Business Case study

RECENCY-FREQUENCY-MONETARY ANALYSIS

(RFM Analysis using SQL)

By

Aravind Udiyana

Let's get Familiar with RFM !

RFM analysis is a marketing technique used to analyze and segment customers based on their purchasing behaviour. RFM stands for Recency , Frequency, and Monetary value:

1. Recency : How recently a customer made a purchase.

2. Frequency : How often a customer makes a purchase.

3. Monetary value : How much money a customer spends on purchases.

How RFM Analysis Works

1. Data Collection : Gather data on customer transactions, including dates, amounts, and frequencies of purchases.

2. Scoring: Assign scores to each customer for recency, frequency, and monetary value. Typically, scores range from 1 to 5 with 5 being the highest. (sometimes scores can be given as Low ,Medium and High . I used this king of scores in my work)

3. Segmentation : Combine the three scores to categorize customers into different segments.

For example:

- A customer with an RFM score of 5-5-5 (or may be High-High-High) is highly valuable: they purchase often, spend a lot, and have done so recently.

- A customer with a score of 1-1-1 (which means low-low-low) is much less valuable.

Benefits of RFM Analysis in Decision Making

1. Targeted Marketing : Helps businesses identify and target high-value customers with personalized marketing campaigns.

2. Customer Retention : By understanding which customers are at risk of churning (low recency scores), businesses can implement strategies to retain them.

3. Resource Allocation : Allows businesses to allocate marketing resources more efficiently, focusing efforts on the most profitable customer segments.

4. Improved Customer Insights : Provides deep insights into customer behavior, enabling more informed strategic decisions.

5. Product Development : Helps in understanding customer preferences and spending patterns, which can inform product development and inventory management.

Example of RFM Analysis Application

A retail company can use RFM analysis to:

- Send special offers to frequent shoppers (high frequency score).

- Re-engage customers who haven't made a purchase recently (low recency score).

- Reward high-spending customers (high monetary score) with loyalty programs.

By leveraging RFM analysis, businesses can enhance customer satisfaction, improve retention rates, and ultimately increase profitability.

Implementing it by SQL

Now our main aim is to demonstrate the segments of customers using SQL.

Here are the steps we need to follow.

Step 1 : We need to import the CSV file to MySQL , we can do it by SQL code or we can do it manually. I did manually as it is easier.

Step 2 : Clear data observation and identification of necessary columns . we'll primarily focus on Customer ID, Purchase Date, and Transaction Amount for RFM analysis. Ensure these fields are correctly formatted.

- **Purchase Date should be in a date format,**
- **Transaction Amount should be a numeric value.**

Step 3 : Perform the RFM calculations , Recency is the days difference between last purchased date and today's date. Frequency means how many times the customer purchased the products . It is done by count method. Monetary is the sum of total cost of all products purchased by the customer.

Key: Database used – analysys ,table name in that db – rfm_data.

SQL

```sql
use analysys;

show tables;
select * from rfm_data;

alter table rfm_data add column PurDate Date;
update rfm_data
set PurDate = str_to_date(PurchaseDate,'%d-%m-%Y');

alter table rfm_data drop column PurchaseDate;
select * from rfm_data;
```

The rfm_data table looks like this:

CustomerID	TransactionAmount	ProductInformation	OrderID	Location	PurDate
8814	943.31	Product C	890075	Tokyo	2023-04-11
2188	463.7	Product A	176819	London	2023-04-11
4608	80.28	Product A	340062	New York	2023-04-11
2559	221.29	Product A	239145	London	2023-04-11
9482	739.56	Product A	194545	Paris	2023-04-11
8483	375.23	Product C	691194	Paris	2023-04-11
8317	272.56	Product B	826847	New York	2023-04-11
6911	433.33	Product C	963918	Tokyo	2023-04-11
8993	16.55	Product D	112426	New York	2023-04-12
3519	464.63	Product C	139726	New York	2023-04-12
9005	120.75	Product C	972064	Paris	2023-04-12
9409	865.98	Product A	597126	London	2023-04-12
5670	392.7	Product B	995296	London	2023-04-12
8724	623.35	Product C	739717	London	2023-04-12
9148	99.15	Product D	629996	Tokyo	2023-04-12

Only Some rows are shown

Next up, We have to see R-F-M values individually. Main story starts from here.

```sql
select CustomerID , max(PurDate) as MostRecentBuy,
datediff(current_date(),max(PurDate)) as Recency  from rfm_data
group by CustomerID;  /* To see the Recency of each customer */

select CustomerID ,count(*)as Frequency from rfm_data
group by CustomerID;  /* To see the Frequency of each customer */

select CustomerID , sum(TransactionAmount) as Monetary
from rfm_data
group by CustomerID;  /* To see Monetary of each customer */
```

The outputs of those three snippets are here respectively

CustomerID	MostRecentBuy	Recency
8814	2023-04-11	406
2188	2023-04-11	406
4608	2023-04-11	406
2559	2023-04-11	406
9482	2023-04-11	406
8483	2023-04-11	406
8317	2023-05-31	356
6911	2023-04-11	406
8993	2023-04-12	405
3519	2023-04-12	405
9005	2023-04-12	405
9409	2023-04-12	405
5670	2023-04-12	405
8724	2023-04-12	405
9148	2023-04-12	405

,,

CustomerID	Frequency
8814	1
2188	1
4608	1
2559	1
9482	1
8483	1
8317	2
6911	1
8993	1
3519	1
9005	1
9409	1
5670	1
8724	1

,,

CustomerID	Monetary
8814	943.31
2188	463.7
4608	80.28
2559	221.29
9482	739.56
8483	375.23
8317	974.8800000000001
6911	433.33
8993	16.55
3519	464.63
9005	120.75
9409	865.98
5670	392.7
8724	623.35

Now we have to set them all in one table for further analysis.

```
27 •  create table rfm_result as
28    select R.CustomerID,R.Recency,F.Frequency,M.Monetary
29    from (select CustomerID , max(PurDate) as MostRecentBuy,
30    datediff(current_date(),max(PurDate)) as Recency  from rfm_data
31    group by CustomerID) R
32    join (select CustomerID ,count(*) as Frequency from rfm_data
33    group by CustomerID) F on R.CustomerID=F.CustomerID
34    join (select CustomerID , sum(TransactionAmount) as Monetary
35    from rfm_data
36    group by CustomerID) M on R.CustomerID=M.CustomerID;
37
38 •  select * from rfm_result;
```

The rfm_result table looks like this,

CustomerID	Recency	Frequency	Monetary
8814	406	1	943.31
2188	406	1	463.7
4608	406	1	80.28
2559	406	1	221.29
9482	406	1	739.56
8483	406	1	375.23
8317	356	2	974.8800000000001
6911	406	1	433.33
8993	405	1	16.55
3519	405	1	464.63
9005	405	1	120.75
9409	405	1	865.98
5670	405	1	392.7
8724	405	1	623.35

Now using those R-F-M values we have to divide the customer by giving them scores. The scoring conditions might vary from one business to another business, but for analysis I have given these conditions below.

```
40  create table rfm_scores as
41  select CustomerID,
42      case
43          when Recency <=360 Then "High"
44          when Recency between 360 and 400 then "Medium"
45          else "Low"
46      end as R_Score,
47      case
48          when Frequency >=5 then "High"
49          when Frequency between 2 and 5 then "Medium"
50          else "Low"
51      End as F_Score,
52      case
53          when Monetary >=1000 then "High"
54          when Monetary between 300 and 1000 then "Medium"
55          else "Low"
56      End as M_Score
57  from rfm_result;
58
59  select * from rfm_scores;
60
```

Now we get the R-F-M scores of each customer

(only few rows are being captured in screenshot)

CustomerID	R_Score	F_Score	M_Score
8814	Low	Low	Medium
2188	Low	Low	Medium
4608	Low	Low	Low
2559	Low	Low	Low
9482	Low	Low	Medium
8483	Low	Low	Medium
8317	High	Medium	Medium
6911	Low	Low	Medium
8993	Low	Low	Low
3519	Low	Low	Medium
9005	Low	Low	Low
9409	Low	Low	Medium
5670	Low	Low	Medium
8724	Low	Low	Medium
9148	Low	Low	Low

These are the RFM scores .By using these scores companies can make decisions.

But how companies target their customers using these scores

Companies use RFM scores to target customers with tailored marketing strategies, aiming to maximize engagement and profitability. Here's how they can approach customers with high, medium, and low RFM scores:

High RFM Scores (High Recency, Frequency, and Monetary Value)

Characteristics:

- Recently made a purchase.

- Purchase frequently.

- Spend a lot.

Targeting Strategies:

1. Exclusive Offers: Providing special discounts or early access to new products to make them feel valued.

2. Loyalty Programs: Introducing or enhancing loyalty programs to reward their frequent purchases and high spending.

3. Personalized Communication: Using personalized emails or messages acknowledging customers loyalty and suggesting products based on their purchase history.

4. VIP Experiences: Offering VIP experiences or events to strengthen their connection with the brand.

5. Upselling and Cross-selling : Recommending complementary products or premium versions of their recent purchases.

Medium RFM Scores (Moderate Recency, Frequency, and Monetary Value)

Characteristics:

- Made a purchase within a reasonable timeframe.

- Purchase occasionally.

- Spend a moderate amount.

Targeting Strategies:

1. Engagement Campaigns: Sending regular updates and newsletters to keep them engaged with the brand.

2. Incentives for Increased Spending: Offering incentives like "buy more, save more" promotions to encourage higher spending.

3. Reminder Emails: Sending reminder emails about products they may be interested in or items left in their shopping cart.

4. Seasonal Offers: Providing special offers during key times of the year to encourage more frequent purchases.

5. Customer Feedback: Engaging them in surveys or feedback forms to better understand their needs and preferences.

Low RFM Scores (Low Recency, Frequency, and Monetary Value)

Characteristics:

- Haven't made a purchase recently.

- Purchase infrequently.

- Spend a small amount.

Targeting Strategies:

1. Reactivation Campaigns: Sending win-back campaigns with special offers or discounts to re-engage them.

2. Personalized Discounts: Providing personalized discounts on items they've shown interest in or purchased in the past.

3. Content Marketing: Sharing valuable content like how-to guides, tips, or blogs to remind them of your brand.

4. Social Media Engagement: Increasing engagement through social media platforms with targeted ads and interactive content.

5. Exit Surveys: If possible, ask them why they haven't purchased recently to gain insights and improve your offerings.

By effectively targeting customers based on their RFM scores, companies can optimize their marketing efforts, increase customer loyalty, and drive revenue growth.

That’s friends..... Meet you in the next document. **Thank You**.