accenture

consulting | technology | outsourcing

Accenture Management Consulting

UCM VIII Modelling Week
Promotion Mix optimization

High performance. Delivered.

Problem description

Introduction

- The use of promotions to increase sales of consumer products is very common. For a products company it is very important to maintain and, if possible, increase market share. To achieve this companies spend a very high budget in advertising, promotions and discounts.
- An optimal use of this budget is essential to increase sales sustainably.
- In the proposed problem we must optimize the promotions strategy of a products company to achieve a maximum ROI (return of investment) and a maximum amount of the product sold. We circumscribe the problem to optimize the promotions strategy in only one retailer in a given quarter. We don't loss generality whit this approach because the promotions strategy is determined separately by retailer and quarter.
- The main problem to perform this type of optimization in a products company is that we need a quantification of the relation between a concrete promotion and the increase of sales. In this case Accenture provides a dataset with the expected increases, costs, and income for the available promotions which can be used to build the objective function and constraints
- For confidentiality reasons, the name of the products company, retailer and products in this dataset will be anonymized.

Problem description

- General goal: define the promotions plan i.e determine what promotion should be made in what product in what time slot (two week slots) to maximize the amount of product sold and/or maximize promotions plan ROI. The promotions comply with some business constraints about combinations of promotions, products and periods of time, and budget.
- To perform this task the following data will be available:
  - A table at product-package-slot-promotion level with the expected the increase in litres, cost of the promotion, revenue obtained by the increased sales and the ROI = (revenue-cost)/cost, separated in numerator and denominator
  - A list of business constraints about some specific combinations of promotions, products/packaging and time slots.
  - Promotion budget for the given retailer-quarter.
- We propose the following steps to solve the problem:
  - Solve the linear optimization problem that maximizes the increase of sales with the given budget and business constraints.
  - In a two step strategy, solve the non linear optimization that maximizes the ROI with the given constraints and transform the maximum obtained in the previous step into a new constraint: Obtain at least (maximum - %slack) litres.
- In both cases the problem is a MIP (Mixed-Integer Programming) problem.

Guidelines to solve the problem

- Given the detail of the available information, the problem may be tackled by different means. We provide some guidelines to solve it, though it is highly encouraged to explore alternative options.
- There are several software packages that can be used to solve MIP problems with a linear objective function, e.g. SAS/OR, Matlab optimization tool box or the R package lpSolve.
- If you decide solve the non linear problem directly, you must select the appropriate software to solve a non-linear optimization problem. Another option is to somehow 'linearize' the non-linear problem prior to solve it(the ROI objective is a quotient, to maximize it you can maximize the numerator and minimize the denominator).
- Managing the constraints correctly to build a correct space of solutions is key

Data provided

- We provide two tables:
  - Detailed data of expected revenues and costs of all available promotional actions.Variables:
    - Brand / Category /Volume and presentation format (packaging)
    - Month / Two-week time slot.
    - Type of promotion
    - Baseline sales (in units)
    - Increase of sales obtained by the promotion (units)
    - Increase of sales obtained by the promotion (€)
    - Cost of the promotion (€)
  - Detailed data about the constraints that must be considered to obtain a feasible solution.
    - Total budget
    - Constraints on product combinations, type of promotion and/or time periods.

Expected results

- Obtain a optimal marketing plan that:
  – Maximizes the increase of units sold.

- Obtain a optimized marketing plan that:
  – Maximizes the ROI (or maximize a similar linear objective function)

- Propose a solution that combines the two previous objectives.

- Analyze how little changes in the budget of the marketing actions can increase the previous objectives. moderated ROI loss is acceptable if the solution provides enough increase in units sold (even negative ROI's are acceptable).