

# REVOLUTIONIZING BOOK RECOMMENDATIONS

## Analytix Consulting

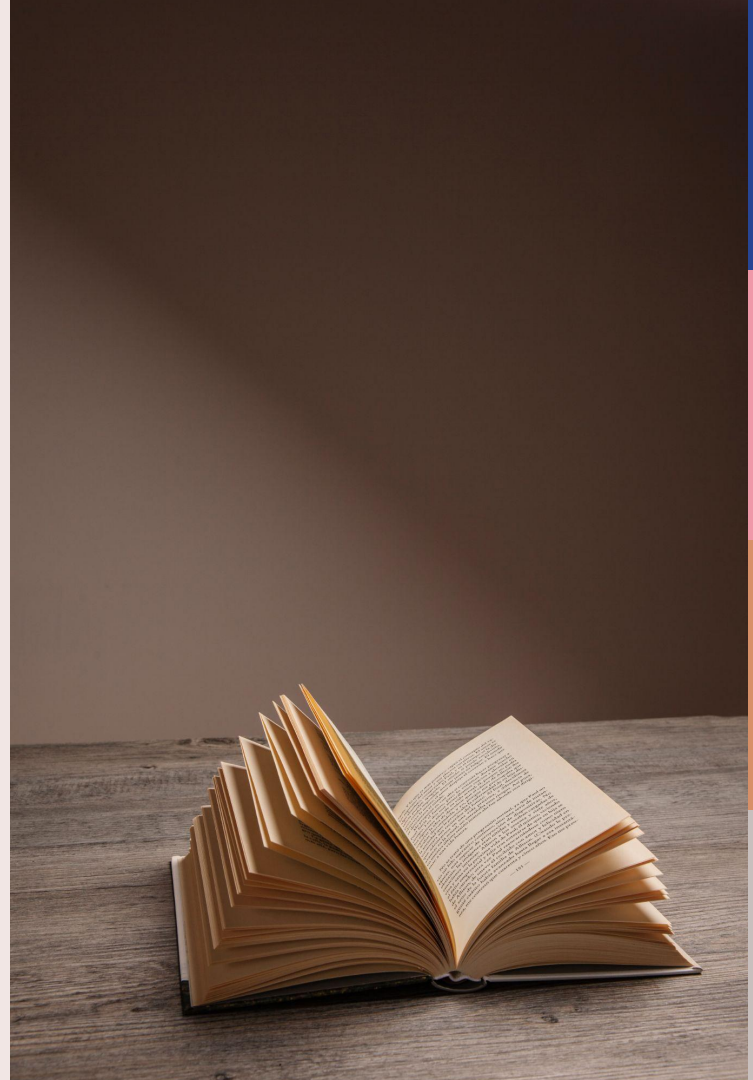
05 December 2023

Yash Bhardwaj,  
Nathan Chen,  
William DeForest,  
Daichi Ishikawa,  
Siobhan McDermott



# AGENDA

1. MEET OUR TEAM
2. PROBLEM STATEMENT
3. NEW RECOMMENDATION SYSTEM
4. BUSINESS IMPACT



# MEET OUR DIVERSE TEAM OF PROFESSIONALS



Team Lead  
Background: Healthcare, Data  
Management, R, Python

—**Siobhan McDermott**



Analytics Consultant  
Background: Finance, Statistics.  
Machine learning

—**Daichi Ishikawa**



Analytics Consultant  
Background: Machine Learning,  
Python, GCP Cloud Architect

—**Yash Bhardwaj**



Analytics Consultant  
Background : Sport Analytics,  
Bilingual, skilled in R and Tableau

—**Nathan Chen**



Analytics Consultant  
Background: Seattle native, baseball  
player, skilled in R and machine learning

—**William DeForest**

# OUR SUCCESS STORIES

Assisted several major companies across industries complete their analytics journey



# IMPROVING RECOMMENDATIONS BOOSTS SALES BY 9.1%

## PROBLEM

**RECOMMENDS ONLY TOP 5  
"MOST POPULAR"**

**FAILS TO PERSONALIZE TO  
INDIVIDUAL PURCHASING HABITS**

**LIMITS TRANSACTION SIZES**

## SOLUTION

**CUSTOMER  
SEGMENTATION**

**RECOMMENDATION  
ALGORITHM**

**TARGETED DISCOUNTS &  
RECOMMENDATIONS**

## IMPACT

**AVERAGE TRANSACTION  
SIZE ⤴**

**SALES FROM TOP 15% OF  
CUSTOMERS ⤴ 20%**

**SALES FROM ALL OTHER  
CUSTOMERS ⤴ 3-5%**

**PROBLEM**

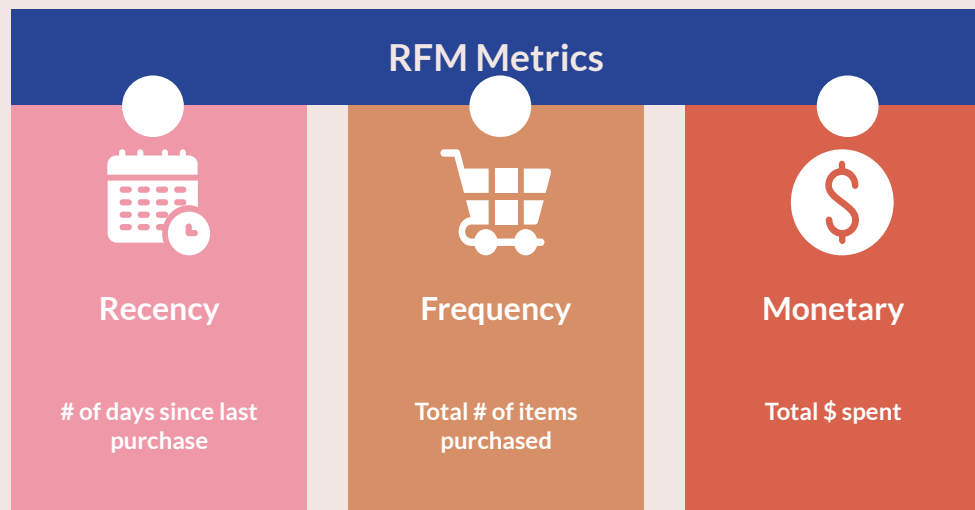
RFM

DISCOUNTS

CATEGORIES

**IMPACT**

# RFM SEGMENTATION OFFERS A NUANCED, WHILE STILL INTUITIVE, APPROACH TO CUSTOMER SEGMENTATION

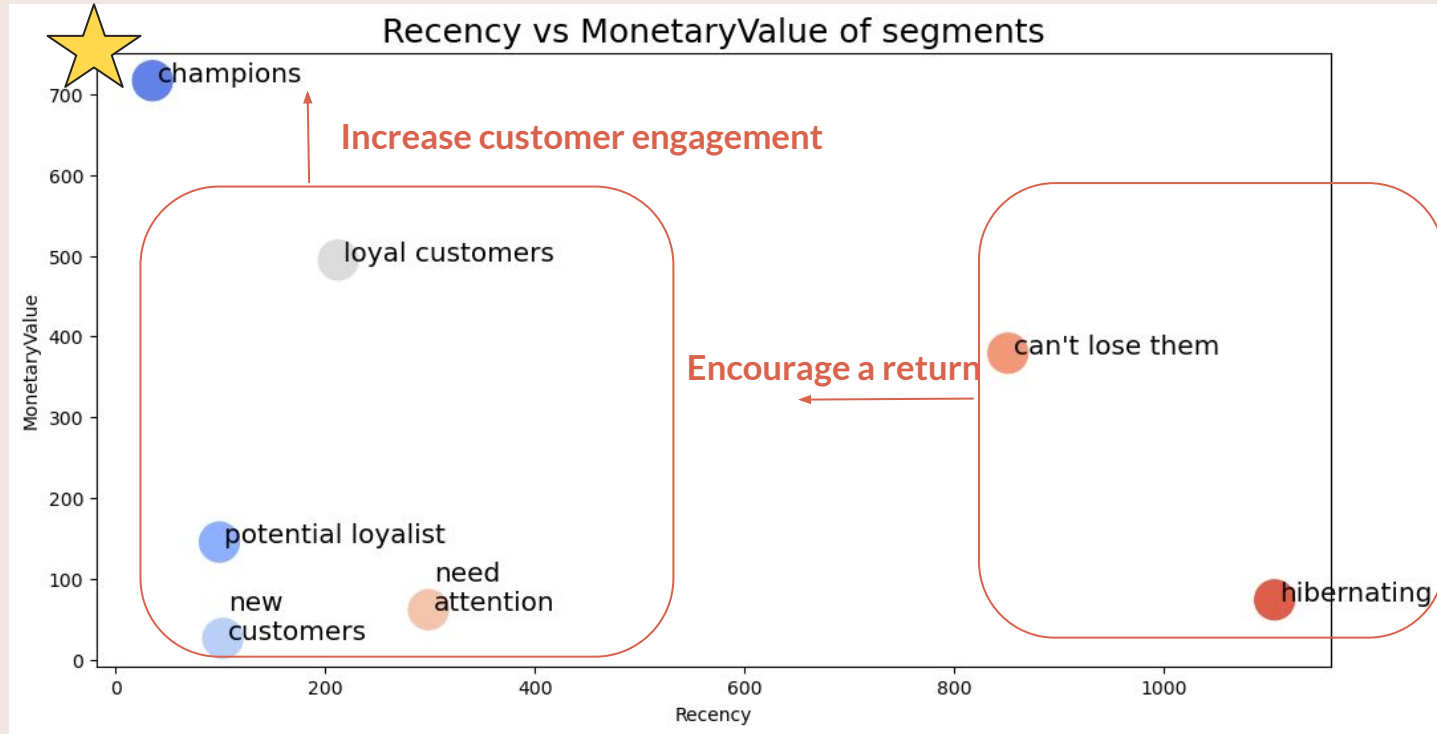


# RFM CUSTOMER SEGMENTS ARE DETAILED, BUT STILL EASY TO UNDERSTAND

| Segment            | R, F, M Scores  | Description  |
|--------------------|-----------------|--|
| Champions          | (5, 4/5, 4/5)   | Buy often, spend the most                          |
| Loyal Customers    | (3/4, 4/5, 4/5) | Buy a lot, pretty active                           |
| Potential Loyalist | (4/5, 2/3, 2/3) | Recent, multiple purchases, decent spend           |
| New Customers      | (4/5, 1, 1)     | Most recent, but not big purchases                 |
| Need Attention     | (3, 1/3, 1/3)   | Need a nudge to keep as customer                   |
| Can't Lose Them    | (1/2, 4/5, 4/5) | Used to be a champion, but haven't bought recently |
| Hibernating        | (1/2, 1/3, 1/3) | Haven't bought recently, never spent that much     |



# SEGMENTATION HELPS GUIDE STRATEGY TO INCREASE SALES



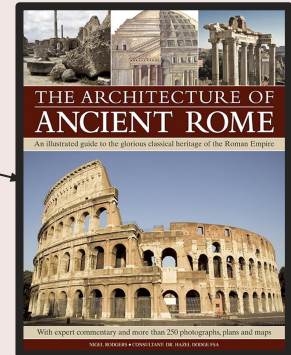
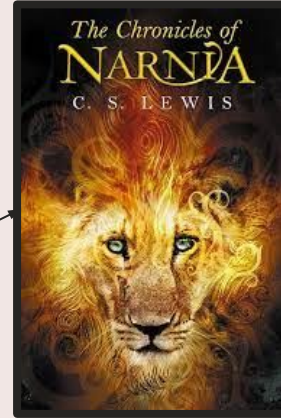
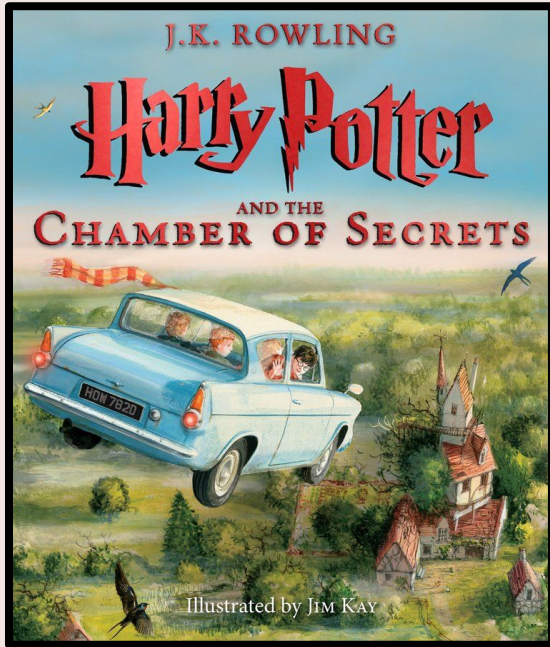


# EACH SEGMENT IS PAIRED WITH A SPECIFIC OFFER

| Segment            | Promotion   |
|--------------------|---|
| Champions          | Offer early access to new releases & book signings to make them feel exclusive and encourage continued high spending                                |
| Loyal Customers    | Tiered discounts to encourage customers to reach higher spending levels for better discounts  |
| Potential Loyalist | Create a “punch card” program to incentivize repeat purchases and build customer loyalty by rewarding customers for consistently choosing your site |
| New Customers      | Offering a first-time purchase discount to incentivize initial buying decision and reel them in   |
| Need Attention     | Create urgency with limited time offer to encourage immediate action  |
| Can't Lose Them    | Provide a high-value, one-time discount to win them back  |
| Hibernating        | Provide a substantial BOGO discount to encourage a return   |



# CATEGORY RECOMMENDATIONS SHOULD BE BASED OFF OF CUSTOMER TASTES



PROBLEM

RFM

DISCOUNTS

CATEGORIES

IMPACT

# A K-NEAREST NEIGHBOURS MODEL PROVIDES TAILORED CATEGORY RECOMMENDATIONS



- Our K-Nearest Neighbors model quantifies how similar book categories are to each other based on how frequently they are purchased together
- This approach is better because it provides personalized recommendations. It does this by understanding what other users with similar preferences have bought, making the suggestions more tailored to each individual's taste



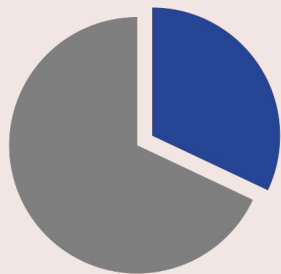
# NEW SYSTEM CATEGORY RECOMMENDATIONS ARE MORE TARGETED AND RELEVANT

| ID | Most Frequent Purchase Category | Old System Category Rec.                   | New System Category Rec.              | Old System Relevant Rec.?   | New System Relevant Rec.?   |
|----|---------------------------------|--|---------------------------------------|---|---|
| 0  | History                         | History, Music, Health, Learning, Religion | History, Cont. History, Travel Guides |  |  |
| 1  | Music                           | History, Music, Health, Learning, Religion | Music, History, Health                |  |  |
| 2  | Health                          | History, Music, Health, Learning, Religion | Health, Learning, History             |  |  |
| 3  | Travel Guide                    | History, Music, Health, Learning, Religion | Travel guide, History, Health         |  |  |
| 4  | Sports                          | History, Music, Health, Learning, Religion | Sports, Health, Hobby                 |  |  |
| 5  | Cooking                         | History, Music, Health, Learning, Religion | Cooking, Travel guides, Health        |  |  |



# NEW SYSTEM BOOSTS SALES BY \$540K (+6.4%) [FOR CHAMPIONS CLUSTER]

32% of current revenue  
comes from Champions cluster



+20% revenue increase  
due to our recommendation system



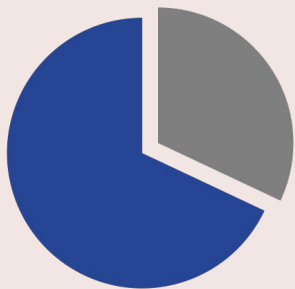
+6.4% (+\$540K)  
revenue increase in total



# NEW SYSTEM BOOSTS SALES BY \$232K (+2.7%) [FOR NON-CHAMPIONS CLUSTERS]

68% of current revenue

comes from non-Champions cluster



+4% revenue increase

due to our recommendation system



=

+2.7%(+\$232K)

revenue increase in total



# TIMELINE & CHANGE MANAGEMENT CONSIDERATIONS

## ENABLE SMOOTH IMPLEMENTATION

| INITIATIVE                | OBJECTIVE   | JAN | FEB | MAR | APR | MAY | JUN |
|---------------------------|---|-----|-----|-----|-----|-----|-----|
| Trial 1                   | Roll out new system for Champions only                                |     |     |     |     |     |     |
| Trial 1 Assessment        | Check category recs. and discount effectiveness, identify pain points |     |     |     |     |     |     |
| System Revision           | Monitor revised system and work out any final kinks                   |     |     |     |     |     |     |
| Trial 2                   | Deploy revised system to entire customer base                         |     |     |     |     |     |     |
| Trial 2 Assessment        | Check category recs. and discount effectiveness, identify pain points |     |     |     |     |     |     |
| System Revision (Ongoing) | Monitor revised system and re-train models once/month                 |     |     |     |     |     |     |



# START A NEW CHAPTER WITH OUR REVOLUTIONARY RECOMMENDATION SYSTEM



## PROBLEM:

THE CURRENT RECOMMENDATION SYSTEM IS NOT CUSTOMER-SPECIFIC AND IS **LEAVING MONEY ON THE TABLE**



## SOLUTION:

**BASED ON RFM SEGMENTATION AND KNN CLUSTERING  
PERSONALIZED DISCOUNTS AND PRODUCT RECOMMENDATIONS**



## IMPACT:

**WITH CMO'S EXPERTISE, PERSONALIZATION WILL  
BOOST SALES TO CHAMPIONS BY \$540K AND OTHER SEGMENTS BY \$232K**



## NEXT STEPS:

**WORK WITH WEBMASTER ON STAGED IMPLEMENTATION  
THAT **MAXIMIZES BUSINESS IMPACT WHILE MINIMIZING RISK****

PROBLEM

RFM

DISCOUNTS

CATEGORIES

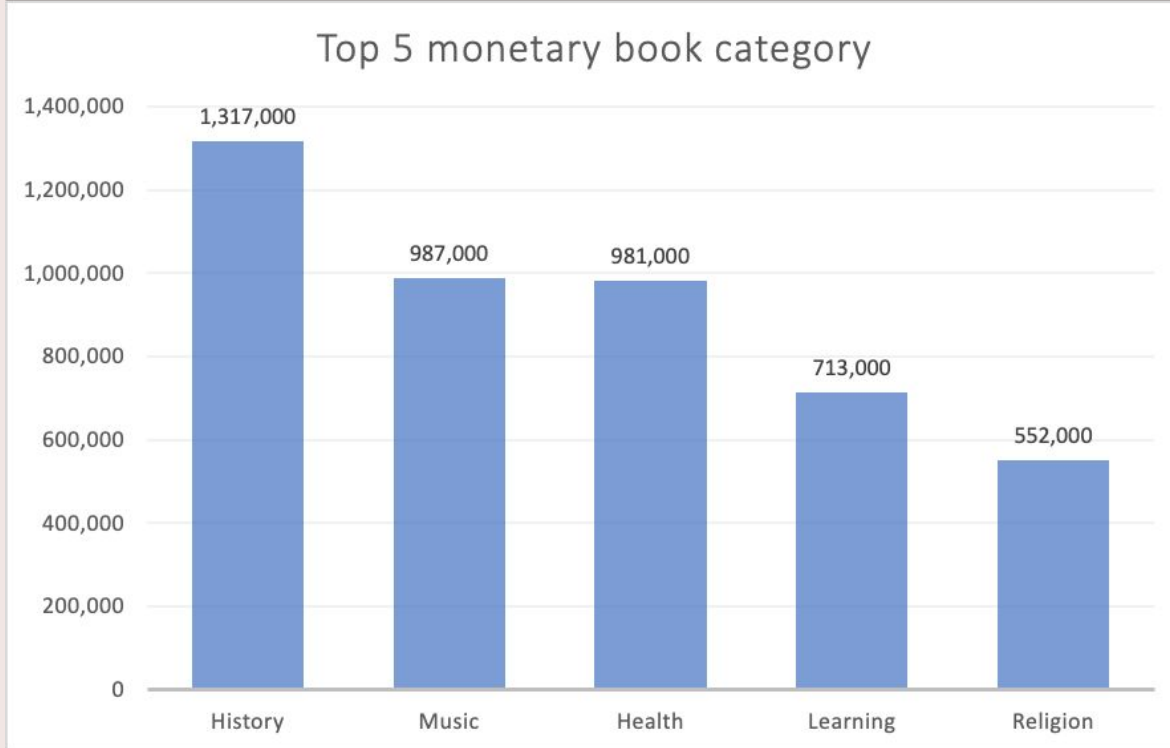
**TIMELINE**



# APPENDIX



# CURRENT SYSTEM SIMPLY RECOMMENDS “MOST POPULAR” CATEGORIES



- The current system recommends "most popular" items
- Not personalized enough for each customer's needs
- Need more advanced and accurate recommendation solutions

**PROBLEM**

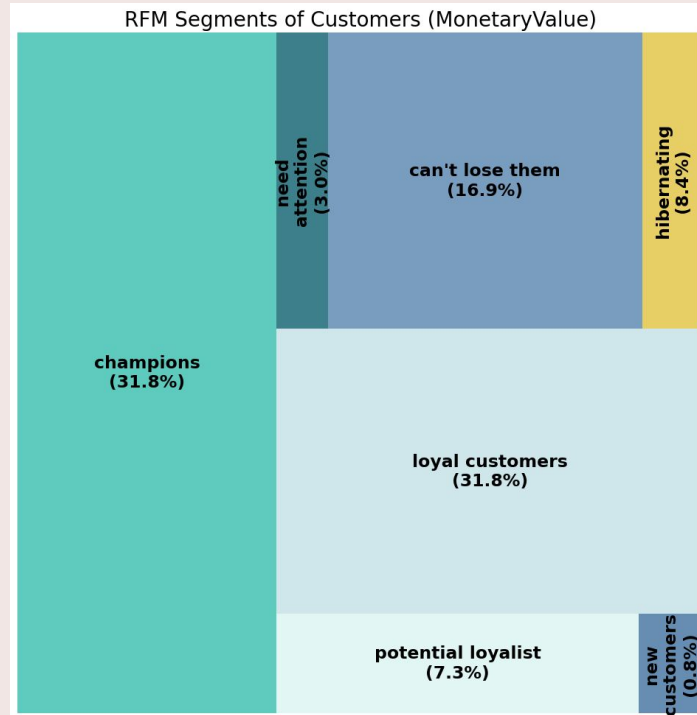
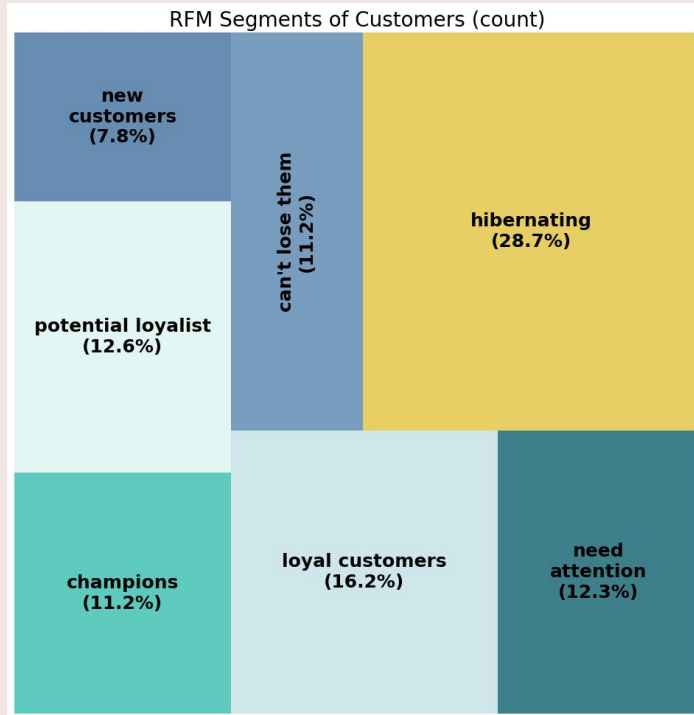
RFM

DISCOUNTS

COMPARE

IMPACT

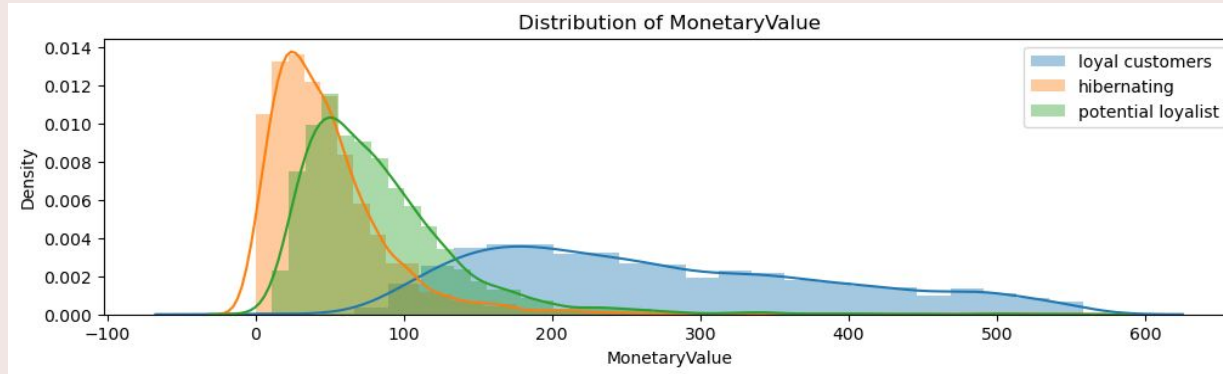
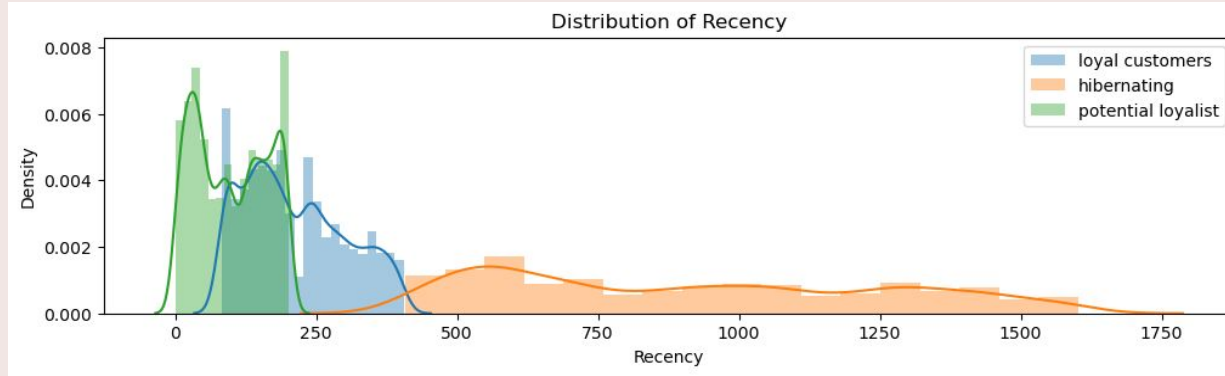
# HIBERNATING CUSTOMERS ARE A LARGE PORTION OF THE CUSTOMER BASE, BUT SMALL PORTION OF REVENUE



- Over 50% of your customers are at risk of being lost. Action needs to be taken
- Champions and loyal customers make up 23.8% of customers, but 63.6% of revenue
- “20% of customers generate 80% of revenue” is not quite true, but close



# DISTINCT GROUPS ARE EVIDENT IN RFM DISTRIBUTIONS



- The three segments with the most customers occupy distinct ranges of the RFM metrics
- Loyal Customers have medium Recency and high Monetary Value
- Hibernating customers have poor Recency and low Monetary Value
- Potential Loyalists have good Recency, but are yet to have spent a lot

TEAM

PROBLEM

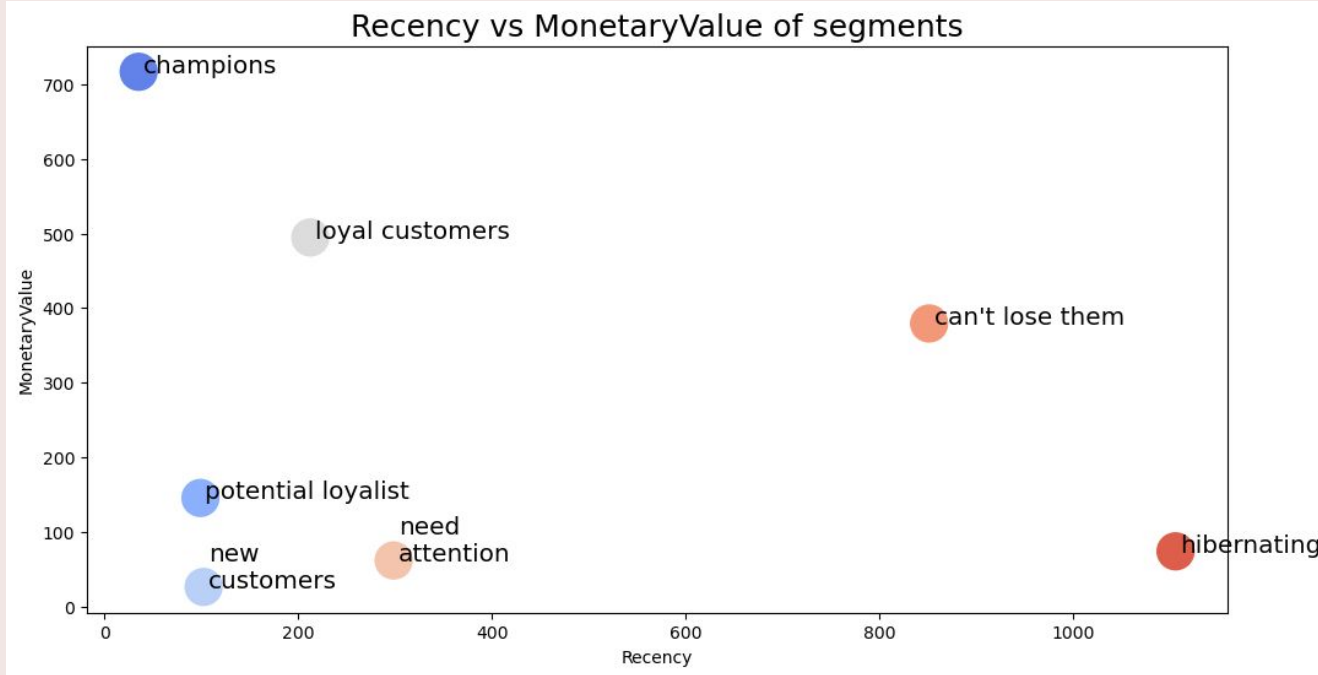
RFM

DISCOUNTS

COMPARE

IMPACT

# RFM SYSTEM SUCCESSFULLY IDENTIFIES UNIQUE GROUPS



- This plot shows how the different segments relate along the Recency and Monetary Value dimensions
- Champions purchased very recently and spent a lot, while Hibernating customers purchased a long time ago and spent very little
- Monetary Value and Frequency are highly correlated, so a Recency vs. Frequency plot is redundant

TEAM

PROBLEM

RFM

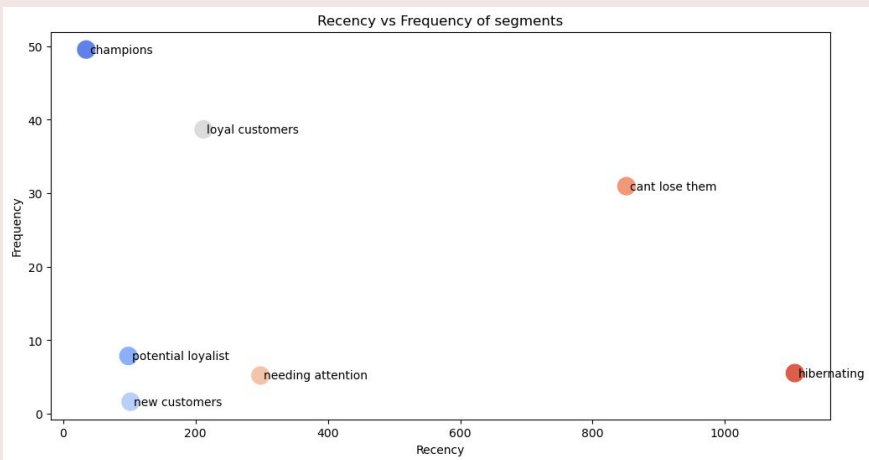
DISCOUNTS

COMPARE

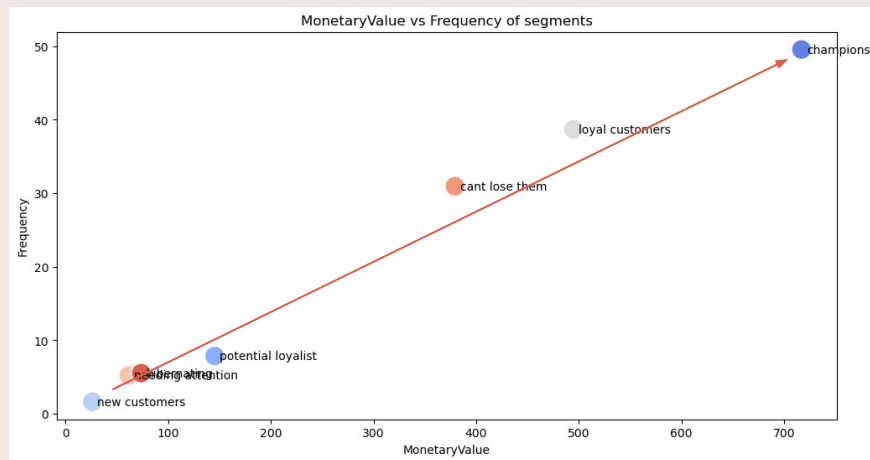
IMPACT

# RFM SYSTEM SUCCESSFULLY IDENTIFIES UNIQUE GROUPS

- Almost the same as Recency vs Monetary Value



- Monetary Value and Frequency has a strong correlation



# DISCOUNT MESSAGES ARE PERSONALIZED BY SEGMENT

## CHAMPIONS

As a thank you for being a Champion customer, we would like to offer you exclusive early access to the upcoming new release in your favorite category!

## LOYAL CUSTOMERS

As one of our most loyal customers, we would like to extend this exclusive offer of 10% off orders of \$50-\$100 and 20% off orders of \$100 or more!

## POTENTIAL LOYALISTS

As a thank you for being a valued customer, we would like to extend the following exclusive “punch card” offer: When you buy nine books, receive the tenth book for free!

## NEW CUSTOMERS

Welcome to the site! Please accept this introductory offer of 10% off your first purchase.

TEAM

PROBLEM

IMPACT

# DISCOUNT MESSAGES ARE PERSONALIZED BY SEGMENT

## NEED ATTENTION

Act fast! 25% off your next order if made in the next 48 hours!

## CAN'T LOSE THEM

Thank you for being one of our most valued customers. Please accept this 30% off discount on your next order.

## HIBERNATING

Welcome back, we've missed you! Pick up reading from your favorite categories and use code 'WelcomeBack' for buy one get one free!"

TEAM

PROBLEM

IMPACT



# OLD SYSTEM DOES NOT SEGMENT CUSTOMERS & SIMPLY RECOMMENDS “MOST POPULAR” CATEGORIES

| ID | Most Frequent Purchase Category | R | F | M | Category Rec.                              |
|----|---------------------------------|---|---|---|--|
| 0  | History                         | 4 | 5 | 5 | History, Music, Health, Learning, Religion |
| 1  | Music                           | 5 | 5 | 5 | History, Music, Health, Learning, Religion |
| 2  | Health                          | 1 | 5 | 5 | History, Music, Health, Learning, Religion |
| 3  | Travel Guide                    | 4 | 2 | 2 | History, Music, Health, Learning, Religion |
| 4  | Sports                          | 4 | 1 | 1 | History, Music, Health, Learning, Religion |
| 5  | Cooking                         | 1 | 2 | 2 | History, Music, Health, Learning, Religion |
| 6  | Learning                        | 3 | 2 | 2 | History, Music, Health, Learning, Religion |

- Customers 3, 4, 5 do not get relevant category recommendations
- Customer purchasing habits (RFM) are not utilized



# NEW SYSTEM PROVIDES CUSTOMER SEGMENTATION AND MORE ACCURATE CATEGORY RECOMMENDATIONS

| ID | Most Frequent Purchase Cat. | R | F | M | Segment            | Discount   | Category Rec.                         |
|----|-----------------------------|---|---|---|--------------------|--|---------------------------------------|
| 0  | History                     | 4 | 5 | 5 | Loyal Customers    | 10% off orders of \$50-\$100 & 20% off orders of \$100 or more | History, Cont. History, Travel Guides |
| 1  | Music                       | 5 | 5 | 5 | Champions          | Early access to new releases                                   | Music, History, Health                |
| 2  | Health                      | 1 | 5 | 5 | Can't Lose Them    | 30% off discount   | Health, Learning, History             |
| 3  | Travel Guide                | 4 | 2 | 2 | Potential Loyalist | Buy 9 books and get the 10th free                              | Travel guide, History, Health         |
| 4  | Sports                      | 4 | 1 | 1 | New Customers      | 10% off first-time purchase                                    | Sports, Health, Hobby                 |
| 5  | Cooking                     | 1 | 2 | 2 | Hibernating        | BOGO 'WelcomeBack' discount                                    | Cooking, Travel guides, Health        |
| 6  | Learning                    | 3 | 2 | 2 | Need Attention     | 25% off if used within 48 hours                                | Learning, Health, History             |



# APPLYING RECOMMENDATIONS TO ALL CUSTOMERS CAN INCREASE SALES BY \$772K (+9.1%)

- Recommendation for top 15% of customers (Champions)

|                               | \$Sales Increase  | Sales Increase(%) |                   |               |
|-------------------------------|-------------------|-------------------|-------------------|---------------|
| Sales created by our proposal | 540,036           | 6.4%              |                   |               |
| Current sales                 | \$Projected Sales | \$Current Sales   | Sales Increase(%) | % of customer |
| Total                         | 9,033,161         | 8,493,125         | 6.4%              | 100%          |
| Champions                     | 3,240,215         | 2,700,179         | 20%               | 15%           |
| Loyal Customers               | 2,699,255         | 2,699,255         | 0%                | 15%           |
| Potential Loyalist            | 618,173           | 618,173           | 0%                | 12%           |
| New Customers                 | 68,943            | 68,943            | 0%                | 7%            |
| Needing Attention             | 254,450           | 254,450           | 0%                | 12%           |
| Can't Lose Them               | 1,437,006         | 1,437,006         | 0%                | 11%           |
| Hibernating                   | 715,118           | 715,118           | 0%                | 27%           |

- Recommendation for all customers

|                               | \$Sales Increase  | Sales Increase(%) |                   |               |
|-------------------------------|-------------------|-------------------|-------------------|---------------|
| Sales created by our proposal | 771,754           | 9.1%              |                   |               |
| Current sales                 | \$Projected Sales | \$Current Sales   | Sales Increase(%) | % of customer |
| Total                         | 9,264,879         | 8,493,125         | 9.1%              | 100%          |
| Champions                     | 3,240,215         | 2,700,179         | 20%               | 15%           |
| Loyal Customers               | 2,807,225         | 2,699,255         | 4%                | 15%           |
| Potential Loyalist            | 642,900           | 618,173           | 4%                | 12%           |
| New Customers                 | 71,701            | 68,943            | 4%                | 7%            |
| Needing Attention             | 264,628           | 254,450           | 4%                | 12%           |
| Can't Lose Them               | 1,494,486         | 1,437,006         | 4%                | 11%           |
| Hibernating                   | 743,723           | 715,118           | 4%                | 27%           |

