Homework 14

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Question 19.1

Model to solve Question 1: Identify the effects of shelf-space
Given:

- Linear width/length and volume of one unit of shelf space for product i
- Linear length and volume of the shelf space.
- Volume of the shelf space.
- Product sales local, regional and national.
- Distance from shell to checkout lane.
- Maximum allowable inventory value

Use: Simple regression or LASSO to leave out unnecessary variables.
To: Determine which variables are important for sales.

Model to solve Question 2: Determine the importance of complementary products
Given:

- Price, cost per unit
- Nodes denoting the weight between all products which is expressed in terms of the number of times each pair of products are purchased together.

Use: Louvain Algorithm
To: Identify products that should be grouped next to each on store shelves due to complementary effect.

Model to solve Question 3: Optimize shelf-space and location for products to maximize sales.
Given:

- Product identity i
- Price, cost per unit
- Per unit cost for shelf space and holding. Ordering cost per order
- Demand, shelf space and length of order cycle
- Capacity of the shelf for one unit of shelf space for product i
- Volume of one unit of shelf space for product i
- Volume of the shelf space.
- Maximum allowable inventory value
- Order size restrictions
- Space allocation restrictions (Model 2)

Use: Linear Programming Optimization.
Constraints: Pricing, Inventory Costs, Inventory Dimensions, Product Dimensions, Ordering, Shelf Costs, Product Relations, Facing Constraints, Shelf Dimensions.
To: Maximize the total net revenue in terms of decision variables expressing product assortment and shelf space allocation