Partnering with Tiger Analytics

Spend Optimization using Azure Platform - Solution Architecture Reference Document

June 24, 2020

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- Our solution drives the planning and optimization of various investments (marketing, trade) that brands make to improve outcomes like sales, new customers, leads etc.

- It provides following specific insights/tools for planners:

  – ROI on various investments

  – Forecast outcomes for future mix of investments

  – Optimize the mix to maximize the business outcome

- It leverages outcome data (sales etc.) and spend data by each activity (TV, Print, Digital, Trade) to build **machine learning models** to quantify the relationship between them. It further uses **optimization module** to generate an optimal investment plan accounting for all the relevant constraints.

- This solution is applicable across industry verticals – CPG, Retail, Financial Services, Hospitality etc.
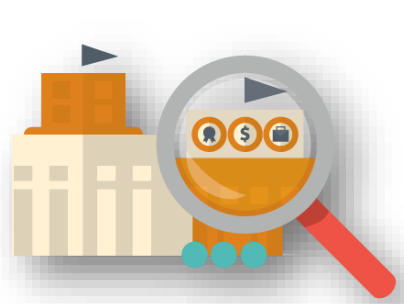
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Solution Overview

Modeling Approach			
Feature Selection	Price Elasticity Model	Output Evaluation	Spend Recommendation

Data from Client

- Weekly PoS Data
- Syndicated Weekly PoS Data
- Competitor Syndicated Data
- Product Characteristics

Price Related Variables

Seasonality Variables

Distribution Variables

Cross Product Variables

Product Interaction Variables

Log-Log Transformation

- Regularization Models
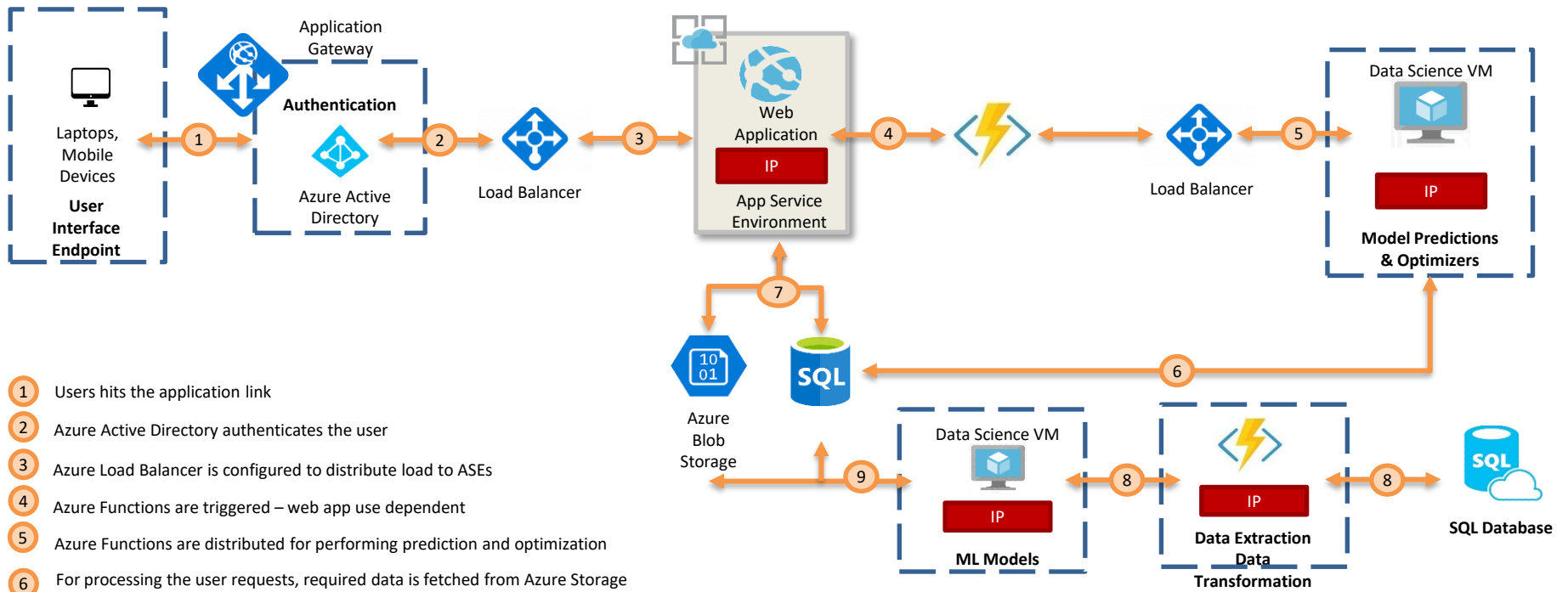- Mixed Effects Models
- Bayesian Models

Price Elasticity
(Own Price and Cross Price Elasticity)

Prediction accuracy
(in the hold out set)

Spend Optimization
(maximizing the True $ sales lift from Price promotions)

$ $ $

Spend and Price Recommendation at Product x US level

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Solution: Azure Reference Architecture

Application Gateway

Authentication

Azure Active Directory

Laptops, Mobile Devices

User Interface Endpoint

Load Balancer

Web Application

IP

App Service Environment

Load Balancer

Data Science VM

IP

Model Predictions & Optimizers

Azure Blob Storage

SQL

Data Science VM

IP

ML Models
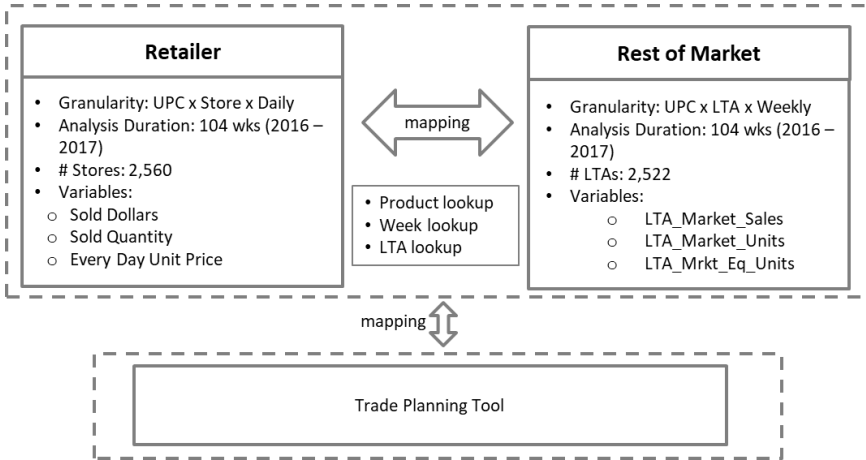
Data Extraction Data Transformation

IP

SQL Database

1. Users hits the application link

2. Azure Active Directory authenticates the user

3. Azure Load Balancer is configured to distribute load to ASEs

4. Azure Functions are triggered – web app use dependent

5. Azure Functions are distributed for performing prediction and optimization

6. For processing the user requests, required data is fetched from Azure Storage and processed results are stored to Azure Blobs

7. Required data for Web Application is loaded from Azure Storage

8. Data required for building the ML models are extracted and transformed from the SQL Database

9. Model Artifacts and Output files are loaded to Azure Blob and SQL

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Solution Approach

Data Preparation

Modeling

Output

Retailer

- Granularity: UPC x Store x Daily
- Analysis Duration: 104 wks (2016 – 2017)
- # Stores: 2,560
- Variables:
  - Sold Dollars
  - Sold Quantity
  - Every Day Unit Price

mapping

- Product lookup
- Week lookup
- LTA lookup

Rest of Market

- Granularity: UPC x LTA x Weekly
- Analysis Duration: 104 wks (2016 – 2017)
- # LTAs: 2,522
- Variables:
  - LTA_Market_Sales
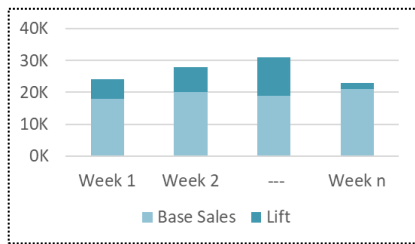 - LTA_Market_Units
 - LTA_Mrkt_Eq_Units

mapping

Trade Planning Tool

Baselining and Lift Estimation Modeling Framework

- Build model for predicting Sales Volume at a product level
- Estimate Base sales by feeding Base Price to the model
- Lift = Actual Sales – Estimated Base Sales

Decomposition of Lift

- Identify other products (within-box, cross-box) impacted by the promoted product
- Use data science models to estimate total cannibalization
- True Incrementality = Lift – Total cannibalization

- True Incrementality
- Within Box Cannibalization
- Cross-Box Cannibalisation

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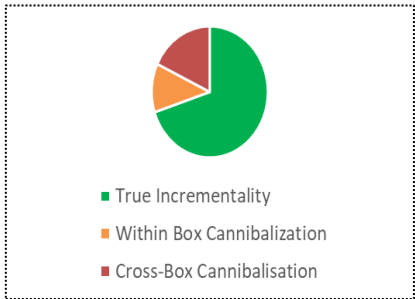
Data Engineering Scope of Work

- Perform the extraction, storage, processing and OLAP services on Azure data Environment
- The job majorly includes designing the pipeline flow and development of the ETL Pipeline using Azure Components such as Azure Data Factory, Azure Data Bricks, Azure Logic Apps and Azure Active Directory
- Build a data ingestion layer using Azure Data Factory to extract data from data sources such as FTP, Rest API etc. into Azure Data Lake Storage
- Build data transformation logic in Azure Databricks implementing the required Business Rules and store the cleansed data in Sql Server and leverage Azure Logic Apps for email notification on the execution status of the pipeline such as Success, Failure etc.
- Control Identity and Access management using Azure Active Directory
- Post the testing and deployment, the support and maintenance to keep the setup up and running is to be provided.

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