ES 01

I have 6 stores at the edge of a hexagon with the supplier at center

radius = side = 100 km
capacity_store = 50 kl
capacity_truck = 39 kl
demand = 3~7 kl
horizon = 30 days

Manual solution

I have considered the worst case scenario where each stores has a demand of 7. It's impossible to not go into stockout because 7*6=42 > 39.

I considered various alternatives where daily i serve only 1 store, 2 store, 3 store or 6 store. No matter the choice, after 30 days, the level of the inventory is at 35.

The only thing to consider was the cost of the trip. 1 store needs 200 km. 100km to go to the store and another 100km to come back. a daily trip to visit all the store costs 700.

So obviously, because the rate of decrease is the same, i choose to serve 1 store per day, having the cost of 200 daily.

km/kl
km = 200km*30 = 6000
kl = 835 //sum(deliveries1)

$\frac{km}{kl} = 7.18$

delivery times
30

Route first, cluster second

The routes are already defined. For cluster we considered the whole matrix of the demand of all stores. But we also know that the stores start with 50 units of goods so 50*6=300.

For the manual solution we understood that the lower the number of stores to visit, the lower the cost. If we consider a total demand of 868-300 = 568/39=14.5641, we need in total 15 visits to the stores.

Each store has a demand of 568/6=94.6/39=2.42 means that i need 3 visits on each store. But this means that everytime that i visit, i need to deposit the whole 39kl of goods. And because the demand of each store is uniformly distributed with same values, if 1 store reach a level of 20kl (so i can deliver my 39kl and deposit it all), the moment i will supply the last sixth store, it will already reach a stockout.

Instead having clusters of 2, i will deliver 19.5kl each so i just need to wait till the level of the store reaches 30kl. In 2 days, the last store can last enough till the last delivery.

In case of manual solution the costs would be 30*200 = 6000.

While for our route first, we know that each store needs 94.6kl. So each cluster needs 189,2kl / 39 = 4.85 => 5 visits. But to visit a cluster it costs 300 so 15*300 = 4500.

The values of 15 changes based on the matrix demandHistory on matlab.

km/kl
km = 300km*21 = 6300
kl = 819//sum(deliveries_h)

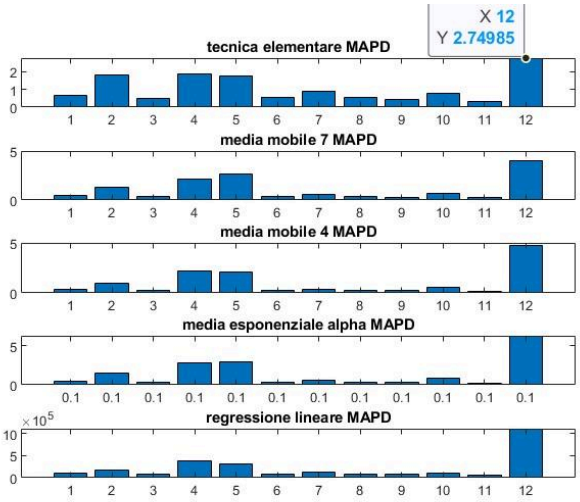
$$\frac{km}{kl} = 7.69$$

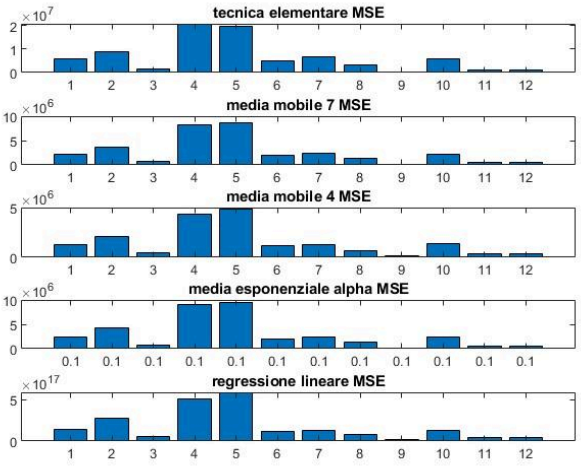
delivery times
21

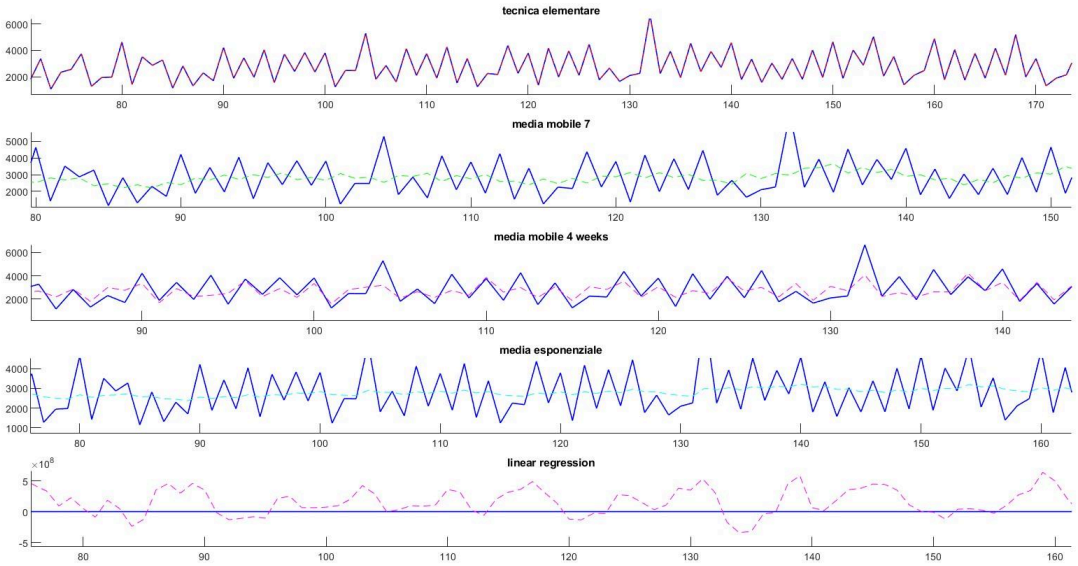
ES 02

Final conclusions

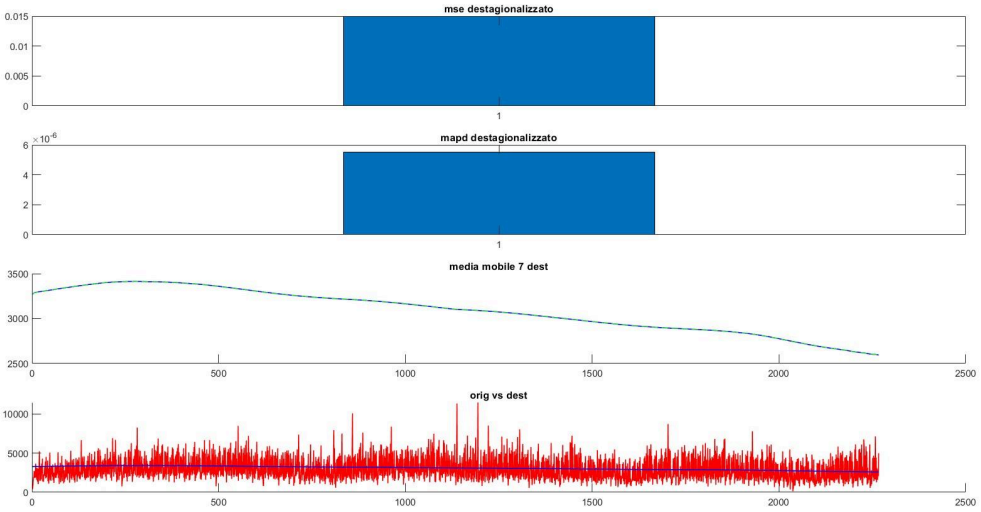
The result values given by MSE and MAPD, shows that the moving average has the lowest error compared to the other methods.







We got a further improvement when we deseasonalize the time series.



We can conclude that, deseasonalize the data can help us on focus more on the trend, to understand how the sales is evolving throughout the year, and so using predicting methods will result in better values.