ISYE 6501 Homework #14

Approach for Part 1: Using Internal Data Set (Dataset #3)

Goal:

Leverage customer browsing patterns and purchase history to improve targeted marketing, drive conversions, and optimize personalized recommendations.

1. Identifying Customer Personas

Given:

- **Dataset #3:**
  - **Products purchased in the past, including purchase dates and ship-to addresses.**
  - **Web pages viewed, clicks, time spent, and eye-tracking data.**

Use:

- **K-Means Clustering:**
  - **Group customers into clusters based on their browsing and purchasing behaviors, such as frequent buyers, deal hunters, or window shoppers.**

To:

- **Create customer personas that guide marketing campaigns and inform product recommendations.**

2. Classifying New Customers

Given:

- **Cluster centers from K-Means and new customer data:**
  - **Past purchases, browsing behavior (time on page, clicks), and eye-tracking data.**

Use:

- **K-Nearest Neighbor (KNN):**
  - **Assign new customers to a cluster/persona based on similarity to existing clusters.**

To:

- **Predict product preferences for new customers and tailor recommendations based on their assigned cluster.**

3. Predicting Purchase Likelihood

Given:

- **Historical behavioral data:**
  - **Number of visits, frequency of clicks, and product page views.**

Use:

- **Logistic Regression:**
  - **Predict the likelihood of a customer making a purchase during their current visit.**
- **OR**

- **CUSUM (Cumulative Sum Control Chart):**
  - **Detect spikes in visits to specific products or overall browsing activity.**

To:

- **Trigger personalized marketing efforts for high-likelihood customers or halt campaigns for low-likelihood customers to reduce marketing waste and avoid spamming.**

4. Recommending Products

Given:

- **Frequently linked web pages, product purchase correlations, and customer-specific browsing data (e.g., recent views, time spent on pages).**

Use:

- **Louvain Algorithm:**
  - **Identify clusters of related products for dynamic recommendations in emails, banner ads, or landing pages.**

To:

- **Enhance customer engagement with highly relevant product recommendations and maximize the likelihood of purchase.**

Approach for Part 2: Using Multiple Data Sets (Dataset #1 and #3)

Goal:

Combine customer browsing behavior and demographic data to create more granular customer profiles and enhance monetization strategies.

1. Enhanced Customer Segmentation

Given:

- **Dataset #1:**
  - **Demographics like marital status, hobbies, and financial net worth.**
- **Dataset #3:**
  - **Products purchased and browsing data.**

Use:

- **K-Means Clustering:**
  - **Combine browsing and demographic data to refine customer clusters based on income levels, interests, and purchasing habits.**

To:

- **Identify customer segments for personalized marketing, such as budget-conscious shoppers or luxury buyers.**

2. Personalized Marketing Campaigns

Given:

- **Dataset #1: Interests and demographics.**
- **Dataset #3: Browsing patterns and purchase history.**

Use:

- **Decision Trees or Random Forests:**

- **Classify customers into groups based on interests, income, and family size to tailor product recommendations and marketing efforts.**

To:

- **Improve engagement by targeting customers with ads or discounts for products most likely to appeal to their group.**

3. Predicting Long-Term Customer Value

Given:

- **Combined datasets:**
  - **Customer interests, income, browsing behavior, and purchasing trends.**

Use:

- **Linear Regression:**
  - **Forecast customer lifetime value and predict long-term revenue from individual customers.**

To:

- **Allocate resources strategically for high-value customers and refine pricing strategies based on expected returns.**

Approach for Part 3: Using All Three Data Sets

Goal:

Maximize data monetization by integrating demographic, financial, and behavioral data to create comprehensive customer profiles.

1. Improved Customer Segmentation

Given:

- **Dataset #1: Demographics and hobbies.**
- **Dataset #2: Credit history and financial behavior.**
- **Dataset #3: Browsing and purchase behavior.**

Use:

- **K-Means Clustering:**
  - **Create detailed customer personas by combining browsing habits, financial stability, and demographic data.**

To:

- **Segment customers into actionable groups (e.g., luxury shoppers, deal seekers, frequent buyers) for precise marketing.**

2. Partnership Opportunities

Given:

- **Comprehensive customer personas created from all datasets.**

Use:

- **Targeted Partnerships:**
  - **Sell ad space to partner companies (e.g., airlines or hotels) targeting specific customer segments, such as those browsing vacation-related items like luggage or ski gear.**

To:

- **Generate recurring revenue through partner collaborations and shared revenue agreements.**

3. Dynamic Product Recommendations

Given:

- **Dataset #3: Browsing and purchasing behavior.**
- **Dataset #1 and #2: Interests, income, and credit behavior.**

Use:

- **Recommendation Systems (content-based or collaborative filtering):**
  - **Dynamically suggest products based on customer history, financial capacity, and cluster associations.**

To:

- **Enhance customer experience and drive sales by providing highly relevant suggestions.**

4. Forecasting Sales and Revenue

Given:

- **All datasets:**
  - **Purchasing patterns, income data, and browsing behavior.**

Use:

- **Time-Series Analysis or Linear Regression:**
  - **Predict future sales trends and revenue by analyzing historical data.**

To:

- **Optimize inventory, adjust marketing budgets, and plan product launches based on demand forecasts.**

Monetization Strategy

By leveraging all datasets, the company can:

1. **Personalize Customer Engagement:**
   - **Provide tailored product recommendations and targeted ads for specific customer groups.**
2. **Generate Revenue from Partnerships:**
   - **Offer advertising opportunities to partners with shared revenue agreements for ad-driven sales.**
3. **Optimize Marketing Efficiency:**
   - **Focus resources on high-value customers and high-probability purchases, while avoiding marketing fatigue for less engaged customers.**