Data Science for Supply Chain

Moving Average

The average demand during the last n periods.

$$f_n = \frac{1}{n} \sum_{i=1}^{n} d_{t-i}$$

Where:

- n is the number of periods we take the average of
- d_t the demand we observe during period t
- f_t is the forecast we made for period t

The first forecast will be done for $t = n + 1$

In scientific literature, you will find often see the output you want to predict noted y

A prediction would be noted as $\hat{y}$

When we want to point to a specific occurrence of the forcast at time t, we will not it f_t or d_t

Demand observation: we will call the demand of each period.

Noise: an unexplained variation in the data. It is often due to the randomness of the different processes at hand.

References

- Moving Average:

```
dmd <- tibble::tribble(
              ~Date, ~Demand,
         "2010-1-1",      37,
         "2011-1-1",      60,
         "2012-1-1",      85,
         "2013-1-1",     112,
         "2014-1-1",     132,
         "2015-1-1",     145,
         "2016-1-1",     179,
         "2017-1-1",     198,
         "2018-1-1",     212,
         "2019-1-1",     232,
         "2020-1-1",      NA,
         "2021-1-1",      NA,
         "2022-1-1",      NA
         )



dmd$Date <- as.Date(dmd$Date)
```

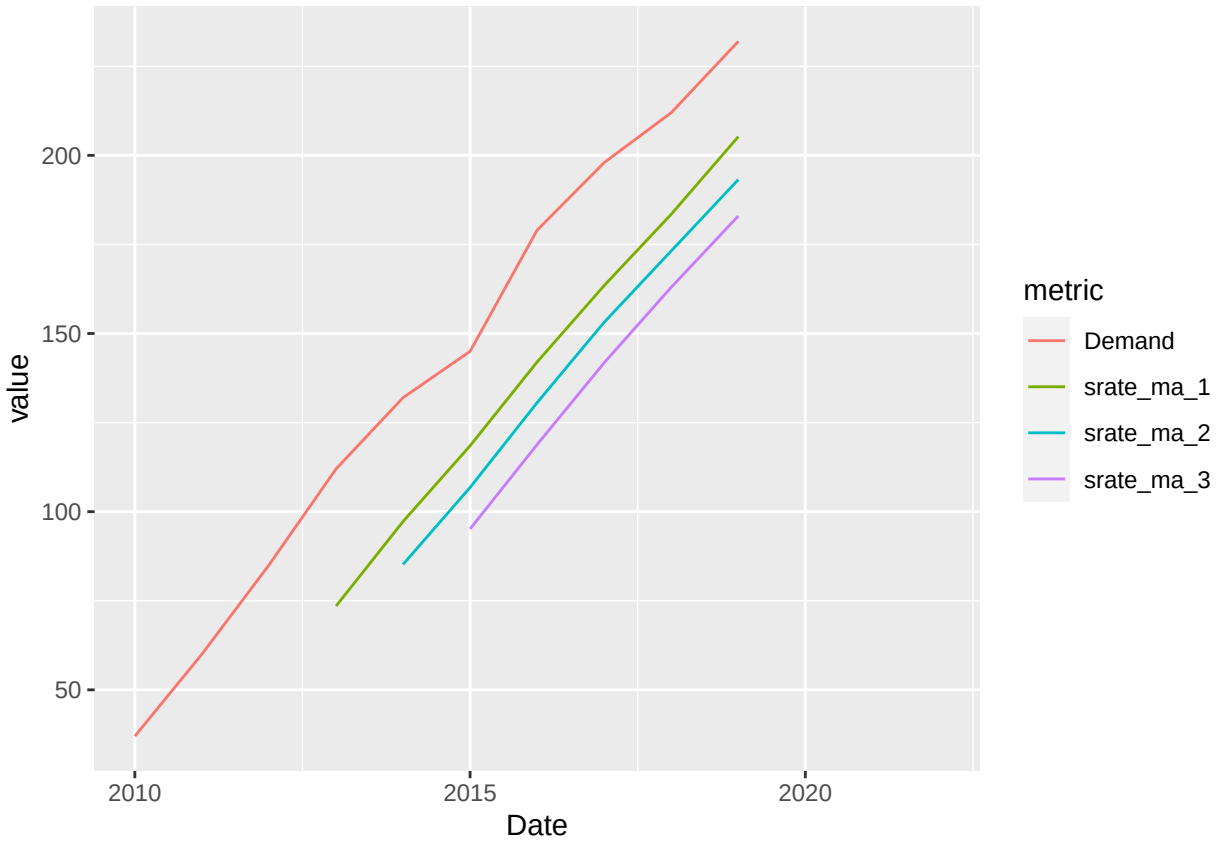
```
demand <- dmd %>% mutate(srate_ma_1 = rollmean(Demand, k = 4, fill = NA, align = "right"),
                         srate_ma_2 = rollmean(Demand, k = 5, fill = NA, align = "right"),
                          srate_ma_3 = rollmean(Demand, k = 6, fill = NA, align = "right"))

demand
```

```
## # A tibble: 13 x 5
##    Date       Demand srate_ma_1 srate_ma_2 srate_ma_3
##    <date>      <dbl>      <dbl>      <dbl>      <dbl>
##  1 2010-01-01     37       NA         NA         NA
##  2 2011-01-01     60       NA         NA         NA
##  3 2012-01-01     85       NA         NA         NA
##  4 2013-01-01    112       73.5       NA         NA
##  5 2014-01-01    132       97.2       85.2       NA
##  6 2015-01-01    145      118.       107.        95.2
##  7 2016-01-01    179      142        131.       119.
##  8 2017-01-01    198      164.       153.       142.
##  9 2018-01-01    212      184.       173.       163
## 10 2019-01-01    232      205.       193.       183
## 11 2020-01-01     NA       NA         NA         NA
## 12 2021-01-01     NA       NA         NA         NA
## 13 2022-01-01     NA       NA         NA         NA
```

```
demand %>% gather(metric, value, Demand:srate_ma_3) %>%
  ggplot(aes(Date, value, color = metric)) +
  geom_line()
```

```
## Warning: Removed 24 row(s) containing missing values (geom_path).
```


200
150
100
50
value
2010
2015
2020
Date
metric
Demand
srate_ma_1
srate_ma_2
srate_ma_3