고객을 세그먼테이션하자! [프로젝트] - 조현우

11-2. 데이터 불러오기

데이터 살펴보기

- **테이블에 있는 10개의 행만 출력하기**

```
# [[YOUR QUERY]]
SELECT *
FROM `kinetic-magnet-470205-h1.modulabs_project.data`
LIMIT 10;
```

[결과 이미지를 넣어주세요]

행	InvoiceNo	StockCode	Description	Quantity	InvoiceDate	UnitPrice	CustomerID	Country
1	536365	85123A	WHITE HANGING HEART T-LIG...	6	2010-12-01 08:26:00 UTC	2.55	17850	United Kingdom
2	536365	71053	WHITE METAL LANTERN	6	2010-12-01 08:26:00 UTC	3.39	17850	United Kingdom
3	536365	84406B	CREAM CUPID HEARTS COAT H...	8	2010-12-01 08:26:00 UTC	2.75	17850	United Kingdom
4	536365	84029G	KNITTED UNION FLAG HOT WA...	6	2010-12-01 08:26:00 UTC	3.39	17850	United Kingdom
5	536365	84029E	RED WOOLLY HOTTIE WHITE H...	6	2010-12-01 08:26:00 UTC	3.39	17850	United Kingdom
6	536365	22752	SET 7 BABUSHKA NESTING BO...	2	2010-12-01 08:26:00 UTC	7.65	17850	United Kingdom
7	536365	21730	GLASS STAR FROSTED T-LIGHT...	6	2010-12-01 08:26:00 UTC	4.25	17850	United Kingdom
8	536366	22633	HAND WARMER UNION JACK	6	2010-12-01 08:28:00 UTC	1.85	17850	United Kingdom
9	536366	22632	HAND WARMER RED POLKA DOT	6	2010-12-01 08:28:00 UTC	1.85	17850	United Kingdom
10	536367	84879	ASSORTED COLOUR BIRD ORN...	32	2010-12-01 08:34:00 UTC	1.69	13047	United Kingdom

- **전체 데이터는 몇 행으로 구성되어 있는지 확인하기**

```
# [[YOUR QUERY]]
SELECT COUNT(*) AS total
FROM `kinetic-magnet-470205-h1.modulabs_project.data`;
```

[결과 이미지를 넣어주세요]

행	total
1	541909

데이터 수 세기

- **COUNT 함수를 사용해서, 각 컬럼별 데이터 포인트의 수를 세어 보기**

```
# [[YOUR QUERY]]
SELECT
  COUNT(InvoiceNo) AS InvoiceNo_COUNT,
  COUNT(StockCode) AS StockCode_COUNT,
  COUNT(Description) AS Description_COUNT,
  COUNT(Quantity) AS Quantity_COUNT,
  COUNT(InvoiceDate) AS InvoiceDate_COUNT,
  COUNT(UnitPrice) AS UnitPrice_COUNT,
  COUNT(CustomerID) AS CustomerID_COUNT,
  COUNT(Country) AS Country_COUNT
FROM `kinetic-magnet-470205-h1.modulabs_project.data`;
```

[결과 이미지를 넣어주세요]

행	InvoiceNo_COUNT	StockCode_COUNT	Description_COU...	Quantity_COUNT	InvoiceDate_COU...	UnitPrice_COUNT	CustomerID_COU...	Country_COUNT
1	541909	541909	540455	541909	541909	541909	406829	541909

11-4. 데이터 전처리 방법(1): 결측치 제거

컬럼 별 누락된 값의 비율 계산

- **각 컬럼 별 누락된 값의 비율을 계산**
  - **각 컬럼에 대해서 누락 값을 계산한 후, 계산된 누락 값을 UNION ALL을 통해 합치기**

```
# [[YOUR QUERY]]
WITH A AS (
  SELECT *
  FROM `kinetic-magnet-470205-h1.modulabs_project.data`
)

SELECT
  'InvoiceNo' AS column_name,
  ROUND(SUM(CASE WHEN InvoiceNo IS NULL THEN 1 ELSE 0 END) / COUNT(*) * 100, 2) AS missing_percentage
FROM A

UNION ALL
SELECT
  'StockCode' AS column_name,
  ROUND(SUM(CASE WHEN StockCode IS NULL THEN 1 ELSE 0 END) / COUNT(*) * 100, 2) AS missing_percentage
FROM A

UNION ALL
SELECT
  'Description' AS column_name,
  ROUND(SUM(CASE WHEN Description IS NULL THEN 1 ELSE 0 END) / COUNT(*) * 100, 2) AS missing_percentage
FROM A

UNION ALL
SELECT
  'Quantity' AS column_name,
  ROUND(SUM(CASE WHEN Quantity IS NULL THEN 1 ELSE 0 END) / COUNT(*) * 100, 2) AS missing_percentage
FROM A

UNION ALL
SELECT
  'InvoiceDate' AS column_name,
  ROUND(SUM(CASE WHEN InvoiceDate IS NULL THEN 1 ELSE 0 END) / COUNT(*) * 100, 2) AS missing_percentage
FROM A

UNION ALL
SELECT
  'UnitPrice' AS column_name,
  ROUND(SUM(CASE WHEN UnitPrice IS NULL THEN 1 ELSE 0 END) / COUNT(*) * 100, 2) AS missing_percentage
FROM A

UNION ALL
SELECT
  'CustomerID' AS column_name,
  ROUND(SUM(CASE WHEN CustomerID IS NULL THEN 1 ELSE 0 END) / COUNT(*) * 100, 2) AS missing_percentage
FROM A

UNION ALL
SELECT
  'Country' AS column_name,
  ROUND(SUM(CASE WHEN Country IS NULL THEN 1 ELSE 0 END) / COUNT(*) * 100, 2) AS missing_percentage
FROM A;
```

[결과 이미지를 넣어주세요]

행	column_name	missing_percenta...
1	InvoiceDate	0.0
2	Country	0.0
3	StockCode	0.0
4	CustomerID	24.93
5	Quantity	0.0
6	Description	0.27
7	InvoiceNo	0.0
8	UnitPrice	0.0

결측치 처리 전략

- `StockCode = '85123A'` 의 `Description` 을 추출하는 쿼리문을 작성하기

```
SELECT DISTINCT
    Description
FROM `kinetic-magnet-470205-h1.modulabs_project.data`
WHERE StockCode = '85123A';
```

[결과 이미지를 넣어주세요]

행	Description
1	WHITE HANGING HEART T-LIGHT HOLDER
2	?
3	wrongly marked carton 22804
4	CREAM HANGING HEART T-LIGHT HOLDER

결측치 처리

- **DELETE 구문을 사용하며, WHERE 절을 통해 데이터를 제거할 조건을 제시**

```
DELETE FROM `kinetic-magnet-470205-h1.modulabs_project.data`
WHERE Description IS NULL
OR CustomerID IS NULL;
```

[결과 이미지를 넣어주세요]

11-5. 데이터 전처리(2): 중복값 처리

중복값 확인

- **중복된 행의 수를 세어보기**
  - **8개의 컬럼에 그룹 함수를 적용한 후, COUNT가 1보다 큰 데이터를 세어보기**

```
FROM (
  SELECT
    InvoiceNo,
    StockCode,
    Description,
    Quantity,
    InvoiceDate,
    UnitPrice,
    CustomerID,
    Country,
    COUNT(*) AS cnt
  FROM `kinetic-magnet-470205-h1.modulabs_project.data`
  GROUP BY
    InvoiceNo, StockCode, Description, Quantity,
    InvoiceDate, UnitPrice, CustomerID, Country
```

```
  HAVING COUNT(*) > 1
);
```

[결과 이미지를 넣어주세요]

행	duplicate_group_...
1	4826

중복값 처리

- **중복값을 제거하는 쿼리문 작성하기**
  - **CREATE OR REPLACE TABLE 구문을 활용하여 모든 컬럼(*)을 DISTINCT 한 데이터로 업데이트**

```
CREATE OR REPLACE TABLE `kinetic-magnet-470205-h1.modulabs_project.data` AS
SELECT DISTINCT *
FROM `kinetic-magnet-470205-h1.modulabs_project.data`;
```

[결과 이미지를 넣어주세요]

11-6. 데이터 전처리(3): 오류값 처리

InvoiceNo 살펴보기

- **고유(unique)한 InvoiceNo의 개수를 출력하기**

```
# [[YOUR QUERY]]
SELECT COUNT(DISTINCT InvoiceNo) AS unique_invoice_count
FROM `kinetic-magnet-470205-h1.modulabs_project.data`;
```

행	unique_invoice_c...
1	22163

[결과 이미지를 넣어주세요]

- **고유한 InvoiceNo를 앞에서부터 100개를 출력하기**

```
SELECT DISTINCT InvoiceNo
FROM `kinetic-magnet-470205-h1.modulabs_project.data`
ORDER BY InvoiceNo DESC
LIMIT 100;
```

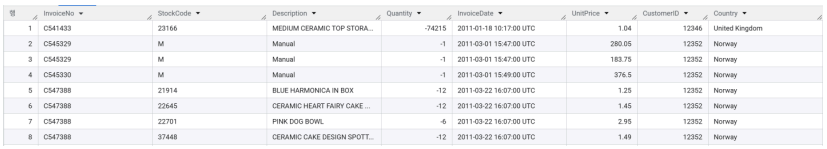
[결과 이미지를 넣어주세요]

행	InvoiceNo
1	C581569
2	C581568
3	C581499
4	C581490
5	C581484
6	C581470
7	C581468
8	C581466
9	C581465

- **`InvoiceNo` 가 'C'로 시작하는 행을 필터링 할 수 있는 쿼리문을 작성하기 (100행까지만 출력)**

```
SELECT *
FROM `kinetic-magnet-470205-h1.modulabs_project.data`
WHERE InvoiceNo LIKE 'C%'
LIMIT 100;
```

[결과 이미지를 넣어주세요]

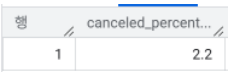


행	InvoiceNo	StockCode	Description	Quantity	InvoiceDate	UnitPrice	CustomerID	Country
1	C541433	23166	MEDIUM CERAMIC TOP STORA...	-74215	2011-01-18 10:17:00 UTC	1.04	12346	United Kingdom
2	C545329	M	Manual	-1	2011-03-01 15:47:00 UTC	280.05	12352	Norway
3	C545329	M	Manual	-1	2011-03-01 15:47:00 UTC	183.75	12352	Norway
4	C545330	M	Manual	-1	2011-03-01 15:49:00 UTC	376.5	12352	Norway
5	C547388	21914	BLUE HARMONICA IN BOX	-12	2011-03-22 16:07:00 UTC	1.25	12352	Norway
6	C547388	22645	CERAMIC HEART FAIRY CAKE ...	-12	2011-03-22 16:07:00 UTC	1.45	12352	Norway
7	C547388	22701	PINK DOG BOWL	-6	2011-03-22 16:07:00 UTC	2.95	12352	Norway
8	C547388	37448	CERAMIC CAKE DESIGN SPOTT...	-12	2011-03-22 16:07:00 UTC	1.49	12352	Norway

- **구매 건 상태가 `Canceled` 인 데이터의 비율(%) - 소수점 첫번째 자리까지**

```
SELECT
  ROUND(
    SUM(CASE WHEN InvoiceNo LIKE 'C%' THEN 1 ELSE 0 END) / COUNT(*) * 100,
    1
  ) AS canceled_percentage
FROM `kinetic-magnet-470205-h1.modulabs_project.data`;
```

[결과 이미지를 넣어주세요]



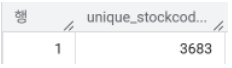
행	canceled_percent...
1	2.2

`StockCode` 살펴보기

- **고유한 `StockCode` 의 개수를 출력하기**

```
SELECT COUNT(DISTINCT StockCode) AS unique_stockcode_count
FROM `kinetic-magnet-470205-h1.modulabs_project.data`;
```

[결과 이미지를 넣어주세요]



행	unique_stockcod...
1	3683

- **어떤 제품이 가장 많이 판매되었는지 보기 위하여 `StockCode` 별 등장 빈도를 출력하기**
  - 상위 10개의 제품들을 출력하기

```
SELECT StockCode, COUNT(*) AS sell_cnt
FROM `kinetic-magnet-470205-h1.modulabs_project.data`
GROUP BY StockCode
ORDER BY sell_cnt DESC
LIMIT 10;
```

[결과 이미지를 넣어주세요]

행	StockCode	sell_cnt
1	22423	1894
2	85099B	1659
3	47566	1409
4	84879	1405
5	20725	1346
6	22720	1224
7	POST	1196
8	22197	1110
9	23203	1108
10	20727	1099

- **`StockCode`의 컬럼에 있던 값 중에서 숫자를 제외한 문자만 남기고 문자가 몇 자리 수 인지 세고**
  - **숫자가 0~1개인 값**들에는 어떤 코드들이 들어가 있는지 출력하기

```
SELECT DISTINCT StockCode, number_count
FROM (
  SELECT StockCode,
    LENGTH(StockCode) - LENGTH(REGEXP_REPLACE(StockCode, r'[0-9]', '')) AS number_count
  FROM project_name.modulabs_project.data
)
WHERE number_count <= 1;
```

[결과 이미지를 넣어주세요]

행	StockCode	number_count
1	POST	0
2	M	0
3	C2	1
4	D	0
5	BANK CHARGES	0
6	PADS	0
7	DOT	0
8	CRUK	0

- **`StockCode`의 컬럼에 있던 값 중에서 숫자를 제외한 문자만 남기고 문자가 몇 자리 수 인지 세고**
  - **숫자가 0~1개인 값들을 가지고 있는 데이터 수는 전체 데이터 수 대비 몇 퍼센트**인지 구하기 (소수점 두 번째 자리까지)

```
SELECT ROUND(SUM(CASE WHEN number_count < 5 THEN 1 ELSE 0 END) / COUNT(*) * 100, 2)
FROM (
  SELECT StockCode,
    LENGTH(StockCode) - LENGTH(REGEXP_REPLACE(StockCode, r'[0-9]', '')) AS number_count
  FROM project_name.modulabs_project.data
);
```

[결과 이미지를 넣어주세요]

행	f0_
1	0.48

- **제품과 관련되지 않은 거래 기록을 제거하기**

```
DELETE FROM project_name.modulabs_project.data
WHERE StockCode IN (
  SELECT DISTINCT StockCode
  FROM (
```

```
    SELECT
      StockCode,
      LENGTH(StockCode) - LENGTH(REGEXP_REPLACE(StockCode, r'[0-9]', '')) AS number_count
    FROM project_name.modulabs_project.data
  )
  WHERE number_count <= 1
);
```

[결과 이미지를 넣어주세요]

Description 살펴보기

- **고유한 Description 별 출현 빈도를 계산하고 상위 30개를 출력하기**

```
SELECT Description, COUNT(*) AS description_cnt
FROM project_name.modulabs_project.data
GROUP BY Description
ORDER BY description_cnt DESC
LIMIT 30;
```

[결과 이미지를 넣어주세요]

행	Description	description_cnt
1	WHITE HANGING HEART T-LIG...	2058
2	REGENCY CAKESTAND 3 TIER	1894
3	JUMBO BAG RED RETROSPOT	1659
4	PARTY BUNTING	1409
5	ASSORTED COLOUR BIRD ORN...	1405
6	LUNCH BAG RED RETROSPOT	1345
7	SET OF 3 CAKE TINS PANTRY D...	1224
8	LUNCH BAG BLACK SKULL.	1099
9	PACK OF 72 RETROSPOT CAKE ...	1062

- **서비스 관련 정보를 포함하는 행들을 제거하기**

```
DELETE
FROM project_name.modulabs_project.data
WHERE
  UPPER(Description) LIKE '%SERVICE%'
  OR UPPER(Description) LIKE '%POSTAGE%'
  OR UPPER(Description) LIKE '%CARRIAGE%'
  OR UPPER(Description) LIKE '%MANUAL%';
```

[결과 이미지를 넣어주세요]

- **대소문자를 혼합하고 있는 데이터를 대문자로 표준화 하기**

```
CREATE OR REPLACE TABLE project_name.modulabs_project.data AS
SELECT
  * EXCEPT (Description),
  UPPER(Description) AS Description
FROM project_name.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

`UnitPrice` 살펴보기

- `UnitPrice`의 최솟값, 최댓값, 평균을 구하기

```
SELECT
  MIN(UnitPrice) AS min_price,
  MAX(UnitPrice) AS max_price,
  AVG(UnitPrice) AS avg_price
FROM project_name.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

행	min_price	max_price	avg_price
1	0.0	649.5	2.904346891323...

- 단가가 0원인 거래의 개수, 구매 수량(`Quantity`)의 최솟값, 최댓값, 평균 구하기

```
SELECT
  COUNT(*) AS cnt_quantity,
  MIN(Quantity) AS min_quantity,
  MAX(Quantity) AS max_quantity,
  AVG(Quantity) AS avg_quantity
FROM project_name.modulabs_project.data
WHERE UnitPrice = 0;
```

[결과 이미지를 넣어주세요]

행	cnt_quantity	min_quantity	max_quantity	avg_quantity
1	33	1	12540	420.5151515151...

- `UnitPrice = 0`를 제거하고 일관된 데이터셋을 유지하기

```
CREATE OR REPLACE TABLE project_name.modulabs_project.data AS
SELECT *
FROM project_name.modulabs_project.data
WHERE UnitPrice <> 0;
```

[결과 이미지를 넣어주세요]

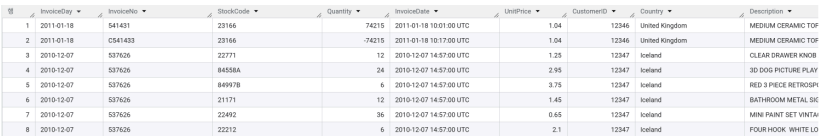
11-7. RFM 스코어

Recency

- `InvoiceDate` 컬럼을 연월일 자료형으로 변경하기

```
SELECT
  DATE(InvoiceDate) AS InvoiceDay,
  *
FROM project_name.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

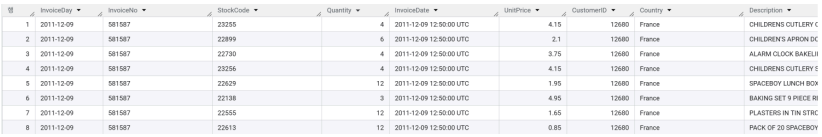


행	InvoiceDay	InvoiceNo	StockCode	Quantity	InvoiceDate	UnitPrice	CustomerID	Country	Description
1	2011-01-18	541431	23166	74215	2011-01-18 10:01:00 UTC	1.04	12346	United Kingdom	MEDIUM CERAMIC TOF
2	2011-01-18	C541433	23166	-74215	2011-01-18 10:17:00 UTC	1.04	12346	United Kingdom	MEDIUM CERAMIC TOF
3	2010-12-07	537626	22771	12	2010-12-07 14:57:00 UTC	1.25	12347	Iceland	CLEAR DRAWER KNOB
4	2010-12-07	537626	84558A	24	2010-12-07 14:57:00 UTC	2.95	12347	Iceland	3D DOG PICTURE PLAY
5	2010-12-07	537626	84997B	6	2010-12-07 14:57:00 UTC	3.75	12347	Iceland	RED 3 PIECE RETROSP
6	2010-12-07	537626	21171	12	2010-12-07 14:57:00 UTC	1.45	12347	Iceland	BATHROOM METAL SIG
7	2010-12-07	537626	22492	36	2010-12-07 14:57:00 UTC	0.65	12347	Iceland	MINI PAINT SET VINTA
8	2010-12-07	537626	22212	6	2010-12-07 14:57:00 UTC	2.1	12347	Iceland	FOUR HOOK WHITE LO

- **가장 최근 구매 일자를 MAX() 함수로 찾아보기**

```
SELECT
  DATE(InvoiceDate) AS InvoiceDay,
  *
FROM project_name.modulabs_project.data
QUALIFY InvoiceDate = MAX(InvoiceDate) OVER();
```

[결과 이미지를 넣어주세요]



행	InvoiceDay	InvoiceNo	StockCode	Quantity	InvoiceDate	UnitPrice	CustomerID	Country	Description
1	2011-12-09	581587	23255	4	2011-12-09 12:50:00 UTC	4.15	12680	France	CHILDRENS CUTLERY C
2	2011-12-09	581587	22899	6	2011-12-09 12:50:00 UTC	2.1	12680	France	CHILDREN'S APRON DC
3	2011-12-09	581587	22730	4	2011-12-09 12:50:00 UTC	3.75	12680	France	ALARM CLOCK BAKELI
4	2011-12-09	581587	23256	4	2011-12-09 12:50:00 UTC	4.15	12680	France	CHILDRENS CUTLERY S
5	2011-12-09	581587	22629	12	2011-12-09 12:50:00 UTC	1.95	12680	France	SPACEBOY LUNCH BOX
6	2011-12-09	581587	22138	3	2011-12-09 12:50:00 UTC	4.95	12680	France	BAKING SET 9 PIECE RI
7	2011-12-09	581587	22555	12	2011-12-09 12:50:00 UTC	1.65	12680	France	PLASTERS IN TIN STRC
8	2011-12-09	581587	22613	12	2011-12-09 12:50:00 UTC	0.85	12680	France	PACK OF 20 SPACEBOY

- **유저 별로 가장 큰 InvoiceDay를 찾아서 가장 최근 구매일로 저장하기**

```
SELECT
    CustomerID,
    MAX(DATE(InvoiceDate)) AS InvoiceDay
FROM project_name.modulabs_project.data
GROUP BY CustomerID;
```

[결과 이미지를 넣어주세요]

행	CustomerID	InvoiceDay
1	12346	2011-01-18
2	12347	2011-12-07
3	12348	2011-09-25
4	12349	2011-11-21
5	12350	2011-02-02
6	12352	2011-11-03
7	12353	2011-05-19
8	12354	2011-04-21
9	12355	2011-05-09

- **가장 최근 일자(`most_recent_date`)와 유저별 마지막 구매일(`InvoiceDay`)간의 차이를 계산하기**

```
SELECT
  CustomerID,
  (MAX(InvoiceDay) OVER () - InvoiceDay) AS recency
FROM (
  SELECT
    CustomerID,
    MAX(DATE(InvoiceDate)) AS InvoiceDay
  FROM project_name.modulabs_project.data
  GROUP BY CustomerID
);
```

[결과 이미지를 넣어주세요]

행	CustomerID	recency
1	12398	0-0 45 0:0:0
2	12435	0-0 79 0:0:0
3	12437	0-0 1 0:0:0
4	12458	0-0 71 0:0:0
5	12713	0-0 0 0:0:0
6	12726	0-0 28 0:0:0
7	12885	0-0 63 0:0:0
8	13062	0-0 191 0:0:0
9	13194	0-0 135 0:0:0

- **최종 데이터 셋에 필요한 데이터들을 각각 정제해서 이어붙이고 지금까지의 결과를 `user_r` 이라는 이름의 테이블로 저장하기**

```
CREATE OR REPLACE TABLE project_name.modulabs_project.user_r AS
SELECT
  CustomerID,
  EXTRACT(DAY FROM MAX(InvoiceDay) OVER () - InvoiceDay) AS recency
FROM (
  SELECT
    CustomerID,
    MAX(DATE(InvoiceDate)) AS InvoiceDay
  FROM project_name.modulabs_project.data
  GROUP BY CustomerID
);
```

[결과 이미지를 넣어주세요]

Frequency

- **고객마다 고유한 InvoiceNo의 수를 세어보기**

```
SELECT
  CustomerID,
  COUNT(DISTINCT InvoiceNo) AS purchase_cnt
FROM project_name.modulabs_project.data
GROUP BY CustomerID;
```

[결과 이미지를 넣어주세요]

행	CustomerID	purchase_cnt
1	12346	2
2	12347	7
3	12348	4
4	12349	1
5	12350	1
6	12352	8
7	12353	1
8	12354	1
9	12355	1

- **각 고객 별로 구매한 아이템의 총 수량 더하기**

```
SELECT
  CustomerID,
  SUM(Quantity) AS item_cnt
FROM project_name.modulabs_project.data
GROUP BY CustomerID;
```

[결과 이미지를 넣어주세요]

행	CustomerID	item_cnt
1	12346	0
2	12347	2458
3	12348	2332
4	12349	630
5	12350	196
6	12352	463
7	12353	20
8	12354	530
9	12355	240

- **전체 거래 건수 계산와 구매한 아이템의 총 수량 계산의 결과를 합쳐서 `user_rf` 라는 이름의 테이블에 저장하기**

```
CREATE OR REPLACE TABLE project_name.modulabs_project.user_rf AS

-- (1) 전체 거래 건수 계산
WITH purchase_cnt AS (
  SELECT
    CustomerID,
    COUNT(DISTINCT InvoiceNo) AS purchase_cnt
  FROM project_name.modulabs_project.data
  GROUP BY CustomerID
),

-- (2) 구매한 아이템 총 수량 계산
item_cnt AS (
  SELECT
    CustomerID,
    SUM(Quantity) AS item_cnt
  FROM project_name.modulabs_project.data
  GROUP BY CustomerID
)

-- 기존의 user_r에 (1)과 (2)를 통합
SELECT
  pc.CustomerID,
  pc.purchase_cnt,
  ic.item_cnt,
  ur.recency
FROM purchase_cnt AS pc
JOIN item_cnt AS ic
  ON pc.CustomerID = ic.CustomerID
JOIN project_name.modulabs_project.user_r AS ur
  ON pc.CustomerID = ur.CustomerID;
```

[결과 이미지를 넣어주세요]

Monetary

- **고객별 총 지출액 계산 (소수점 첫째 자리에서 반올림)**

```
SELECT
  CustomerID,
  ROUND(SUM(Quantity * UnitPrice), 1) AS user_total
FROM project_name.modulabs_project.data
GROUP BY CustomerID;
```

[결과 이미지를 넣어주세요]

행	CustomerID	user_total
1	12346	0.0
2	12347	4310.0
3	12348	1437.2
4	12349	1457.6
5	12350	294.4
6	12352	1265.4
7	12353	89.0
8	12354	1079.4
9	12355	459.4

- **고객별 평균 거래 금액 계산**
  - **고객별 평균 거래 금액을 구하기 위해 1) `data` 테이블을 `user_rf` 테이블과 조인(LEFT JOIN) 한 후, 2) `purchase_cnt`로 나누어서 3) `user_rfm` 테이블로 저장하기**

```
CREATE OR REPLACE TABLE project_name.modulabs_project.user_rfm AS
SELECT
  rf.CustomerID AS CustomerID,
  rf.purchase_cnt,
  rf.item_cnt,
  rf.recency,
  ut.user_total,
  ROUND(ut.user_total / rf.purchase_cnt, 1) AS user_average
FROM project_name.modulabs_project.user_rf rf
LEFT JOIN (
  -- 고객 별 총 지출액
  SELECT
    CustomerID,
    SUM(Quantity * UnitPrice) AS user_total
  FROM project_name.modulabs_project.data
  GROUP BY CustomerID
) ut
ON rf.CustomerID = ut.CustomerID;
```

[결과 이미지를 넣어주세요]

RFM 통합 테이블 출력하기

- **최종 user_rfm 테이블을 출력하기**

```
SELECT *
FROM `kinetic-magnet-470205-h1.modulabs_project.user_rfm`;
```

[결과 이미지를 넣어주세요]

행	CustomerID	purchase_cnt	item_cnt	recency	user_total	user_average
1	12713	1	505	0	794.55	794.5
2	14569	1	79	1	227.39	227.4
3	15520	1	314	1	343.4999999999...	343.5
4	13298	1	96	1	360.0	360.0
5	13436	1	76	1	196.89	196.9
6	14204	1	72	2	150.61	150.6
7	15471	1	255	2	447.8300000000...	447.8
8	15195	1	1404	2	3861.0	3861.0
9	14578	1	240	3	168.6300000000...	168.6

11-8. 추가 Feature 추출

1. 구매하는 제품의 다양성

- **1) 고객 별로 구매한 상품들의 고유한 수를 계산하기**
  2) `user_rfm` **테이블과 결과를 합치기**
  3) `user_data` **라는 이름의 테이블에 저장하기**

```
CREATE OR REPLACE TABLE project_name.modulabs_project.user_data AS
WITH unique_products AS (
  SELECT
    CustomerID,
    COUNT(DISTINCT StockCode) AS unique_products
  FROM project_name.modulabs_project.data
  GROUP BY CustomerID
)
SELECT ur.*, up.* EXCEPT (CustomerID)
FROM project_name.modulabs_project.user_rfm AS ur
JOIN unique_products AS up
ON ur.CustomerID = up.CustomerID;
```

[결과 이미지를 넣어주세요]

2. 평균 구매 주기

- **고객들의 쇼핑 패턴을 이해하는 것을 목표 (고객 별 재방문 주기 살펴보기)**
  - **균 구매 소요 일수를 계산하고, 그 결과를** `user_data` **에 통합**

```
CREATE OR REPLACE TABLE project_name.modulabs_project.user_data AS
WITH purchase_intervals AS (
  -- (2) 고객 별 구매와 구매 사이의 평균 소요 일수
  SELECT
    CustomerID,
    CASE WHEN ROUND(AVG(interval_), 2) IS NULL THEN 0 ELSE ROUND(AVG(interval_), 2) END AS average_interval
  FROM (
    -- (1) 구매와 구매 사이에 소요된 일수
    SELECT
      CustomerID,
      DATE_DIFF(InvoiceDate, LAG(InvoiceDate) OVER (PARTITION BY CustomerID ORDER BY InvoiceDate), DAY) AS interval_
    FROM
      project_name.modulabs_project.data
    WHERE CustomerID IS NOT NULL
  )
  GROUP BY CustomerID
)

SELECT u.*, pi.* EXCEPT (CustomerID)
FROM project_name.modulabs_project.user_data AS u
LEFT JOIN purchase_intervals AS pi
ON u.CustomerID = pi.CustomerID;
```

[결과 이미지를 넣어주세요]

3. 구매 취소 경향성

- **고객의 취소 패턴 파악하기**
  1) 취소 빈도(cancel_frequency) : 고객 별로 취소한 거래의 총 횟수
  2) 취소 비율(cancel_rate) : 각 고객이 한 모든 거래 중에서 취소를 한 거래의 비율

- **취소 빈도와 취소 비율을 계산하고 그 결과를 `user_data` 에 통합하기**
  (취소 비율은 소수점 두번째 자리)

```
CREATE OR REPLACE TABLE project_name.modulabs_project.user_data AS

WITH TransactionInfo AS (
  SELECT
    CustomerID,
    COUNT(DISTINCT InvoiceNo) AS total_transactions,
    COUNT(DISTINCT IF(UPPER(InvoiceNo) LIKE 'C%', InvoiceNo, NULL)) AS cancel_frequency
  FROM project_name.modulabs_project.data
  GROUP BY CustomerID
)

SELECT
  u.*,
  t.* EXCEPT(CustomerID),
  ROUND(SAFE_DIVIDE(t.cancel_frequency, t.total_transactions), 2) AS cancel_rate
FROM `project_name.modulabs_project.user_data` AS u
LEFT JOIN TransactionInfo AS t
ON u.CustomerID = t.CustomerID;
```

[결과 이미지를 넣어주세요]

- **다양한 컬럼들을 활용하여 고객의 구매 패턴과 선호도를 보다 심층적으로 이해할 수 있도록 최종적으로 `user_data` 를 출력하기**

```
SELECT *
FROM `kinetic-magnet-470205-h1.modulabs_project.user_data`;
```

[결과 이미지를 넣어주세요]

행	CustomerID	purchase_cnt	item_cnt	recency	user_total	user_average	unique_products	average_interval	total_transactions	cancel_frequency	cancel_rate
1	15668	1	72	217	76.32000000000...	76.3	1	0.0	1	0	0.0
2	13135	1	4300	196	3096.0	3096.0	1	0.0	1	0	0.0
3	16754	1	4280	372	2002.4	2002.4	2	0.0	1	0	0.0
4	14185	1	6	331	197.65	197.7	3	0.0	1	0	0.0
5	16387	1	44	322	94.36	94.4	4	0.0	1	0	0.0
6	14196	1	142	106	335.52	335.5	6	0.0	1	0	0.0
7	15256	1	55	148	98.45	98.5	6	0.0	1	0	0.0
8	14059	1	128	266	183.599999999...	183.6	8	0.0	1	0	0.0

회고

[회고 내용을 작성해주세요]

Keep :

Problem :

Try :