

Moving Average

Types of moving average

Smoothing of Data

- ① Simple moving average
- ② Cumulative moving average
- ③ Exponential Weighted moving average

Simple moving average

$$\text{Average} \Rightarrow [10, 12, 15, 13, 11]$$

$$\Rightarrow \frac{\text{Sum of all the no.s}}{\text{total no}}$$

$$\Rightarrow \frac{10 + 12 + 15 + 13 + 11}{5} = \boxed{12.2}$$

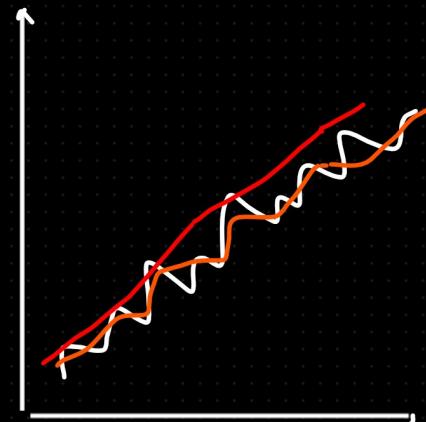
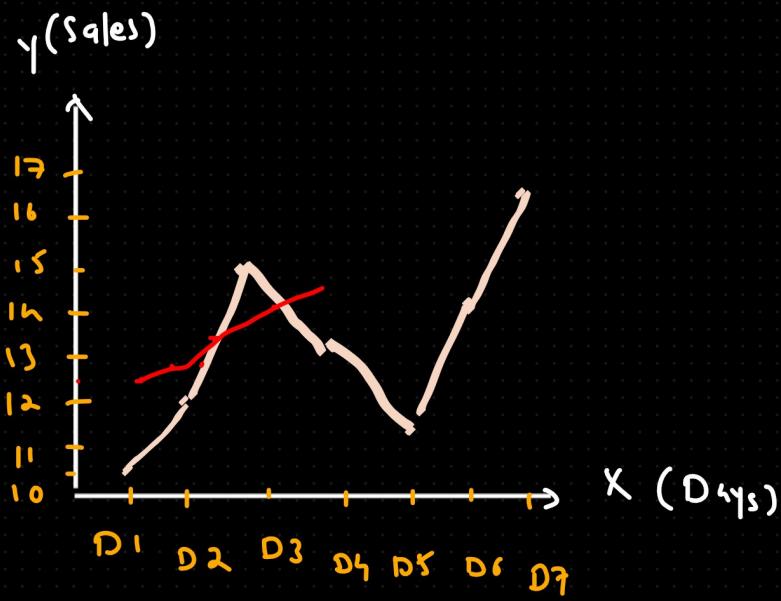
Moving \Rightarrow ① First decide the window
② Average calculation

$$[10, 12, 15, 13, 11, 14, 16]$$

- Moving \Rightarrow ① First decide the window
 ② Average calculation

[10, 12, 15, 13, 11, 14, 16]

Day 1	10
Day 2	12
Day 3	15
Day 4	13
Day 5	11
Day 6	14
Day 7	16



What is Window Size \Rightarrow [Window Size = 3] $[12.33, 13.33, 13, 12.66, 13.66]$

$$1^{\text{st}} \text{ avg} = \frac{\text{Day 1} + \text{Day 2} + \text{Day 3}}{3} = \frac{10 + 12 + 15}{3} = 12.33$$

$$2^{\text{nd}} \text{ avg} = \frac{\text{Day 2} + \text{Day 3} + \text{Day 4}}{3} = \frac{12 + 15 + 13}{3} = 13.33$$

$$3^{\text{rd}} \text{ avg} = \frac{\text{Day 3} + \text{Day 4} + \text{Day 5}}{3} = \frac{15 + 13 + 11}{3} = 13$$

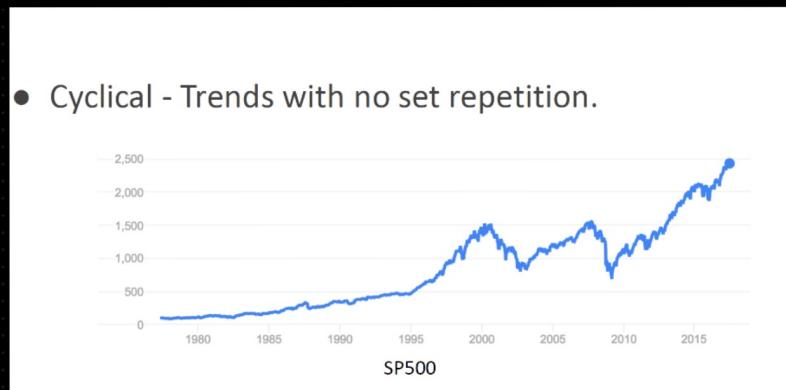
$$4^{\text{th}} \text{ avg} = \frac{\text{Day 4} + \text{Day 5} + \text{Day 6}}{3} = \frac{13 + 11 + 12}{3} = 12.66$$

$$5^{\text{th}} \text{ avg} = \frac{\text{Day 5} + \text{Day 6} + \text{Day 7}}{3} = \frac{11 + 14 + 16}{3} = 13.66$$

Smoothing of Data \Rightarrow We can do Smoothing of the Data by the Moving Avg.

(Time window)

- 1 Pattern recognition
- 2 trend of the data
- 3 reduce the outliers effect
- 4 enhancing the visualization
- 5 making data more manageable



Cumulative moving avg

Day 1	10
Day 2	12
Day 3	15
Day 4	13
Day 5	11
Day 6	14
Day 7	16

$$\boxed{\text{Avg}} = \frac{10 + 12 + 15 + 13 + 11 + 14 + 16}{7}$$

Moving Avg (SMA) \Rightarrow $\boxed{\text{Window size} = 3}$

move \Rightarrow time horizon

Cumulative Avg =
(cmA)

D ₁	10	10
D ₂	12	$D_1 + D_2 / 2$
D ₃	15	$D_1 + D_2 + D_3 / 3$
D ₄	13	$D_1 + D_2 + D_3 + D_4 / 4$
D ₅	11	$D_1 + D_2 + D_3 + D_4 + D_5 / 5$
D ₆	14	$D_1 - \dots - D_6 / 6$
D ₇	16	$D_1 - \dots - D_7 / 7$

find the avg of all the Data point
up to the give time stamp

$$D_8 = ?$$

① it will give you the exponential trend

② it is used for the long term.

Exponential moving avg or Exponential weighted moving avg

We give more weightage to the recent Data point or

give more weightage to the recent time stamp.

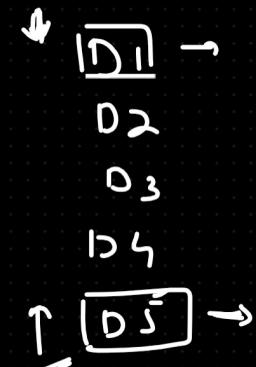
$$V_t = \beta V_{t-1} + (1-\beta) D_t$$

$\uparrow \quad \uparrow$

EMA at time $t-1$ EMA at previous time

$0 < \beta < 1$

current (t)
time stamp value



$$\boxed{D_1 25} \Rightarrow 0$$

$$\boxed{D_2 13} \Rightarrow$$

$$\boxed{D_3 17}$$

$$D_4 31$$

$$\boxed{D_5 43}$$

$$\boxed{V_0 = 0}$$

$$V_1 = 0.9 \times V_0 + 0.1 \times 13 \quad \beta = [0.1]$$

$$V_1 = 0.9 \times 0 + 1.3$$

$$\boxed{V_1 = 1.3}$$

$$\begin{array}{c} \uparrow \\ 0.9 \\ \downarrow \\ 1 - 0.9 = 0.1 \end{array}$$

$$\boxed{V_2 = 0.9 \times 1.3 + 0.1 \times 17 =}$$