 6),
                                   rep("3 (2015-2019)", 6)),
                                 levels = c("0", "3", "3 (2019)", "3 (2015-2019)")))
last_100 %>%
  ggplot(aes(x = Minute, y = ENERG1, col = Model)) +
  geom_line() +
  geom_point() +
  scale_x_continuous(breaks = c(0, 15, 30, 45, 60, 75)) +
  theme_bw() +
  ggtitle("Last 100 matches") +
  ylab("Energy norm 1")
```




```
last_100 %>%
  pivot_wider(id_cols = "Model", values_from = "ENERG1", names_from = "Minute",
              names_prefix = "Minute ") %>%
  kable()
```

| Model | Minute 0 | Minute 15 | Minute 30 | Minute 45 | Minute 60 | Minute 75 |
|---|---|---|---|---|---|---|
| 0 | 1.282330 | 1.174070 | 1.094062 | 0.9319545 | 0.7339341 | 0.4807513 |
| 3 | 1.284256 | 1.161467 | 1.080365 | 0.9248571 | 0.7307472 | 0.4676580 |
| 3 (2019) | 1.280246 | 1.159778 | 1.075961 | 0.9229413 | 0.7297084 | 0.4653288 |
| 3 (2015-2019) | 1.281281 | 1.159194 | 1.077303 | 0.9226743 | 0.7268169 | 0.4651255 |