

Case study: Analysis of sales data in a local supermarket

Introduction

A local supermarket wants to use its sales data to make informed operational decisions. As a medium-sized retailer, it attaches great importance to customer satisfaction and a balanced range of fresh, high-quality products. In order to be able to compete with larger supermarket chains, it is essential to better understand the purchasing behavior of customers.

The supermarket has collected sales data for a specific product over a long period of time. This database is now to be used to gain insights into sales patterns, price elasticity, promotions and other influencing factors.

Task

Your task is to analyze the sales data of the selected product and derive recommendations for action for the supermarket. You should take various aspects into account and carry out methodologically sound analyses.

Task overview

1. Data preparation and understanding

Import the data set provided.

Get an overview of the data structure and the variables it contains.

Check the data for completeness, consistency and possible outliers.

2. Descriptive analysis

Visualize the sales of the product over the entire period.

Analyze seasonal patterns. Examine sales in relation to months, quarters or days of the week.

Identify a possible trend.

Analyze the frequency and extent of price changes.

Examine the progression of promotions over time

3. Regression analysis

Model creation

Define a regression model with sales as the dependent variable.

Integrate independent variables such as price, promotion (dummy variable), seasonal components (monthly dummies or trigonometric functions) and trend.

If necessary, model interaction effects between the variables.

Model validation

Check the quality of the model using suitable key figures.

Analyze the residuals to check the model assumptions.

Graph forecast data and actual sales for the best model.

Interpretation

Interpret the coefficients of the model and evaluate their statistical significance.

4. Group comparisons

Compare sales on days with and without a promotion using a t-test and visualize the differences with boxplots

Check whether sales are higher or lower on certain days of the week. Use ANOVA for the comparison.

5. Recommendations for action

Based on your analyses, you will develop concrete proposals for optimizing the pricing strategy and promotions for the product.

6. Presentation of the results

Prepare a presentation in which you present your analyses, findings and recommendations.

Make sure that your presentation is clearly structured and contains visual aids such as graphics and tables.

Discuss possible limitations of your analysis.

Please upload your code and your presentation!