SNS College of Technology

Coimbatore – 35

19BAZ782 – Analytics for Everyone

Unit V – Predictive Analytics II

Topic…Guess…???

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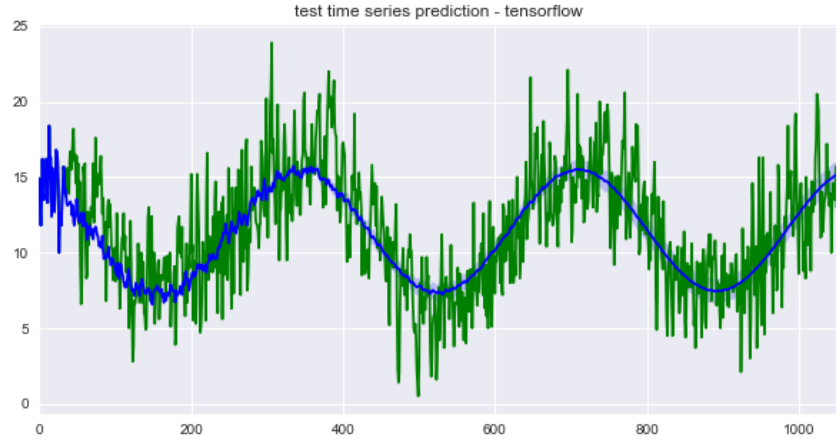
1st Indian Institution to Implement Design Thinking Curriculum

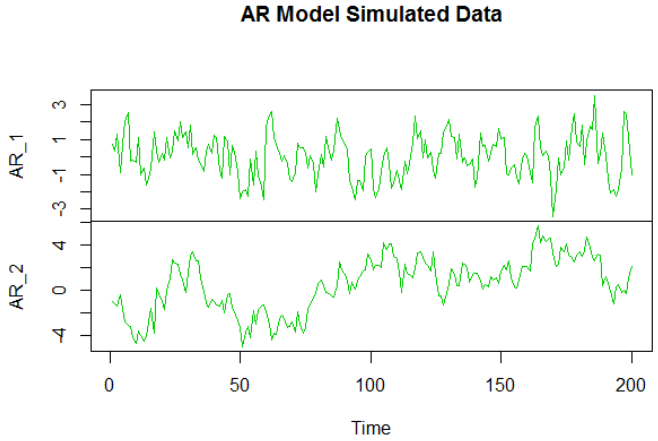
Redesigning Common Mind and Business Towards Excellence

Recall

- Accuracy
- Training and test sets
- Forecasting
- Training and test sets
- Error
- Methods

Guess the topic...???





Regression

Auto Correlation

- Auto correlation: Correlation of variable observed at 2 different point of time [Y_t & Y_{t-1}, Y_t & Y_{t-3}]
- K-period plot of autocorrelation is called as Autocorrelation Function (ACF) or Correlogram

Auto-correlation of lag k, ρ_k, is given by:

$$\rho_k = \frac{\sum_{t=k+1}^{n} \left(Y_{t-k} - \bar{Y}\right)\left(Y_t - \bar{Y}\right)}{\sum_{t=1}^{n} (Y_t - \bar{Y})^2}$$

n = total number of observations

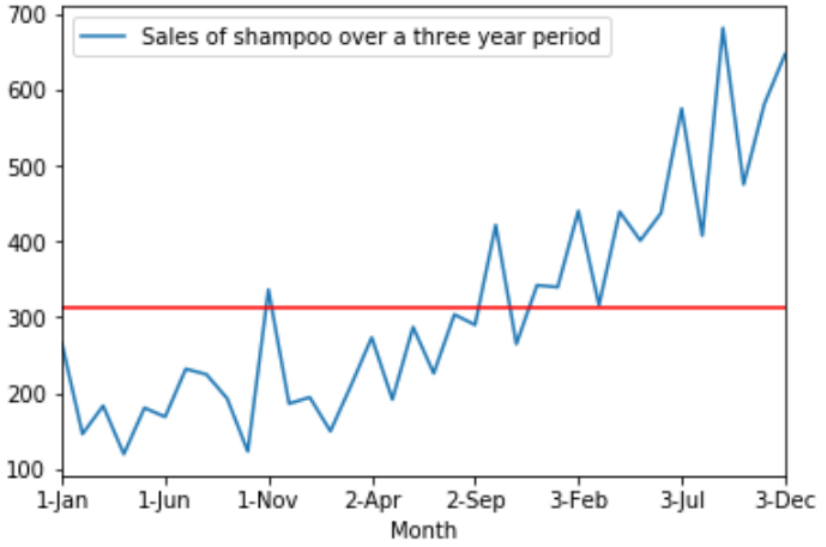
Auto Correlation...Cont...

- Auto correlation of lag k is auto – correlation between Y_t and Y_{t+k}
- To test whether the autocorrelation at lag k is significantly different from 0...
- For any k, reject Ho if $|\rho_k| > 1.96/\sqrt{n}$.

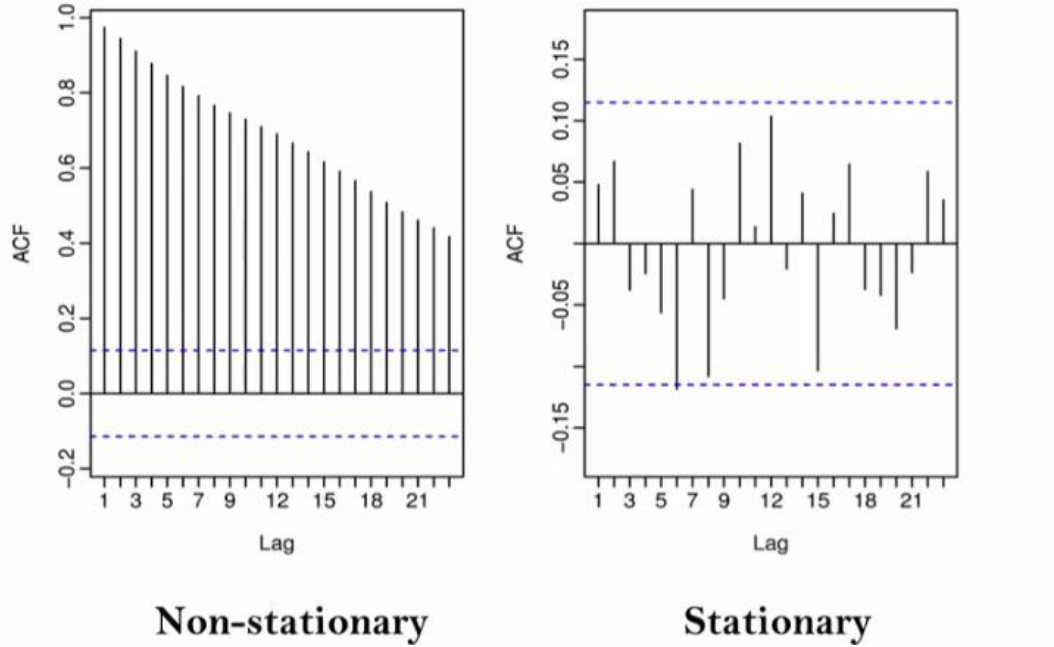
$$H_o: \rho_k = 0$$
$$H_A: \rho_k \neq 0$$

Stationarity

- A time series is stationary if,
  - *Mean is constant*
  - *Variance is constant*
  - *The covariance between two time periods (Y_t) and (Y_{t+k}) depends only on the lag k not on the time t*
- Assume that the time series is stationary before applying forecasting models

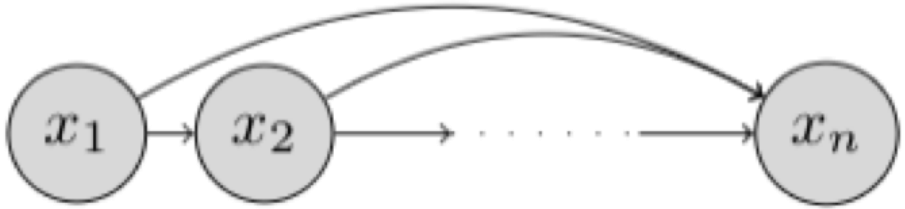


How to identify...?



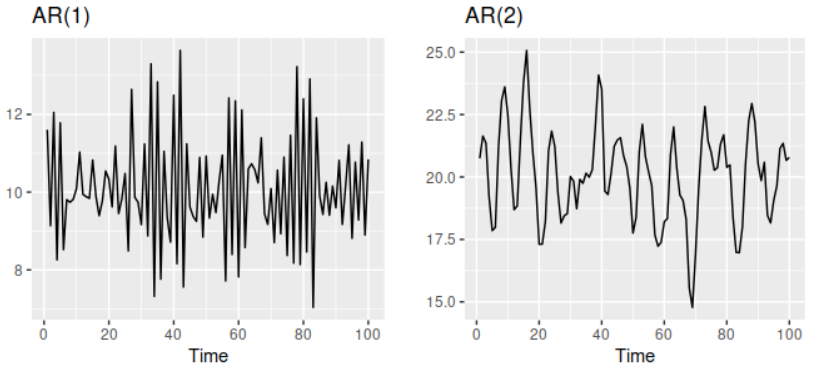
AR Model

- Auto Regressive model
- Similarities between past and present data
- Auto correlation between data
- Regression of Y on itself



AR Model...Cont...

- Relies on past data to predict the current / future
- AR(p): “p” is called the order of the model and represents the number of lagged values
- $X_t = C + \phi_1 X_{t-1} + \epsilon_t$
- Φ – Range from -1 to +1
- ϵ_t - residual
- These residuals are usually unpredictable differences



AR Model Lags

- How many lags are needed [Past values]
- More in number – More complex model – More accurate results
- Process Mean

$$\delta = \left(1 - \sum_{i=1}^{p} \phi_i\right) \mu \,,$$

Assessment

Difference between
Regression and AR Model...

Summary

- Regression
- Auto regressive Model
- AR Model lags

Reference

- https://online.stat.psu.edu/stat501/lesson/14/14.1
- https://www.statisticshowto.com/autoregressive-model/
- https://365datascience.com/autoregressive-model/

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