Optimal Dynamic MVPs
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Problem Statement

**Current approach to MVP’s**
- By Trade Channel
- Updated yearly
- Determined by business insights

**Opportunities**
- What if 2 supermarkets have different demand?
- What if we want MVP’s to adjust seasonally?
- How can we make use data to inform MVP’s?

**Goal**

**Customization**
- Multiple MVP portfolios per trade channel

**Dynamic**
- Can be updated monthly, quarterly, bi-annually, etc.

**Data-Driven**
- Determine with optimization, considering historical demand
As a solution, our objective is to create dynamic customer-level MVP portfolio that secures optimal levels of Gross Profit in 3 steps: Customer Segmentation, Forecasting, and Optimization.

Methodology for each trade channel:

1. **Cluster** stores by **demographics** and **sales demand in 2 steps**
2. **Predict** gross profit and purchase probability, by product
3. **Assign** MVP’s using **Optimization**
4. **Adjust** based on seasonality
   - Rerun the assignment algorithm at least two times a year to account for changing demand

**4200 Home Market Retailers in Dallas-Fort Worth**

**4 Trade Channels:** Supermarket, Superette, Convenience, Drug

**Transactions from past 24 months**
Methodology Step 1 – Clustering

1. Clustering stores based on demographics information:
   a. Sales Office, Population, Income, Age Distribution

2. For each area, cluster stores based on past sales:
   a. Last year sales volume/gross profit
   b. % of sales in each beverage category
   c. % change in sales across years

Interpretation
- Lifetime: Mature/Young stores
- Last year sales: High/Low/Medium Sales
- Portfolio Mix
Example: Mature Customers – High Sales Supermarkets in Fossil Creek

94 Stores
24 Years Average Lifetime
$226k Average Yearly Revenue
Methodology Step 2 – Prediction: Sales Propensity and Gross Profit

Average Out-of-sample AUC: 0.91
Average Out-of-sample $R^2$: 0.86

Linear Regression
Decision Tree
Random Forest
XGBoost

Machine Learning Models

Feature Selection
All Features
LASSO Selection
PCA

Ensemble Model

Evaluation

AUC
$R^2$

Baselines:
Last 1, 3, 6, 12, 24 Months
Average Profit and Volume
Average over past sales

Best Model
Methodology Step 3 – Optimization: MVP Product Assignment

Input:
- Gross Profit, by product by customer
- Sales propensity: probability of a customer buying a product

Objective: Maximize the expected gross profit

\[
\text{Expected Gross Profit} = \text{Predicted Gross Profit} \times \text{Predicted Propensity}
\]

Constraints:
- Same size as the current portfolio
- Portfolio variety based on market trends and past sales

Output: List of core products to be included in a store’s portfolio (only suggest products, not volume)
- Eg. Coca-Cola, 12 oz., Glaceau Smartwater, 33.8 OZ
Initial experiments have shown that updating the portfolio twice a year would have secured 4.3% more gross profit on average from June 2021 to May 2022.

**Backtesting Process and Results**

**Average Incremental Gross Profit Secured**

+4.3% per Channel

Run our models 2x to obtain optimal MVP portfolio for June and December

Use June portfolio from June 2021-November 2021; December portfolio: December 2021-May 2022

Compare profit captured between our solution and the current approach

<table>
<thead>
<tr>
<th>Trade Channels</th>
<th>% of Actual Gross Profit Captured (Time period: June 2021 – May 2022)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current static MVP Portfolio</td>
</tr>
<tr>
<td>Supermarket</td>
<td>87.6%</td>
</tr>
<tr>
<td>Superette</td>
<td>91.4%</td>
</tr>
<tr>
<td>Convenience</td>
<td>86.8%</td>
</tr>
<tr>
<td>Drug</td>
<td>83.1%</td>
</tr>
</tbody>
</table>
The optimal portfolio would have secured 5.4% more gross profit for the High Sales Supermarkets in Fossil Creek in June 2021

Example: High Sales Supermarkets in Fossil Creek in June 2021

- **62** Products
- **+5.4%** Gross Profit Secured
- **=** **+$102K** Secured by Optimal MVPs in June 2021, USD

**Overlap with the Current Portfolio** + **New Opportunities Captured by the Optimal Portfolio**

- 8oz/6pk
- 12oz 12/20/24pk
- 2L
- 16.9oz/MP
- 15oz
- 2L
- 12oz/MP
- 16.9oz/6pk

9.1% gross profit captured
Testing has shown that optimal portfolio can secure the same sales percentage with a smaller portfolio size, leaving room for products that the business wants to push.

Example: High Sales Supermarkets in Fossil Creek

Before

- 62 MVPs

After

- 40 Optimal MVPs
- 22 Free Slots

Capturing the same sales as the current 62 products

High Potential Products
Seasonal SKUs
Tactical/Innovation

High Potential Products: Products that have high sales among a store’s neighbors (similar area, sales activity).
Sales Potential = Average of neighbors’ sales - store’s sales
Thank you!