

Answer on Question #57298-Math-Statistics and Probability

Consider the following annual series on the number of people assisted by a county's human resources department.

Year: People:

1 22

2 24

3 28

4 24

5 22

6 24

7 20

8 26

9 24

10 28

11 26

- a. What is the 3-year moving average for period 4?
- b. What is the 3-year moving average forecast for period 12?
- c. What is the Mean Square Error (MSE) for the 3-year moving average?
- d. Using a smoothing constant of 0.4, what is the exponential smoothing value to be used as forecasts for period 4?
- e. Using a smoothing constant of 0.4, what is the exponential smoothing value to be used as forecasts for period 12?
- f. Using a smoothing constant of 0.4, what is the Mean Square Error (MSE) for exponential smoothing?
- g. When comparing the accuracy of both forecasting techniques (3-year moving average and exponential smoothing with a 0.4 smoothing constant) we can conclude that

Solution

a. The 3-year moving average for period 4 is

$$\frac{22 + 24 + 28}{3} = 24.67 \text{ rounded to } 25.$$

b. The 3-year moving average forecast for period 12 is

$$\frac{24 + 28 + 26}{3} = 26.$$

c. The Mean Square Error (MSE) for the 3-year moving average.

Year	People	Moving Average	Error	Error Squared
1	22			
2	24			
3	28			
4	24	25	1	1
5	22	25	3	9
6	24	25	1	1
7	20	23	3	9
8	26	22	-4	16
9	24	23	-1	1
10	28	23	-5	25
11	26	26	0	0

$$MSE = \frac{1 + 9 + 1 + 9 + 16 + 1 + 25 + 0}{8} = 7.75.$$

d.

Year	People	Smoothed Average	Error	Error Squared
1	22			
2	24	22	-2	4
3	28	$0.4(24) + 0.6(22) = 23$	-5	25
4	24	$0.4(28) + 0.6(23) = 25$	1	1
5	22	$0.4(24) + 0.6(25) = 25$	3	9
6	24	$0.4(22) + 0.6(25) = 24$	0	0
7	20	$0.4(24) + 0.6(24) = 24$	4	16
8	26	$0.4(20) + 0.6(24) = 22$	-4	16
9	24	$0.4(26) + 0.6(22) = 24$	0	0
10	28	$0.4(24) + 0.6(24) = 24$	-4	16
11	26	$0.4(28) + 0.6(24) = 26$	0	0
12		$0.4(26) + 0.6(26) = 26$		

The exponential smoothing value to be used as forecasts for period 4 is 25.

e. The exponential smoothing value to be used as forecasts for period 12 is 26.

f.

$$MSE = \frac{4 + 25 + 1 + 9 + 0 + 16 + 16 + 0 + 16 + 0}{10} = 8.7.$$

g. When comparing the accuracy of both forecasting techniques (3-year moving average and exponential smoothing with a 0.4 smoothing constant) we can conclude that 3-year moving average forecasting technique is more accurate in this example ($7.75 < 8.7$).