INDENG 250 PS1

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1. Supply chain Management Definition. It is the set of practices required to perform the functions of a Supply chain and to make them more efficient, profitable, equitable, sustainable less costly, less wasteful and less stressful.

2. Write out $D_t = \cdots$.

2.1 Under the simple average model, we make the assumption that

$$D_t = I + \epsilon_t. \tag{1}$$

2.2 Under the moving average model, we have

2.3 Under the exponential model, we have

2.4 Under the double exponential smoothing model, we assume

$$D_t = I + tS + \epsilon_t. \tag{2}$$

2.5 Under triple exponential smoothing model, we assume

$$D_t = (I + tS)c_t + \epsilon_t, \sum_t c_t = N. \tag{3}$$

3. Insert all the figures generated by the code.

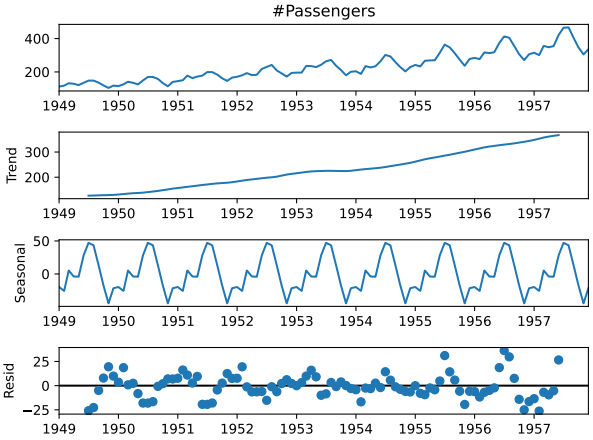

Figure 1: decomposition

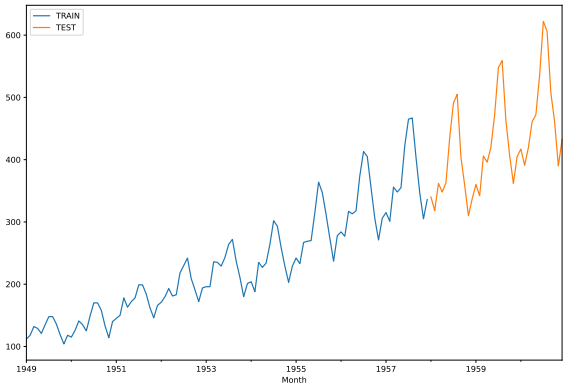

Figure 2: historical

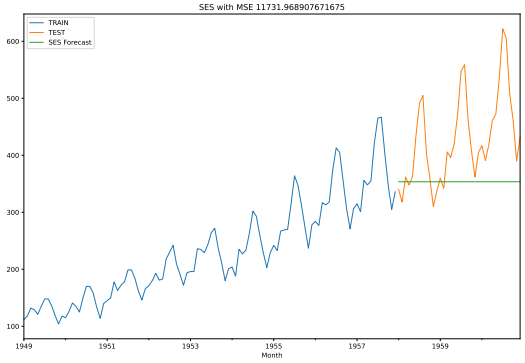

Figure 3: SES

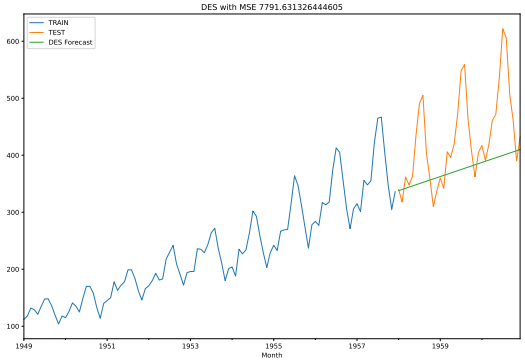

Figure 4: DES

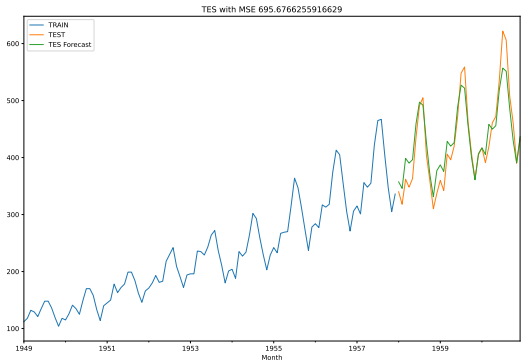

Figure 5: DES

4. Now we show that the simple average is the least square minimizer. Assume $\sigma_t \sim \mathcal{N}(0, \sigma^2)$. Suppose we would like to have a parmeter θ, with the estimator as $\hat{x}_t = \sum_{i=0}^{t-1} \theta_i x_i$. Now we would like to minimize the square loss as

$$\mathcal{L} = \mathbb{E}[(x_t - \hat{x}_t)^2]. \tag{4}$$

Also we denote $\theta = (\theta_0, \cdots, \theta_{t-1})^\top$, and we can simplify (**??**) into