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Customer Lifetime Value(CLV)?

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Customer Lifetime Value (CLV) is a metric that measures the total amount of money that a customer brings to a business over the entire duration of their relationship. This metric is important for businesses to understand because it helps them make informed decisions about their customer acquisition and retention strategies.

Calculating CLV involves considering a number of different factors, such as the average purchase value, the frequency of purchases, and the length of the customer relationship. By analyzing these factors, businesses can gain insights into the profitability of different customer segments, and identify opportunities to improve their overall CLV.

One key benefit of focusing on CLV is that it encourages businesses to prioritize long-term customer relationships over short-term gains. By investing in customer satisfaction and loyalty, businesses can increase their overall CLV and build a sustainable revenue stream.

In order to calculate CLV, businesses can use a variety of different formulas and models. Some of the most common approaches include:

- Historic CLV: This model looks at a customer's past behavior to predict their future spending. It involves analyzing data such as purchase history, frequency of purchases, and average order value.
- Predictive CLV: This model uses machine learning algorithms to predict a customer's future behavior based on a variety of different factors, such as demographics, browsing behavior, and purchase history.
- Cohort analysis: This approach involves grouping customers into different cohorts based on their behavior or demographics, and analyzing their CLV over time. This can help businesses identify trends and patterns in customer behavior, and adjust their strategies accordingly.

Overall, CLV is a critical metric for businesses to track in order to optimize their customer acquisition and retention strategies, and build long-term relationships with their customers.

We have the step to calculate the CLV:

1. **Repeat rate**: number of customers who make multiple purchases / all customers
2. **Churn rate**: 1 - repeat rate
3. **Purchase frequency**: total transactions / total number of unique customers
4. **Average order value**: total price / total transactions
5. **Customer value**: average order value * purchase frequency
6. **Profit margin**: total price * profit margin rate(provided by the company)
7. **CLV = (customer value / churn rate) * profit margin**

SQL coding

1. **Repeat rate:** sử dụng subquerry và CTE để tính số khách hàng có điều kiện và không có điều kiện, ta cóp thể dùng aggreate function với FILTER cũng cho ta kết quả tương tự.

```
With repeat_tbl as (SELECT COUNT(Customer_ID) total_cust
        , (SELECT COUNT(Customer_ID)
        FROM (
        SELECT Customer_ID
                ,  COUNT(Customer_ID) OVER(partition by Customer_ID ORDER by Date) order_num
        FROM dbo.scanner_data) sub
        where order_num > 1) multiple_purchases_cust
FROM dbo.scanner_data)

SELECT round(1.0*multiple_purchases_cust/total_cust,2) repeat_rate
FROM repeat_tbl
```

2. **Churn rate**: 1 - repeat rate

```
With repeat_tbl as (SELECT COUNT(Customer_ID) total_cust
        , (SELECT COUNT(Customer_ID)
        FROM (
        SELECT Customer_ID
                ,  COUNT(Customer_ID) OVER(partition by Customer_ID ORDER by Date) order_num
        FROM dbo.scanner_data) sub
        where order_num > 1) multiple_purchases_cust
FROM dbo.scanner_data)

SELECT 1 - round(1.0*multiple_purchases_cust/total_cust,2) churn_rate
FROM repeat_tbl
```

3. **Purchase frequency**:

```
1.0*COUNT(distinct Transaction_ID)/(select COUNT(distinct Customer_ID) FROM dbo.scanner_data) Purchase_frequency
```

4. **Average order value**: total price / total transactions

```
Average_order_value_tbl as (SELECT Customer_ID
        , round(1.0*SUM(Sales_Amount)/COUNT(distinct Transaction_ID),2) Average_order_value
        , 1.0*COUNT(distinct Transaction_ID)/(select COUNT(distinct Customer_ID) FROM dbo.scanner_data) Purchase_frequency
        FROM dbo.scanner_data
        GROUP by Customer_ID)
 SELECT * FROM Average_order_value_tbl
```

5. **Customer value**:

```
Average_order_value_tbl as (SELECT Customer_ID
        , round(1.0*SUM(Sales_Amount)/COUNT(distinct Transaction_ID),2) Average_order_value
        , 1.0*COUNT(distinct Transaction_ID)/(select COUNT(distinct Customer_ID) FROM dbo.scanner_data) Purchase_frequency
        FROM dbo.scanner_data
        GROUP by Customer_ID)
 SELECT * FROM Average_order_value_tbl
```

6. **Profit margin**:

```
SUM(price)*0.1 profit_margin
```

7. **CLV = (customer value / churn rate) * profit margin**

```
With repeat_tbl as (SELECT COUNT(Customer_ID) total_cust
        , (SELECT COUNT(Customer_ID)
        FROM (
        SELECT Customer_ID
                ,  COUNT(Customer_ID) OVER(partition by Customer_ID ORDER by Date) order_num
        FROM dbo.scanner_data) sub
        where order_num > 1) multiple_purchases_cust
FROM dbo.scanner_data),

        repeat_rate_tbl as (SELECT 1 - round(1.0*multiple_purchases_cust/total_cust,2) repeat_rate
        FROM repeat_tbl),

        scanner_data_price as ( select *
                , ROUND(Sales_Amount/Quantity,2) price
        FROM dbo.scanner_data),

        Average_order_value_tbl as (SELECT Customer_ID
        , round(1.0*SUM(price)/COUNT(Transaction_ID),2) Average_order_value
        , 1.0*COUNT(distinct Transaction_ID)/(select COUNT(distinct Customer_ID) FROM dbo.scanner_data) Purchase_frequency
        , SUM(price)*0.1 profit_margin
        FROM scanner_data_price
        GROUP by Customer_ID)

SELECT  *
        , ROUND(Customer_value / (SELECT 1 - round(1.0*multiple_purchases_cust/total_cust,2) repeat_rate
        FROM repeat_tbl),2) * profit_margin AS CLV
FROM (
 SELECT *
        , round(Average_order_value * Purchase_frequency,2) Customer_value
 FROM Average_order_value_tbl
 ) sub
 ORDER BY Customer_ID
```