IT-Based Management Summary

Group 06

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Forecasting and Probalistic 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:
multinominal reggression-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 uncertainity in business environment, the future predictation of sales volumes is also uncertain and time series-based approch forecast data with the help of historical data. It is not clear which time-based approch 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 approches. Updating feature is very important in the fixed-event forecasting[1] 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. ## Result Multinomial regression-based and stochastic processbased forecasting are mathematically defined and statistically calibrated.

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

Research Methodology

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

Research literature

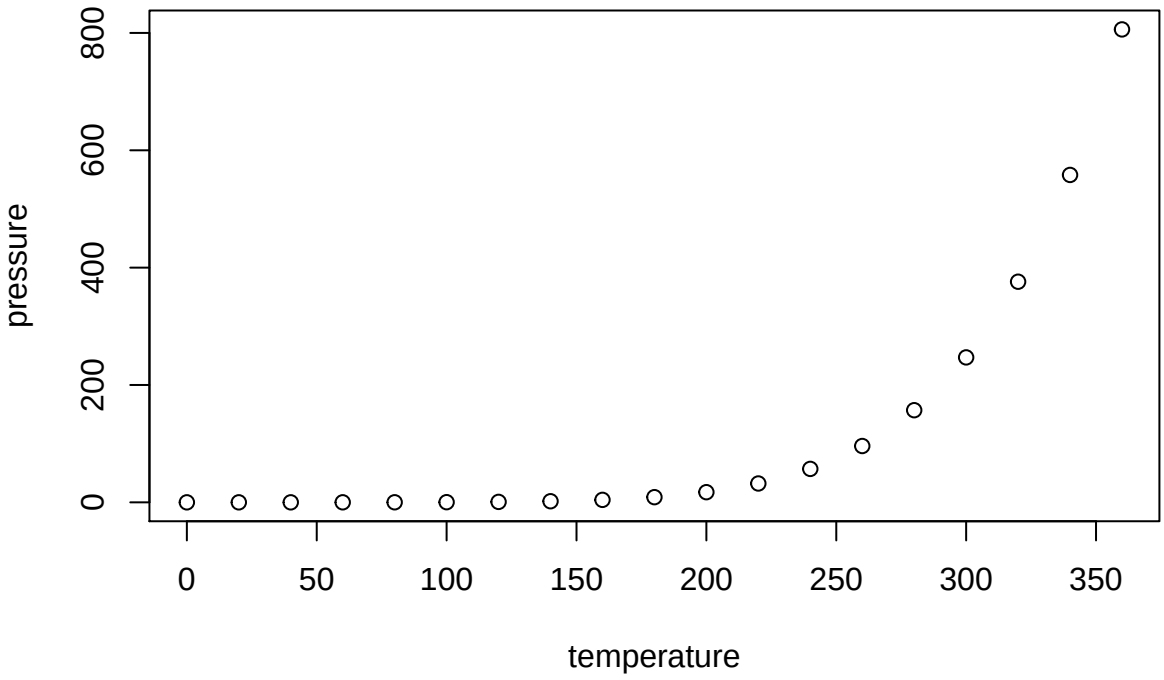
Hyndman Rob/Athanasopoulos George: Forecasting Principles and Practice Lawrence Michael/O???Connor Marcus: Sales forecasting updates: how good are they in practice?

```
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.