Ana Lucia

Outcome optimally close to ML output of 11.8% using cross Bremer XGBoost on input and prediction

Create monthly Individual sales data

Compare results to ML

Dr. Steffen Illig

Re: Joins the predictors into one data frame
take

Define approach, features and model from scratch

Perform LOESS
Optimize

Goal: Establish Option Take
and

Andreea Georgescu

Define and test choice modeling approach

10 months

Options

Options

BM G GROUP

BMW X6 XDRIVE 50i

1 Feb. 2018

US Build-to-stock optimization

1. Goal: Perform alternative to current BMW approach
2. Define and test choice modeling approach
3. Compare results to ML-approach from BMW

1 Jun. 2018

Option take-rate forecasting

• Goal: Establish Option Take-rate forecasting model
• Define approach, features and model from scratch
• Hand-over to BMW/BCG Gamma for implementation

17 Aug. 2018

Data source: VDWH - individual sales data
- Raw data (VDWH or BV)
- Monthly take-rates per ID
- Regular and smoothed take-rates per ID
- Data including prediction and target variables
- Multiple data sets including time-related variables
- One data set including all prediction variables
- Values & Importances of variables in prediction
- Test set RMSE and MAE and predicted future take-rates

Data (.csv)

Pipeline steered by main document (R)

Preparation

Time-series

Feature engineering

Machine Learning

Optimization

Raw data (VDWH or BV-15) – Monthly take-rates per ID

Regular and smoothed take-rates per ID

Data including prediction and target variables

Multiple data sets including time-related variables

One data set including all prediction variables

Values & Importances of variables in prediction

Test set RMSE and MAE and predicted future take-rates

Initial data frame.R

• Produce monthly option take-rates per unique ID

Smoothing.R

• Perform LOESS on take-rates across full timespan

Target.R

• Create prediction target (at prediction horizon set)

Re-smoothing.R

• Re-smooth training set to preserve right information

Historic.R

• Set Historic take-rates

Linear.R

• FTE linear trends

Quadratic.R

• Nexus TR convexity

ARIMA.R

• Forecast ARIMA model

BusinessInput.R

• Include business forecasts

Generation.R

• Highlight generation transitions

Option price.R

• Show price of the option

ModelsOptions.R

• Indicate model series & option types

Similarity.R

• Show take-rates in similar models

MacroEconomics.R

• Input Macro-economic variables

Rule-based Optimization.R

• Avoids rule violation: rules as constraints
• Outcome optimally close to ML output