# Untitled

## GrJa23

### January 18, 2024

## **Explanations**

Test have been performed in the below website as user "a7710" https://arnaud-legrand.shinyapps.io/design\_of\_experiments/?user\_a7710

The goal is to find the best series of number between [0,1] in a range [x1,...,x11] that will provide the highest score final score.

## Loading data

## 6 2024-~

```
library(tidyverse)
## -- Attaching core tidyverse packages --
                                                                    -- tidyverse 2.0.0 --
## v dplyr
                1.1.4
                           v readr
                                        2.1.5
## v forcats
                1.0.0
                           v stringr
                                        1.5.1
## v ggplot2
                3.4.4
                           v tibble
                                        3.2.1
## v lubridate 1.9.3
                           v tidyr
                                        1.3.0
## v purrr
                1.0.2
                                     ----- tidyverse conflicts() --
## -- Conflicts -----
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()
                      masks stats::lag()
## i Use the conflicted package (<a href="http://conflicted.r-lib.org/">http://conflicted.r-lib.org/</a>) to force all conflicts to become error
library(dplyr)
library(ggplot2)
df_loaded <- read_delim("Data/user_a7710",delim = ",",show_col_types = FALSE)</pre>
print(tail(df_loaded))
## # A tibble: 6 x 13
##
     Date
                x1
                       x2
                             xЗ
                                    x4
                                          x5
                                                 x6
                                                       x7
                                                              x8
                                                                    x9
                                                                          x10
                                                                                x11
             <dbl> <dbl> <dbl> <dbl> <
                                       <dbl>
##
     <chr>
                                             <dbl>
                                                    <dbl>
                                                          <dbl>
                                                                 <dbl>
                                                                       <dbl>
                                                                              <dbl> <dbl>
## 1 2024-~
               0.5
                     0.7
                            0.3
                                  0.4
                                         0.5
                                                0.1
                                                      0.5
                                                             0.1
                                                                   0.1
                                                                         0.5
                                                                                0.7
                                                                                      1.81
## 2 2024-~
               0.5
                     0.7
                            0.3
                                  0.4
                                         0.5
                                                0.1
                                                      0.5
                                                             0.1
                                                                   0.1
                                                                         0.6
                                                                                 0.7
                                                                                      1.80
## 3 2024-~
               0.5
                     0.7
                            0.3
                                  0.4
                                         0.5
                                                      0.5
                                                                         0.7
                                                                                      1.80
                                                0.1
                                                             0.1
                                                                   0.1
                                                                                0.7
## 4 2024-~
               0.5
                     0.7
                            0.3
                                  0.4
                                         0.5
                                                0.1
                                                      0.5
                                                             0.1
                                                                   0.1
                                                                        0.8
                                                                                0.7
                                                                                      1.80
## 5 2024-~
               0.5
                     0.7
                            0.3
                                  0.4
                                         0.5
                                                0.1
                                                      0.5
                                                             0.1
                                                                   0.1
                                                                        0.9
                                                                                0.7
                                                                                      1.80
```

## Steps Followed during the testing

0.7

0.3

0.4

0.5

0.5

1. I have first tested with only 0 values in all lines, the result is that all numbers are having values are all different with values going from ~1.01149 to ~1.01951.

0.1

0.5

0.1

0.1

0.95

0.7 1.80

```
df_loaded[1:10,]
   # A tibble: 10
                                       x4
                                             x5
                                                     x6
                                                                          x9
##
                        x2
                               xЗ
                                                            x7
                                                                   8x
                                                                                x10
                                                                                       x11
       Date
                 x1
                                                                                                У
##
       <chr> <dbl>
                     <dbl>
                            <dbl>
                                   <dbl>
                                          <dbl>
                                                 <dbl>
                                                        <dbl>
                                                               <dbl>
                                                                      <dbl>
                                                                              <dbl>
                                                                                    <dbl>
##
    1 2023~
                  0
                          0
                                 0
                                        0
                                               0
                                                      0
                                                             0
                                                                    0
                                                                           0
                                                                                  0
                                                                                         0
                                                                                             1.02
##
    2 2023~
                  0
                          0
                                 0
                                        0
                                               0
                                                      0
                                                             0
                                                                    0
                                                                           0
                                                                                  0
                                                                                         0
                                                                                             1.02
                          0
                                        0
                                               0
                                                                           0
                                                                                  0
##
    3 2023~
                  0
                                 0
                                                      0
                                                             0
                                                                    0
                                                                                         0
                                                                                             1.02
##
    4 2023~
                  0
                          0
                                 0
                                        0
                                               0
                                                      0
                                                             0
                                                                    0
                                                                           0
                                                                                  0
                                                                                         0
                                                                                            1.01
    5 2023~
                          0
                                                                           0
                                                                                  0
                                                                                            1.02
##
                  0
                                 0
                                        0
                                               0
                                                      0
                                                             0
                                                                    0
                                                                                         0
    6 2023~
                  0
                          0
                                        0
                                                                    0
                                                                           0
##
                                 0
                                               0
                                                      0
                                                             0
                                                                                  0
                                                                                         0
                                                                                            1.01
##
    7 2023~
                  0
                          0
                                 0
                                        0
                                               0
                                                      0
                                                             0
                                                                    0
                                                                           0
                                                                                  0
                                                                                         0
                                                                                            1.02
##
    8 2023~
                  0
                          0
                                 0
                                        0
                                               0
                                                      0
                                                             0
                                                                    0
                                                                           0
                                                                                  0
                                                                                         0
                                                                                            1.02
    9 2023~
                          0
                                 0
                                        0
                                               0
                                                                           0
                                                                                             1.02
##
                  0
                                                      0
                                                             0
                                                                    0
                                                                                  0
                                                                                         0
## 10 2023~
                  0
                          0
                                 0
                                        0
                                               0
                                                      0
                                                             0
                                                                    0
                                                                           0
                                                                                  0
                                                                                            1.02
                                                                                         0
min(df_loaded[1:10,]$y)
## [1] 1.011496
max(df_loaded[1:10,]$y)
## [1] 1.019509
  2. I have then selected randomly (with 1 digit) numbers in each columns. The result is at ~1.7998
df_loaded[11:11,]
## # A tibble: 1 x 13
##
     Date
                 x1
                        x2
                               xЗ
                                       x4
                                             x5
                                                     x6
                                                            x7
                                                                   8x
                                                                          x9
                                                                                x10
                                                                                       x11
                                                                                                У
##
      <chr>
              <dbl> <dbl> <dbl> <dbl> <dbl> <
                                                 <dbl> <dbl> <dbl> <dbl> <
                                                                             <dbl> <dbl>
                                                                                           <dbl>
## 1 2024-~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                0.2
  3. I have then used the previous numbers for all rows but in x1 to x10 only changing the last column with
     incrementals. Numbers are going from \sim 1.7983 to \sim 1.8092
df_loaded[12:22,]
## # A tibble: 11 x 13
##
      Date
                               xЗ
                                       x4
                                             x5
                                                     x6
                                                            x7
                                                                   x8
                                                                          x9
                                                                                x10
                 x1
                        x2
                                                                                       x11
                                                                                                У
                                          <dbl>
                                                                             <dbl> <dbl>
##
       <chr> <dbl>
                    <dbl> <dbl>
                                   <dbl>
                                                 <dbl>
                                                        <dbl>
                                                               <dbl>
                                                                      <dbl>
                                                                                           <dbl>
##
    1 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.05
                                                                                             1.80
                                                                                     0.1
##
    2 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                0.2
                                                                                             1.80
    3 2024~
                              0.3
                                     0.4
                                                                         0.1
                                                                                0.2
                                                                                     0.2
##
                0.5
                       0.2
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                                             1.80
##
    4 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.3
                                                                                             1.80
##
    5 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                                                0.2
                                                                                     0.4
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                             1.80
##
    6 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.5
                                                                                             1.81
                                                                                     0.6
    7 2024~
                                                                                0.2
##
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                             1.80
##
    8 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.7
                                                                                             1.81
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                          0.5
                                                                                0.2
                                                                                     0.8
##
    9 2024~
                                                   0.1
                                                                  0.1
                                                                         0.1
                                                                                             1.81
## 10 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.9
                                                                                             1.81
   11 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                                0.2
                                                                                     0.95
                                                                                             1.80
                                                                  0.1
                                                                         0.1
min(df_loaded[12:22,]$y)
## [1] 1.798308
max(df_loaded[12:22,]$y)
```

#### ## [1] 1.809425

4. I have then the exact same table changing only one value in the 8th row in X10. Numbers are going from  $\sim$ 1.8010 to  $\sim$ 1.8086. No significant changes in the result can be seen.

```
df_loaded[23:33,]
##
   # A tibble: 11
##
                                      x4
                                             x5
                                                    x6
                                                                          x9
       Date
                 x1
                        x2
                               xЗ
                                                            x7
                                                                  x8
                                                                               x10
                                                                                       x11
                                                                                                У
##
       <chr>
              <dbl>
                     <dbl>
                            <dbl>
                                   <dbl>
                                          <dbl>
                                                 <dbl>
                                                        <dbl>
                                                               <dbl>
                                                                      <dbl>
                                                                             <dbl>
                                                                                    <dbl>
                                                                                           <dbl>
##
    1 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.05
                                                                                             1.81
##
    2 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                 0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.1
                                                                                             1.80
                                                                                     0.2
##
    3 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                 0.1
                                                                         0.1
                                                                                0.2
                                                                                             1.80
##
    4 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                         0.1
                                                                                0.2
                                                                                     0.3
                                                                                             1.80
                                                                 0.1
    5 2024~
                                                                 0.1
                                                                                0.2
                                                                                     0.4
##
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                         0.1
                                                                                             1.80
##
    6 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                 0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.5
                                                                                             1.81
##
    7 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                          0.5
                                                                                0.2
                                                                                     0.6
                                                                                             1.81
                                                   0.1
                                                                 0.1
                                                                         0.1
                                                                 0.1
##
    8 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                         0.1
                                                                                0.7
                                                                                     0.7
                                                                                             1.81
    9 2024~
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                                                0.2
                                                                                     0.8
##
                0.5
                                                   0.1
                                                          0.5
                                                                 0.1
                                                                         0.1
                                                                                             1.80
## 10 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                 0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.9
                                                                                             1.80
## 11 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                           0.5
                                                                  0.1
                                                                         0.1
                                                                                0.2
                                                                                     0.95
                                                                                             1.80
min(df_loaded[23:33,]$y)
```

```
## [1] 1.801009
```

```
max(df_loaded[23:33,]$y)
```

#### ## [1] 1.808582

5. I have then the exact same table changing again one value in the 8th row in X10. Numbers are going from  $\sim$ 1.7990 to  $\sim$ 1.8049. No significant changes in the result can be seen.

```
df_loaded[34:44,]
```

```
## # A tibble: 11 x 13
##
       Date
                 x1
                        x2
                               xЗ
                                      x4
                                             x5
                                                     x6
                                                            x7
                                                                   8x
                                                                          x9
                                                                                x10
                                                                                       x11
                                                                                                у
##
       <chr>
             <dbl>
                    <dbl>
                            <dbl>
                                   <dbl>
                                          <dbl>
                                                 <dbl>
                                                        <dbl>
                                                               <dbl>
                                                                      <dbl>
                                                                             <dbl>
                                                                                    <dbl>
                                                                                            <dbl>
      2024~
                0.5
                       0.2
                                            0.5
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                              0.2
                                                                                     0.05
##
    1
                              0.3
                                     0.4
                                                   0.1
                                                                                             1.80
##
    2 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                              0.2
                                                                                     0.1
                                                                                             1.80
##
    3 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                              0.2
                                                                                     0.2
                                                                                             1.80
##
    4 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                              0.2
                                                                                     0.3
                                                                                             1.80
##
    5 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                              0.2
                                                                                     0.4
                                                                                             1.80
    6 2024~
                                            0.5
##
                0.5
                       0.2
                              0.3
                                     0.4
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                              0.2
                                                                                     0.5
                                                                                             1.80
##
    7 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                         0.1
                                                                              0.2
                                                                                     0.6
                                                                                             1.80
                                                                  0.1
                              0.3
                                     0.4
##
    8 2024~
                0.5
                       0.2
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                              0.05
                                                                                     0.7
                                                                                             1.80
##
    9
      2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                         0.1
                                                                              0.2
                                                                                     0.8
                                                                                             1.80
                                                                  0.1
## 10 2024~
                0.5
                       0.2
                              0.3
                                     0.4
                                            0.5
                                                                              0.2
                                                                                     0.9
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                             1.80
## 11 2024~
                0.5
                       0.2
                              0.3
                                                                              0.2
                                     0.4
                                            0.5
                                                   0.1
                                                          0.5
                                                                  0.1
                                                                         0.1
                                                                                     0.95
                                                                                             1.80
min(df_loaded[34:44,]$y)
```

```
max(df_loaded[34:44,]$y)
```

## ## [1] 1.804943

## [1] 1.799003

6. I have then restarted from the table in 3. and changed the column X11 with 0.7. Numbers are going from ~1.8000 to ~1.8058. No significant changes in the result can be seen.

```
df_loaded[45:55,]
##
   # A tibble: 11
      Date
                               xЗ
                                      x4
                                             x5
                                                    x6
##
                 x1
                        x2
                                                           x7
                                                                 8x
                                                                        x9
                                                                              x10
                                                                                     x11
                                                                                              У
##
       <chr> <dbl>
                    <dbl> <dbl>
                                  <dbl>
                                         <dbl>
                                                <dbl>
                                                       <dbl>
                                                              <dbl>
                                                                     <dbl>
                                                                            <dbl>
                                                                                   <dbl>
                                                                                          <dbl>
##
    1 2024~
                0.5
                       0.2
                              0.3
                                    0.4
                                            0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.05
                                                                                     0.7
                                                                                           1.80
##
    2 2024~
                0.5
                       0.2
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.1
                                                                                     0.7
                                                                                           1.80
                       0.2
                                           0.5
##
    3 2024~
                0.5
                              0.3
                                    0.4
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.2
                                                                                     0.7
                                                                                           1.81
##
    4 2024~
                0.5
                       0.2
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.3
                                                                                     0.7
                                                                                           1.80
##
    5 2024~
                0.5
                       0.2
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.4
                                                                                     0.7
                                                                                           1.80
    6 2024~
                       0.2
##
                0.5
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.5
                                                                                     0.7
                                                                                           1.80
##
    7 2024~
                0.5
                       0.2
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.6
                                                                                     0.7
                                                                                           1.80
##
    8 2024~
                0.5
                       0.2
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.7
                                                                                     0.7
                                                                                           1.80
    9 2024~
                       0.2
                              0.3
##
                0.5
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.8
                                                                                     0.7
                                                                                           1.80
## 10 2024~
                0.5
                       0.2
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                       0.1
                                                                                           1.80
                                                                0.1
                                                                             0.9
                                                                                     0.7
## 11 2024~
                0.5
                       0.2
                              0.3
                                    0.4
                                            0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.95
                                                                                     0.7
                                                                                           1.80
min(df loaded[45:55,]$y)
## [1] 1.800037
max(df_loaded[45:55,]$y)
## [1] 1.805801
  6. I have then restarted then changed the column X2 with 0.7. Numbers are going from ~1.7989 to ~1.8072.
     No significant changes in the result can be seen.
df_loaded[56:66,]
## # A tibble: 11 x 13
##
      Date
                 x1
                        x2
                               xЗ
                                      x4
                                             x5
                                                    x6
                                                           x7
                                                                 x8
                                                                        x9
                                                                              x10
                                                                                     x11
                                                                                              у
##
                    <dbl> <dbl> <dbl>
                                                                     <dbl>
                                                                            <dbl>
                                                                                          <dbl>
       <chr> <dbl>
                                         <dbl>
                                                <dbl>
                                                       <dbl>
                                                              <dbl>
                                                                                   <dbl>
##
    1 2024~
                0.5
                       0.7
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.05
                                                                                     0.7
                                                                                           1.81
##
    2 2024~
                0.5
                       0.7
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.1
                                                                                     0.7
                                                                                           1.80
##
    3 2024~
                0.5
                       0.7
                              0.3
                                    0.4
                                            0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.2
                                                                                     0.7
                                                                                           1.80
    4 2024~
                                                                       0.1
##
                0.5
                       0.7
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                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                             0.3
                                                                                     0.7
                                                                                           1.80
##
    5 2024~
                0.5
                       0.7
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.4
                                                                                     0.7
                                                                                           1.80
##
    6 2024~
                0.5
                       0.7
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                       0.1
                                                                                           1.81
                                                                0.1
                                                                             0.5
                                                                                     0.7
##
    7 2024~
                0.5
                       0.7
                              0.3
                                    0.4
                                           0.5
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                                                                             0.6
                                                                                     0.7
                                                                                           1.80
                                                         0.5
                                                                0.1
                                                                       0.1
    8 2024~
                              0.3
##
                0.5
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                                    0.4
                                           0.5
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                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.7
                                                                                     0.7
                                                                                           1.80
    9 2024~
                0.5
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                              0.3
##
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.8
                                                                                     0.7
                                                                                           1.80
## 10 2024~
                0.5
                       0.7
                              0.3
                                    0.4
                                            0.5
                                                          0.5
                                                                                     0.7
                                                                                           1.80
                                                  0.1
                                                                0.1
                                                                       0.1
                                                                             0.9
## 11 2024~
                0.5
                       0.7
                              0.3
                                    0.4
                                           0.5
                                                  0.1
                                                         0.5
                                                                0.1
                                                                       0.1
                                                                             0.95
                                                                                     0.7
                                                                                           1.80
min(df_loaded[56:66,]$y)
## [1] 1.798993
max(df_loaded[56:66,]$y)
```

## [1] 1.807244