Personalized E-Commerce Recommendation Engine

Team 5:
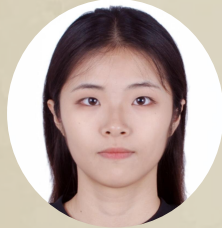Sam Fisher
Sally Shen
Heath Liao
Amy Kim
Suma Ragi

Meet Our Team

Sam Fisher
Financial Specialist & Marketing Expert

Sally Shen
Project Manager

Heath Liao
Data Science Manager

Amy Kim
Customer Experience Specialist & Front-End Developer

Suma Ragi
ML Engineer

BRAIN & COMPANY
— CONSULTING FIRM —

Agenda

1. Business Problem

2. Our Solution

3. The Business Strategy

4. Front-end Demo Showcase

5. Economic Value

01

The Business Problem

The Problem: One-Size-Fits-All Recommendations

Current System

VS.

Our New System

Current System:

➤ Recommending "**most popular**" books to **all e-commerce customers**
  ○ **Regardless** of customer purchase history and behavior

➤ **Limitations:** This system **DOES NOT**
  ○ Highlight **new relevant products** for **frequent customers**
  ○ Provide **incentives** for **in-frequent** customers to **re-engage**

Our New System:

➤ Personalized recommendations
  ○ **Segment** customers based on customer purchase history and behavior

➤ **Key Improvements:** This system **DOES:**
  ○ Offer early access with **tailored recommendations** for frequent customers
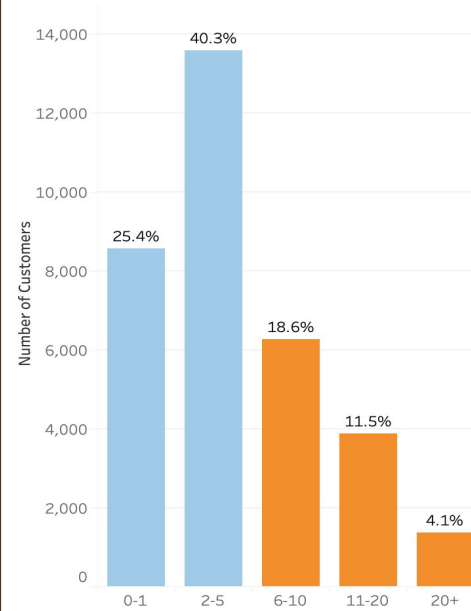 ○ **Re-engage inactive customers** with **targeted discounts**

Understanding Your Customers

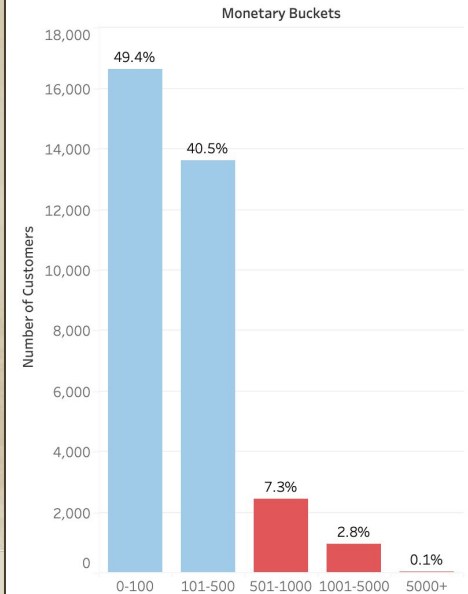## 42.6% of Customers Have Been Hibernating

Customer Distribution by Recency

89.8% of customers spent less than $500
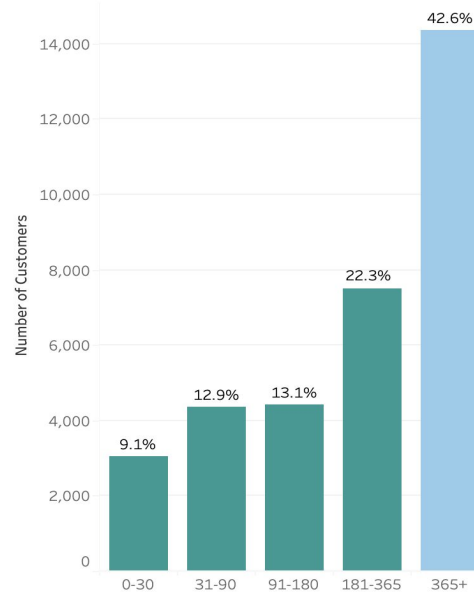
Customer Distribution by Frequency

Customer Distribution by Monetary Value

65.7% of Customers Only Purchased Less than 5 Books

Our Solution

02

Personalizing Recommendations With Distinct Customer Segments

Due to the **differing behaviors and interests** of various customers, providing the popular titles to all customers will be more **difficult** in lifting revenue

Solution: Brain & Company proposes **a model** to **segment customers** and **tailor book recommendations** via **categorizing customers** based on their revenue, monetary, frequency (RFM) and interests

This will create a **AT LEAST $650,000 Revenue** Boost for The Liberati Nook! -- **A 10% Increase**

How Our System Works

Automatically Segmenting New Customers Using RFM

Recency: Last Visited 60 Days Ago

Monetary: $100

Frequency: 8 purchases

Recency	Frequency	Monetary

4 3 2 1   4 3 2 1   4 3 2 1

Recency Score: 2   Frequency Score: 2   Monetary Score: 2
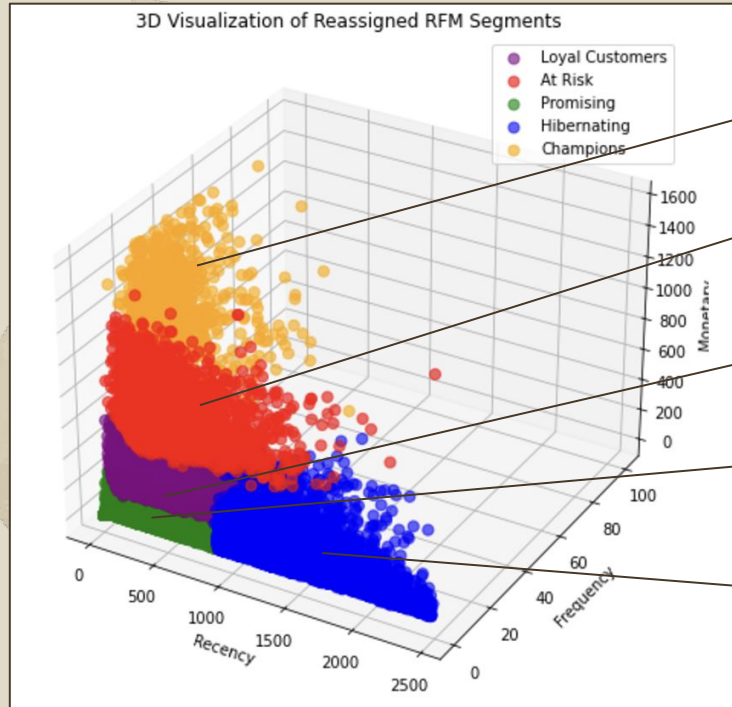
RFM: 222 (Overall Score = 6)

Resulting Segment: Loyal Customers

K-means Clustering Mechanism
Automatically groups similar customers by finding nearest cluster centers by their <u>revenue, order frequency, and purchase recency</u> (RFM).

Moderate Recency & frequency & monetary

→ **Loyal Customers**

5 Customer Segments

3D Visualization of Reassigned RFM Segments

Legend:
- Loyal Customers
- At Risk
- Promising
- Hibernating
- Champions

*Not including the 3 outlier "Bulk Buyers"

Champions (3%) : Low recency, high frequency, high monetary - **16.5% Revenue**

At Risk (9%) : High Recency, Moderate Frequency & Monetary - **29.3% Revenue**

Loyal Customers (20%): Moderate Recency & Frequency & Monetary **28.1% Revenue**

Promising (48%) : Moderate Recency, Low Frequency & Monetary - **15.2% Revenue**

Hibernating (20%): High recency, low frequency, low monetary - **10.9% Revenue**

* Customer segmentation was performed using K-Means

Utilizing A Detailed Books Dataset

Dataset

- We used a books dataset to find **specific books** to recommend to your customers.
- Key Features: Title, author, genres, ratings and plot descriptions.
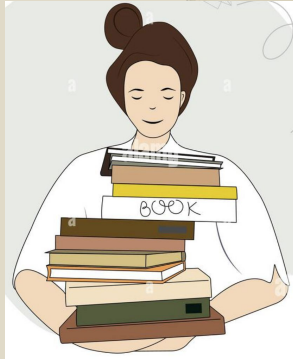
Why this dataset?

- Bridges genre preferences to **tailored book suggestions**.
- Placeholder for real purchase history.
- Seamlessly adaptable.

Books dataset is taken from Kaggle: https://www.kaggle.com/datasets/meetnaren/goodreads-best-books

Personalised Smart Recommendations

Discovering Preferences

Unveiling favourite genres through past purchases and reading habits

Browsing the Bookshelf

Fiction	Fantasy	Romance
Mystery	Thriller	Non-Fiction
Self-Help	History	Horror
Adventure	Classics	Biography

The bookshelf represents an extensive book database, organized into diverse genres. This helps us map books to align with a customer's unique preferences.

Crafting connections

The puzzle piece symbolizes matching preferences to books, crafting a personalized library for each reader.

Delivering Joy

*Personalized recommendations for a **unique reading experience***

03

Business Strategy

Providing Personalized Rewards

Champions

- Exclusive early access to new releases.

- Free Shipping

Loyal Bookworms

- Early access to selected books.

- "Read 5, Get 1 Free" Promotion

Promising Explorers

- Discounted book bundles in new genres.

- "Try before you buy": get a free PDF sample via email.

At-risk Readers

- Targeted email campaigns with special offers.

- Reactivation discount on next purchase

Hibernating

- "We Miss You" campaign with a significant discount.

- Provide free access to an ebook.

Messages to each segment

Champions

Thank you for being one of our most valued readers! 🎉 Exclusive early access to top picks tailored to your taste.

Promising Explorers

You're on your way to becoming a star reader! 🌟 Here's a 10% discount to keep you inspired.

Loyal Bookworms

Your loyalty means the world to us! 🌟 Enjoy these handpicked recommendations with early access just for you.

Hibernating

It's been a while! 📚 Let us reignite your love for books with a 40% discount and a free e-book with a $30 purchase!

At-risk Readers

We miss you! 💔 Here's a 10% discount on your next purchase. Check out these books we think you'll enjoy!

Every Customer is getting customized recommendations

Tailored Recommendations

Examples with Hibernating Customers: Reigniting Engagement with readers!

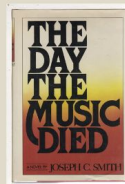Hey there! 📚 It's been a while. Here's a 20% discount on these popular books to reignite your reading journey.
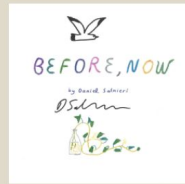
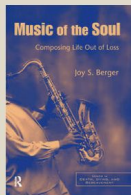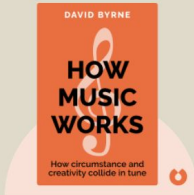|				
Music of the heart	Broken Music	John	The day the music died	Before Now
The story of us	Music of the soul	Please don't stop the music	How music works	Back-up

Testing Recommendations for Customer 2046:

Customer 2046's **purchase history** *highlighted a main focus on* **music genre**, *reflected in these top 10 tailored recommendations.*
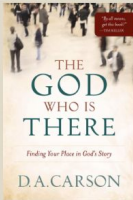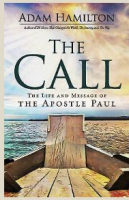
Tailored Recommendations

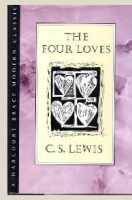**Examples with Hibernating Customers:** Reigniting Engagement with readers!

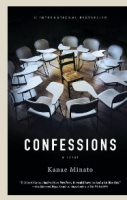Hey there! 📚 It's been a while. Here's a 20% discount on these popular books to reignite your reading journey.
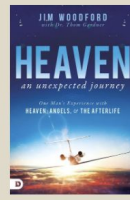
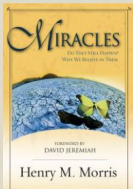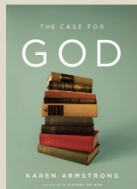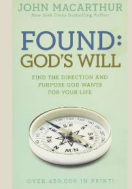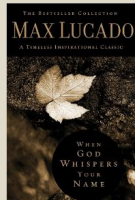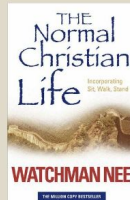|				
The God Who Is There	The Call	The Four Loves	Confessions	Heaven
Miracles	The Case For God	Found: God's Will	When God Whispers Your Name	The Normal Christian Life

Testing Recommendations for Customer 5665:

*Customer 5665's **purchase history** showed a strong interest in **religion and music**, which is reflected in these top recommendations.*

Front-End Demo Showcase

04

Updating the Online Store

Customer Interface

- Greeted **with top personalized books** and a **unique message above** that includes their **special promotion** on the front page

- Below this message, users will also be able to see **what other similar customers have purchased recently** and the most popular titles

Customer Experience

- Users will **see book covers** of the top books recommended and be able to **read their summaries** and **excerpts**

- Users will be able to then **apply their unique discounts** by clicking on those book titles for purchase

With a **simple and clean** UI and UX, customers will be able to **quickly find** the books meant for them and **easily purchase them**

Demo: Personalized Book Recommendation System

Get Customized Book Recommendation

Enter The Customer ID:

e.g. 123

Get Recommendations

➢ The front-end showcases how the recommendation system works using the customer IDs.

➢ In practice, customers won't need to provide their ID.

➢ The engine is designed to integrate seamlessly into your existing website for a smooth experience.

05

Economic Value

$650,000 Growth Via Strategic Marketing

PROMOTIONS

Promotion	Segment	Growth	Value
Enjoy Exclusive early access to new releases and Free Shipping!	Champions	+20%	$209,000
Get Early access to selected books and "Read 5, Get 1 Free" promotion!	Loyal Customers	+11.5%	$204,000
Enjoy Discounted book bundles in new genres and "Try before you buy": get a free PDF sample via email!	Promising	+5%	$48,000
Get Targeted email campaigns with special offers and a reactivation discount on next purchase!	At Risk	+5%	$92,500
We Miss You! Enjoy an special 40% discount on your next purchase over $30 with additional free access to an e-book!	Hibernating	+5%	$34,500
20% Revenue Growth for the top 15% most engaged customers (all Champions and most Loyal Customers) and **5% growth for all other groups** creates $650,000 in value.	Bulk Buyers	+5%	$58,500

~$650,000 In Revenue Growth!

Implementation Timeline

Implement personalized tests on each segmentations

Revenue & Profit Analysis

| 2 weeks | 3 months | 1 month | 2 weeks | 2 weeks |

Further Data Review and Collection

Operational Review

Final Review & Recommendations

A/B Test

Conclusion

Our advanced customer segmentation system can **conservatively drive a $650,000 Gain in E-Commerce Revenue**

- Segments get **personalized recommendations** and **promotions**

- A **customized e-commerce website experience** will drive customers to **spend more and re-engage**

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Questions?

Appendix 1.
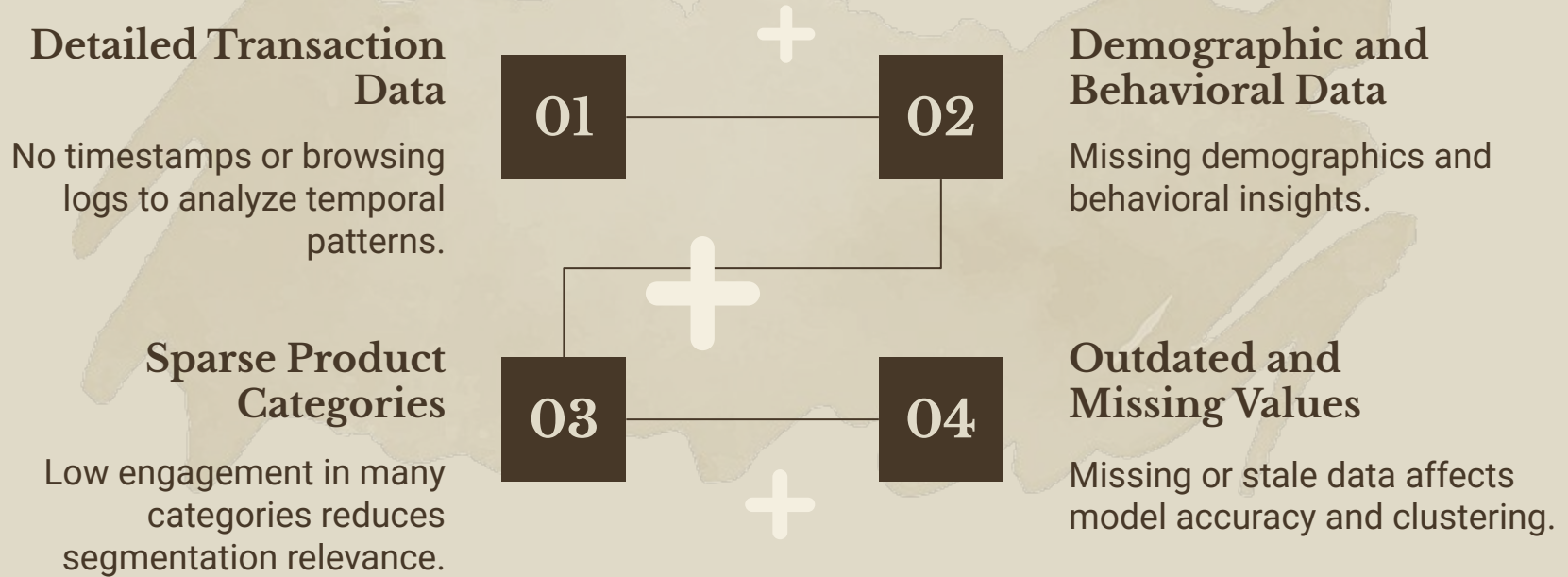# RFM Segmentation summary

RFM Segmentation Summary

Segment	Recency Mean	Frequency Mean	Monetary Mean	Customer Count
At Risk	764.9	8.0	$304.83	6,935
Champions	110.8	12.6	$594.14	8,420
Hibernating	988.9	1.7	$63.50	9,893
Loyal Customers	119.8	4.9	$75.97	1,150
Promising	134.3	1.7	$90.34	7,315

Appendix 2.
Data Constraints

Detailed Transaction Data

No timestamps or browsing logs to analyze temporal patterns.

01

02

Demographic and Behavioral Data

Missing demographics and behavioral insights.

Sparse Product Categories

Low engagement in many categories reduces segmentation relevance.

03

04

Outdated and Missing Values

Missing or stale data affects model accuracy and clustering.

Appendix 3.
Additional Data

- **Transaction Data**
  - Request: Timestamped transaction logs.
  - Purpose: Analyze temporal shopping trends to optimize recommendations.
- **Customer Profiles**
  - Request: Demographic and behavioral data.
  - Purpose: Enhance personalization of recommendations.
- **Category Engagement**
  - Request: Detailed data on interactions with specific product categories.
  - Purpose: Improve segmentation by identifying low-engagement categories.
- **Data Updates**
  - Request: Regular updates for customer metrics like frequency and monetary value.
  - Purpose: Ensure segmentation reflects current behaviors.

Appendix 4.
Personalised Recommendations

A snapshot of how customers are engaged with a 20 or 10% discount and curated book suggestions tailored to their preferences, driving re-engagement and loyalty.

Segment: At-Risk *(Customer ID: 1406)*

Segment: Promising *(Customer ID: 16061594)*

```
            We miss you! 💓 To bring you back, here's a **10% discount** on your next purchase.
            Check out these books we think you'll enjoy!


**Top 10 Recommended Books:**
– Before Ever After
– Never Never
– After The Fire
– The Next Together
– Fire With Fire
– Obscured Darkness (Family Secrets #2)
– Elliptical Door (A Multifaceted Overview) (Us) (2013)
– Females Of Valor
– The Daughter Of Kurdland: A Life Dedicated To Humankind
– Patience'S Love
```

```
            You're on your way to becoming a star reader! 🌟
            Here are some trending books we recommend for you.
            Enjoy a **10% discount** on your next order!


**Top 10 Recommended Books:**
– The Next Together
– Before Ever After
– The Book Of Everything
– The System Of The World
– The Eight
– The Book Of Love
– Take Me
– The Little Book
– All Change
– American Front
```
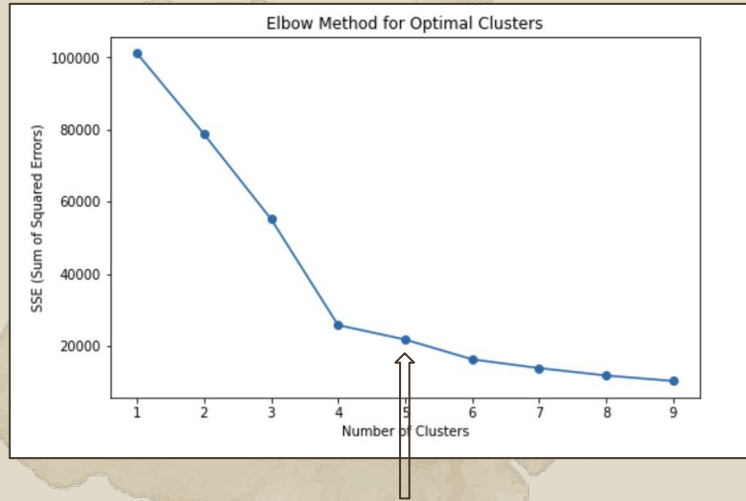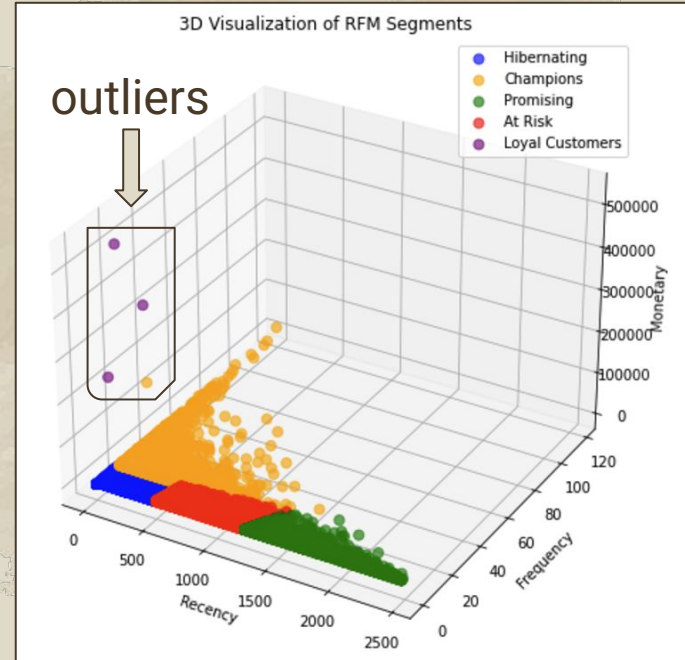
Appendix 5.
Clustering Customers with K-Means

Optimal Number of Clusters: 5
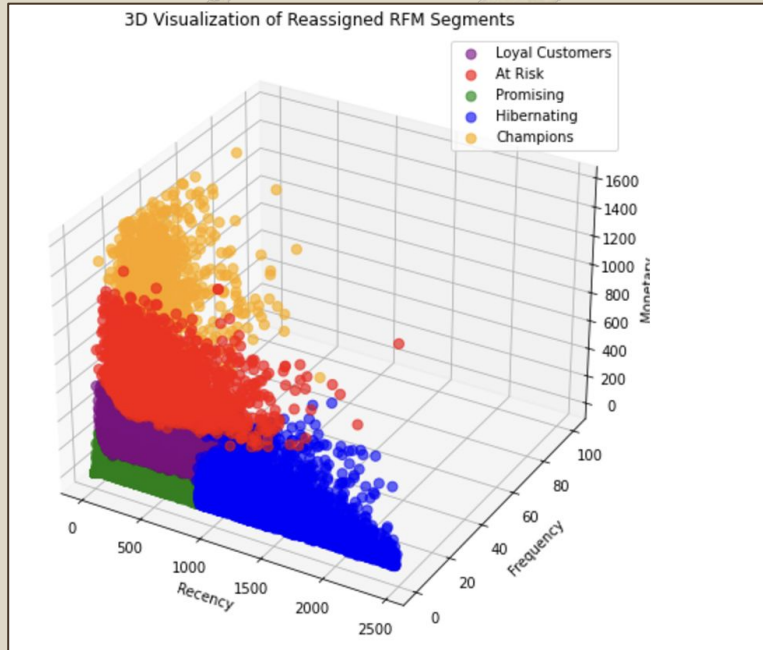

Combining Business Sense & Elbow Method

The Elbow Method suggests that 5 clusters provide optimal balance between variance explained and simplicity.

Identifying and Removing outliers:

Removed outliers to improve accuracy and prevent skewed results.

Appendix 6.
Customer Segmentation Results

3D Visualization of Reassigned RFM Segments

Segment	Recency (Days)	Frequency (Purchases)	Monetary (USD)	Count (Customers)
Hibernating	1426.1	2.78	100.40	6858
Champions	169.8	26.73	1036.32	1009
Loyal Customers	280.2	8.13	254.76	6971
At Risk	270.6	14.73	575.62	3214
Promising	280.7	2.28	62.64	15323

Distribution of RFM Segments

RFM Segments: **Recency vs Frequency**
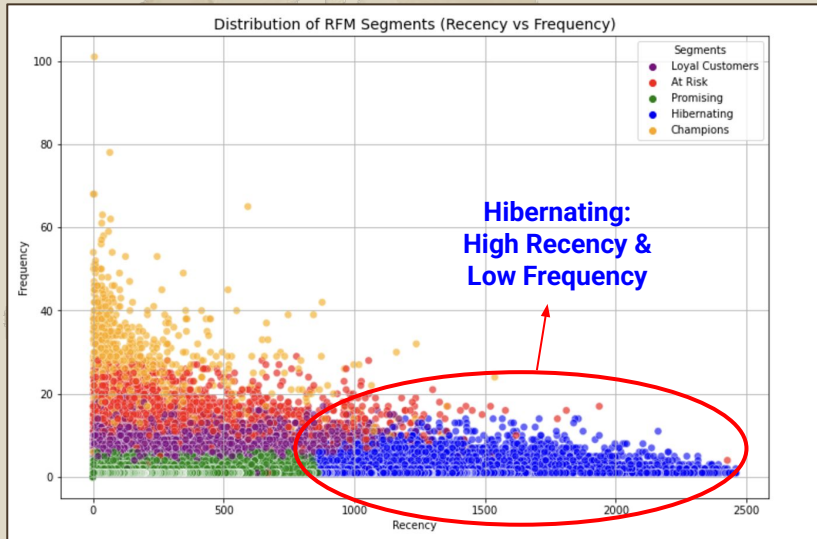
RFM Segments: **Frequency vs Monetary Value**