

IT-Based Management Summary

Group 06

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Forecasting and Probabilistic Budgeting: Sales Volume Context (Learning with Case Studies)

Use Case

It is about Candle Manufacturing Inc. company, which produce three different candles like molded candles, solid candles and pulled candles. The company needs to setup the annual sales budget for the next year. To accomplish this, the traditional *time series-based forecasting* methods are applied and two new approaches has been introduced:

multinomial regression-based

stochastic process-based forecasting of time series

To answer question about sales volumes that can expected for next year, the R software package are used as we can

- perform a traditional time series analysis and use the model for **time series-based forecasting** for the next year
- use timely intervals and perform a **regression-based forecasting**
- read monthly sales from transactional data
- perform a **stochastic process-based forecasting**
- derive year-end forecast in fixed-event form
- budget-forecast deviation with p-value to perform adjustments

Problem Statement

As there is uncertainty in business environment, the future prediction of sales volumes is also uncertain and time series-based approach forecast data with the help of historical data. It is not clear which time-based approach should be used in R to produce unbiased data. The two new approaches that are mentioned above allow additional forecast updating which are not possible in time series-based approaches. Updating feature is very important in the fixed-event forecasting¹ context as fixed time period is considered over time leading to a successively reducing of the lead time.

Contribution

Traditional time series analysis covers the range between decomposition approaches, where non-stationary trends and seasonalities are included, and stationary ARIMA approaches. By introducing new modeling techniques in form of the multinomial regression-based and the stochastic processbased forecasting methods the time series modeling repertoire can be extended in an effective and easy to grasp way.

¹ In the management control the fixed-event forecasts are the year-end forecasts

Result

Multinomial regression-based and stochastic processbased forecasting are mathematically defined and statistically calibrated.

Research Methodology

The new artifacts are mathematically modeled and their applications are demonstrated in numerical examples.

Research literature

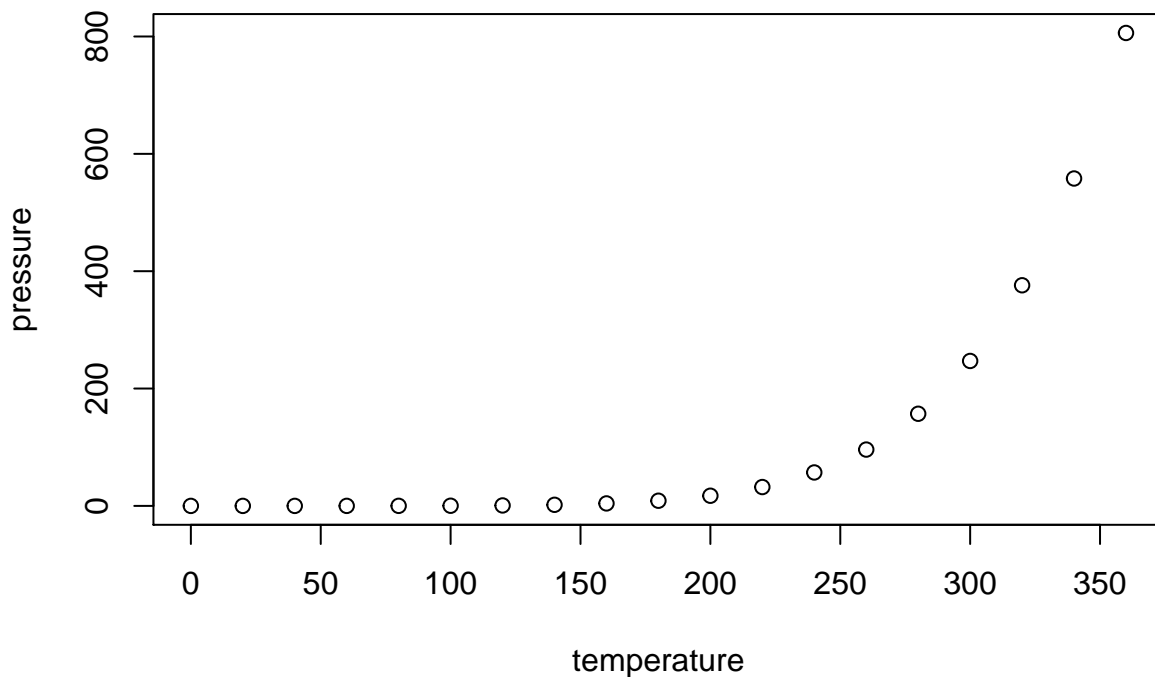
Hyndman Rob/Athanasopoulos George: Forecasting Principles and Practice Lawrence Michael/O???Connor Marcus: Sales forecasting updates: how good are they in practice?

```
summary(cars)
```

```
##      speed      dist
##  Min.   : 4.0    Min.   : 2.00
## 1st Qu.:12.0    1st Qu.: 26.00
##  Median:15.0    Median : 36.00
##  Mean   :15.4    Mean   : 42.98
## 3rd Qu.:19.0    3rd Qu.: 56.00
##  Max.   :25.0    Max.    :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.