Aalto-yliopisto
Perustieteiden
korkeakoulu

Evaluating cannibalization between items in retail promotions (final presentation)

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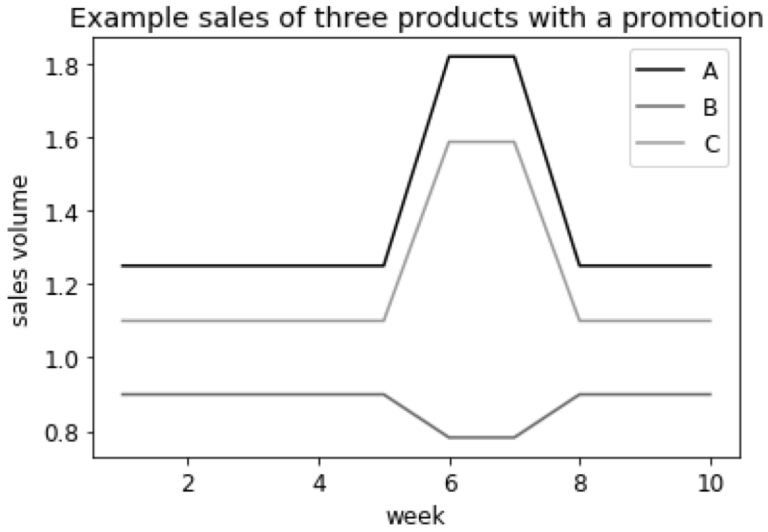
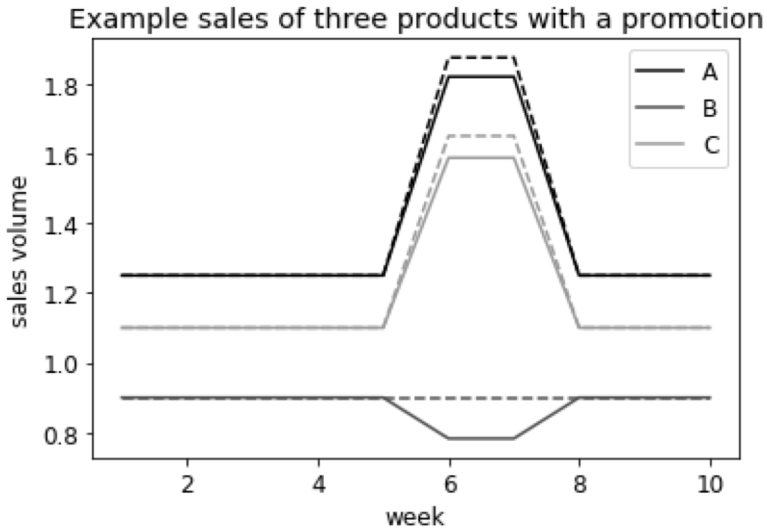
Basic idea



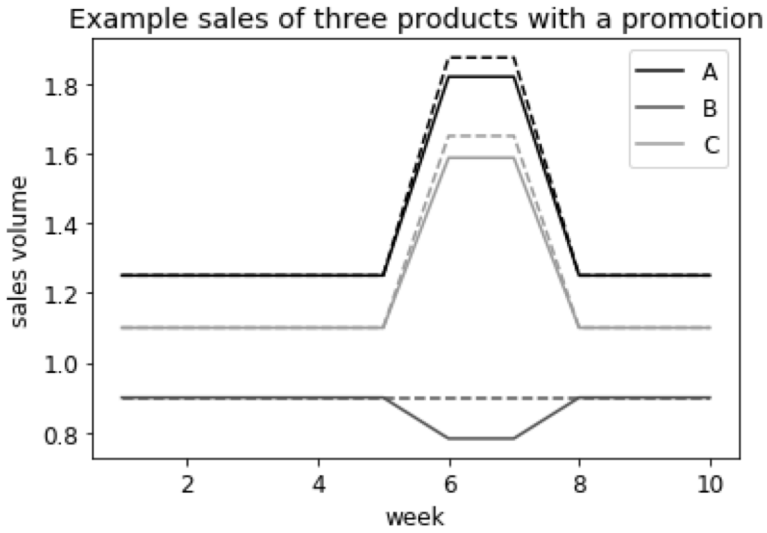
- n-by-n matrix C of cannibalization coefficients
- Not necessarily symmetrical (literature)
- Baseline = volume/turnover with no promotion at all
- Cannibalization is defined as the ratio between changes in demand: U'C = D, where U' contains the (positive) demand changes for promoted products and D the changes for other products

Taking it further



- Assumption: promoted products cannibalize each other with the same cannibalization mechanic regardless of the combination
- U’ = U - (U’∘P)C, where P is a binary promotion matrix and U is the measured uplifts

Taking it further



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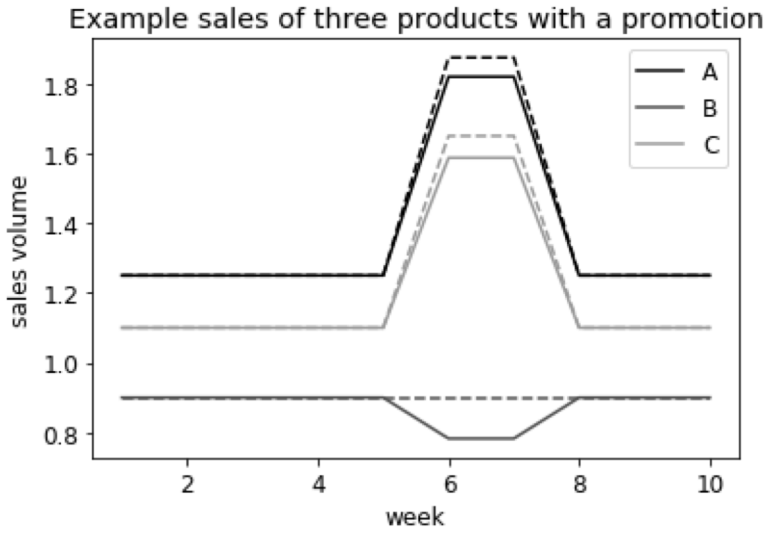
- => Alternating Least Squares

Taking it further



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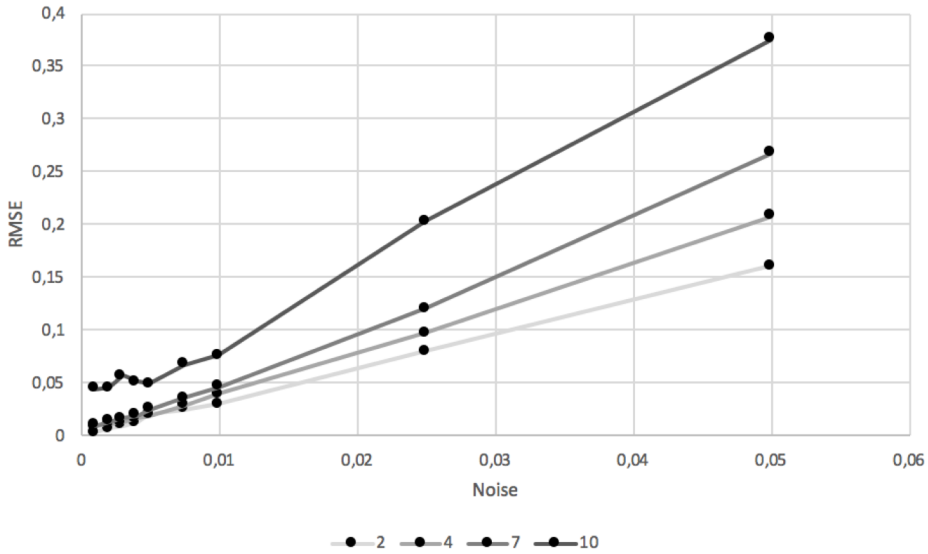
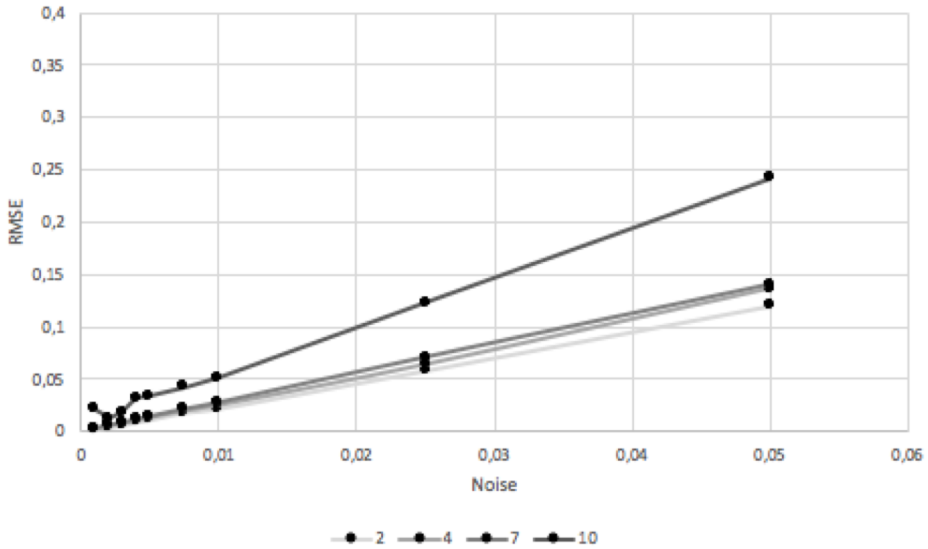
- Elastic Net Regularization

$$\hat{\boldsymbol{C}} = \underset{\boldsymbol{C}}{\operatorname{argmin}} \|\boldsymbol{D} - \boldsymbol{U'C}\|^2 + \lambda_2\|\boldsymbol{C}\|^2 + \lambda_1\|\boldsymbol{C}\|_1$$
$$\text{subject to } diag(\boldsymbol{C}) = 0$$

Simulated data

- Enables testing with different number of products and different noise levels with predefined cannibalization matrices.
- => Possibility to calculate the accuracy of the method





The figure on the left shows the results with the implemented naive baseline, while the results on the right use a proprietary baseline method. This baseline method change reduces RMSE by roughly 1/3.

Future work

- Tuning the hyperparameters
- Multibuys
- Promotion types
- Product selection