



Cannabis Data Science

Saturday Morning Statistics

October 30, 2021

The 10 Commandments of Forecasting

Silvia, J, Iqbal, A, et. al (2014), 'Economic and Business Forecasting'.

- 1 Know what you are forecasting.
- 2 Understand the purpose of forecasting.
- 3 Acknowledge the cost of the forecast error.
- 4 Rationalize the forecast horizon.
- 5 Understand the choice of variables.
- 6 Rationalize the forecasting model used.
- 7 Know how to present the results.
- 8 Know how to decipher the forecast results.
- 9 Use recursive methods.
- 10 Understand that forecasting models evolve over time.

The out-of-sample root mean square error (RMSE) can quantify forecast error.

$$RMSE = \sqrt{\frac{1}{T} \sum (Y_{t+1} - \hat{Y}_{t+1})^2}$$

1. Know what you are forecasting

- Forecast total sales and total plants grown in Massachusetts in 2021 and 2022 to compare the historic and estimated growth.

2. Understand the purpose of forecasting

- Get better expectations for the size and growth rate of the Massachusetts cannabis industry in 2021 and 2022.

3. Acknowledge the cost of the forecast error.

- Overstating growth may lead to foolhardy decisions, where as understating growth may leave money on the table.

4. Rationalize the forecast horizon

- Forecasting a series for 2021 is a long, yet informative horizon. A shorter time frame may be less informative and a longer time frame may yield unreliable forecasts.

5. Understand the choice of variables.

- Historic plant totals and cannabis sales in Massachusetts from November 2018 through October 2021 will be used, utilizing all of the available data under the principle to never throw away data.

6. Rationalize the forecasting model used.

- An atheoretical forecasting approach, Box-Jenkins methodology, will be utilized. The Box-Jenkins methodology is useful for short-term forecasting, but less useful for long-term forecasting because the model may not capture slower moving variables that define the state of the economy.

AR(p) process:

$$y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \dots + \beta_p y_{t-p} + \epsilon_t$$

MA(q) process:

$$y_t = \theta + \gamma_1 \epsilon_{t-1} + \gamma_2 \epsilon_{t-2} + \dots + \gamma_q \epsilon_{t-q} + \epsilon_t$$

7. Know how to present the results.

- Always show the data (in this case in a figure).

8. Know how to decipher the forecast results.

- Look for seasonality, etc.

9. Use recursive methods.

- When future data is released, calculate the RMSE for actual forecasts and create new forecasts.

10. Understand that forecasting models evolve over time.

- See if better forecasting models predict better.

Thank you for coming.