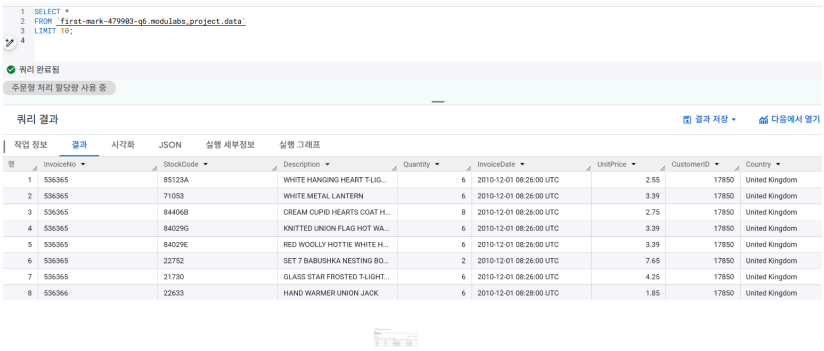
고객을 세그먼테이션하자 [프로젝트] - 조아영

11-2. 데이터 불러오기

데이터 살펴보기

- **테이블에 있는 10개의 행만 출력하기**

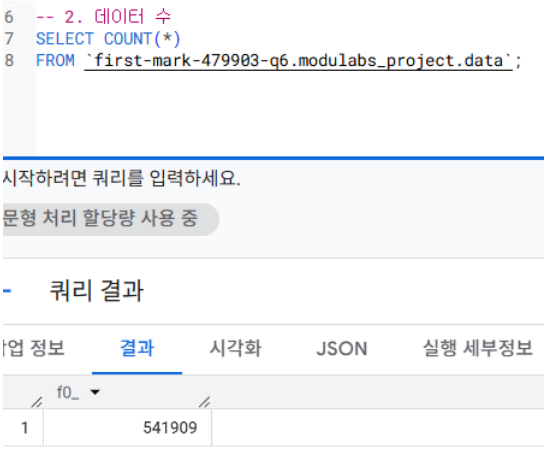
```
SELECT *
FROM `first-mark-479903-q6.modulabs_project.data`
LIMIT 10;
```



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

- **전체 데이터는 몇 행으로 구성되어 있는지 확인하기**

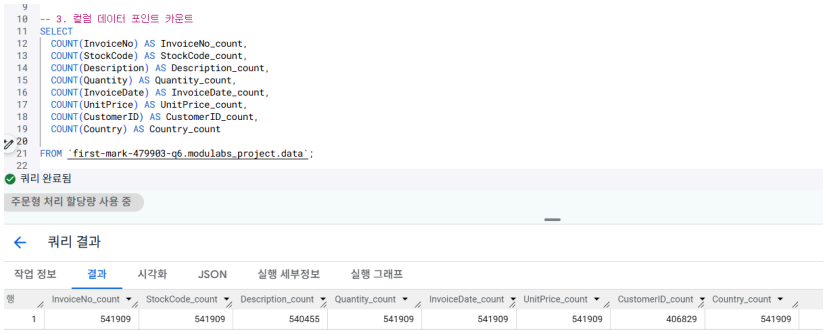
```
SELECT COUNT(*)
FROM `first-mark-479903-q6.modulabs_project.data`;
```



데이터 수 세기

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

```
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 `first-mark-479903-q6.modulabs_project.data`;# [[YOUR QUERY]]
```



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**

```
SELECT
   'InvoiceNo' AS column_name,
   ROUND(
      SUM(CASE WHEN InvoiceNo IS NULL THEN 1 ELSE 0 END) / COUNT(*) * 100,
      2
   ) AS missing_percentage
FROM `first-mark-479903-q6.modulabs_project.data`

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 `first-mark-479903-q6.modulabs_project.data`

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 `first-mark-479903-q6.modulabs_project.data`

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 `first-mark-479903-q6.modulabs_project.data`

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 `first-mark-479903-q6.modulabs_project.data`

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 `first-mark-479903-q6.modulabs_project.data`

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 `first-mark-479903-q6.modulabs_project.data`

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 `first-mark-479903-q6.modulabs_project.data`;
```

결측치 처리 전략

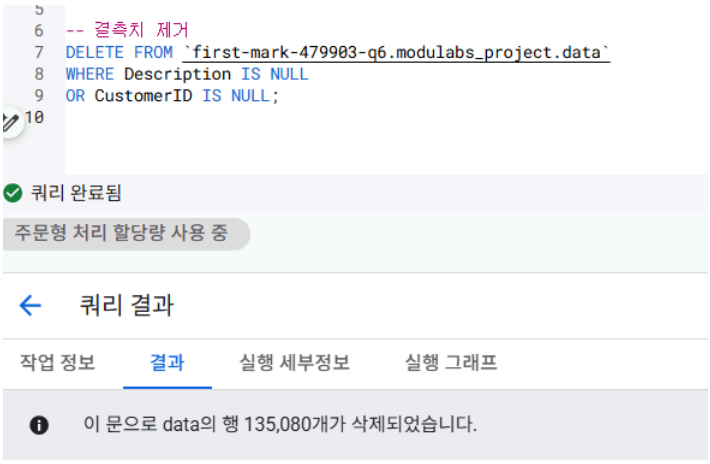
- `StockCode = '85123A'` 의 `Description` 을 추출하는 쿼리문을 작성하기

```
SELECT Description
FROM `first-mark-479903-q6.modulabs_project.data`
WHERE StockCode = '85123A';
```

결측치 처리

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

```
DELETE FROM `first-mark-479903-q6.modulabs_project.data`
WHERE Description IS NULL
OR CustomerID IS NULL;
```

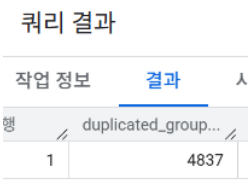


11-5. 데이터 전처리(2): 중복값 처리

중복값 확인

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

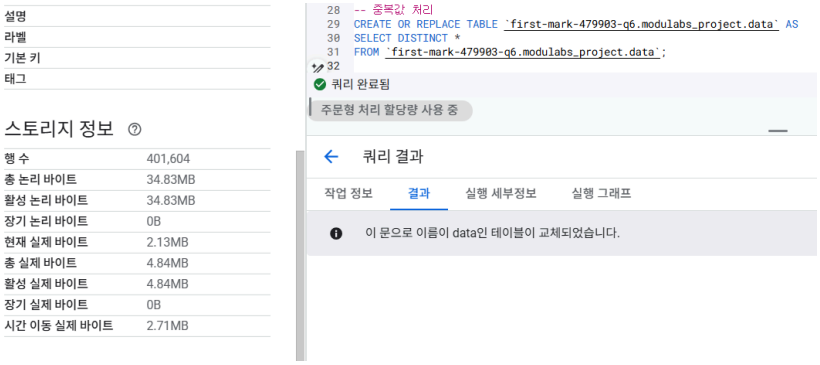
```
SELECT
  COUNT(*) AS duplicated_group_count
FROM (
    SELECT
        InvoiceNo,
        StockCode,
        Description,
        Quantity,
        InvoiceDate,
        UnitPrice,
        CustomerID,
        Country,
        COUNT(*) AS cnt
    FROM `first-mark-479903-q6.modulabs_project.data`
    GROUP BY
        InvoiceNo,
        StockCode,
        Description,
        Quantity,
        InvoiceDate,
        UnitPrice,
        CustomerID,
        Country
    HAVING COUNT(*) > 1
);
```



중복값 처리

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

```
CREATE OR REPLACE TABLE `first-mark-479903-q6.modulabs_project.data` AS
SELECT DISTINCT *
FROM `first-mark-479903-q6.modulabs_project.data`;
```

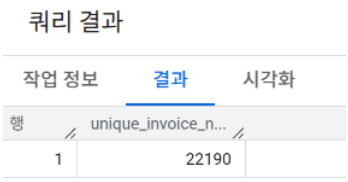


11-6. 데이터 전처리(3): 오류값 처리

InvoiceNo 살펴보기

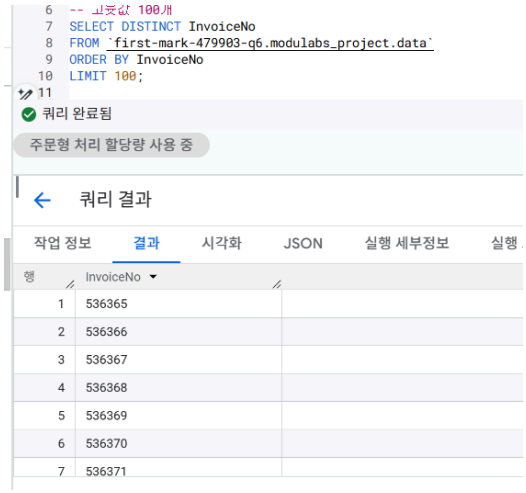
- **고유(unique)한 InvoiceNo의 개수를 출력하기**

```
SELECT
   COUNT(DISTINCT InvoiceNo) AS unique_invoice_no_count
FROM `first-mark-479903-q6.modulabs_project.data`;
```



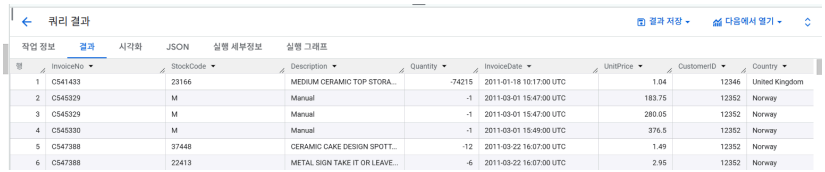
- **고유한 InvoiceNo를 앞에서부터 100개를 출력하기**

```
SELECT DISTINCT InvoiceNo
FROM `first-mark-479903-q6.modulabs_project.data`
ORDER BY InvoiceNo
LIMIT 100;
```



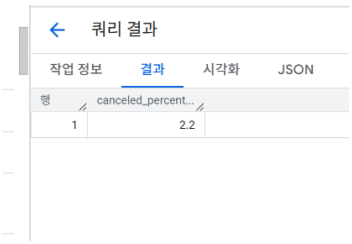
- `InvoiceNo`가 'C'로 시작하는 행을 필터링 할 수 있는 쿼리문을 작성하기 (100행까지만 출력)

```
SELECT *
FROM `first-mark-479903-q6.modulabs_project.data`
WHERE InvoiceNo LIKE 'C%'
LIMIT 100;
```



- 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 `first-mark-479903-q6.modulabs_project.data`;
```



`StockCode` 살펴보기

- 고유한 `StockCode`의 개수를 출력하기

```
-- StockCode 개수
SELECT
   COUNT(DISTINCT StockCode) AS unique_stockcode_count
FROM `first-mark-479903-q6.modulabs_project.data`;
```

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

```
SELECT StockCode, COUNT(*) AS sell_cnt
FROM `first-mark-479903-q6.modulabs_project.data`
GROUP BY StockCode
ORDER BY sell_cnt DESC
LIMIT 10;
```

- **`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 `first-mark-479903-q6.modulabs_project.data`
)
WHERE number_count <= 1;
```

- `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 DISTINCT StockCode, number_count
FROM (
 SELECT
  StockCode,
  LENGTH(StockCode) - LENGTH(REGEXP_REPLACE(StockCode, r'[0-9]', '')) AS number_count
 FROM `first-mark-479903-q6.modulabs_project.data`
)
WHERE number_count <= 1;
```

- **제품과 관련되지 않은 거래 기록을 제거하기**

```
DELETE FROM `first-mark-479903-q6.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 `first-mark-479903-q6.modulabs_project.data`
 )
 WHERE number_count <= 1
);
```

Description 살펴보기

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

```
SELECT Description, COUNT(*) AS description_cnt
FROM `first-mark-479903-q6.modulabs_project.data`
GROUP BY Description
ORDER BY description_cnt DESC
LIMIT 30;
```

```sql
-- 고유한 Description 별 출현 빈도를 계산하고 상위 30개를 출력하기
SELECT Description, COUNT(*) AS description_cnt
FROM `first-mark-479903-q6.modulabs_project.data`
GROUP BY Description
ORDER BY description_cnt DESC
LIMIT 30;
```

쿼리 완료됨

주문형 처리 할당량 사용 중

쿼리 결과

작업 정보 | 결과 | 시각화 | JSON | 실행 세부정보 | 실행 그래프

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

- **서비스 관련 정보를 포함하는 행들을 제거하기**

```sql
DELETE
FROM `first-mark-479903-q6.modulabs_project.data`
WHERE
    Description LIKE '%POST%'
  OR Description LIKE '%BANK%'
  OR Description LIKE '%CHARGE%'
  OR Description LIKE '%CARRIAGE%'
  OR Description LIKE '%ADJUST%'
  OR Description LIKE '%SAMPLE%'
  OR Description LIKE '%CHECK%';
```

```sql
-- 서비스 관련 정보를 포함하는 행들을 제거하기
DELETE
FROM `first-mark-479903-q6.modulabs_project.data`
WHERE
    Description LIKE '%POST%'
  OR Description LIKE '%BANK%'
  OR Description LIKE '%CHARGE%'
  OR Description LIKE '%CARRIAGE%'
  OR Description LIKE '%ADJUST%'
  OR Description LIKE '%SAMPLE%'
  OR Description LIKE '%CHECK%';
```

쿼리 완료됨

주문형 처리 할당량 사용 중

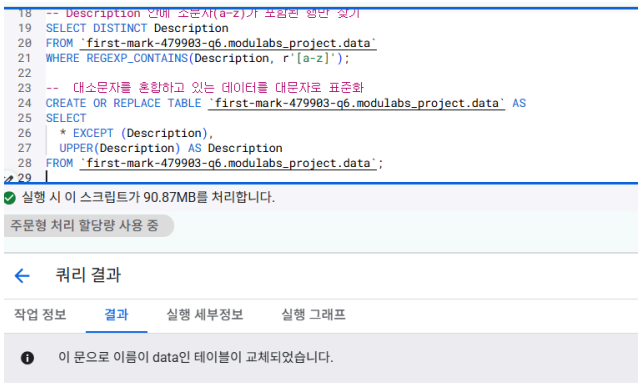
쿼리 결과

작업 정보 | 결과 | 실행 세부정보 | 실행 그래프

이 문으로 data의 행 1,992개가 삭제되었습니다.

- **대소문자를 혼합하고 있는 데이터를 대문자로 표준화 하기**

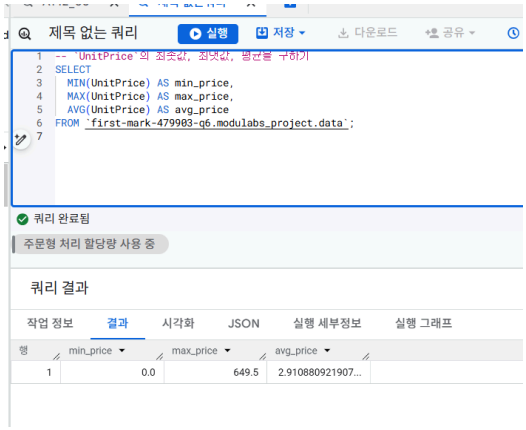
```
CREATE OR REPLACE TABLE `first-mark-479903-q6.modulabs_project.data` AS
SELECT
 * EXCEPT (Description),
 UPPER(Description) AS Description
FROM `first-mark-479903-q6.modulabs_project.data`;
```



UnitPrice 살펴보기

- **UnitPrice의 최솟값, 최댓값, 평균을 구하기**

```
SELECT
  MIN(UnitPrice) AS min_price,
  MAX(UnitPrice) AS max_price,
  AVG(UnitPrice) AS avg_price
FROM `first-mark-479903-q6.modulabs_project.data`;
```



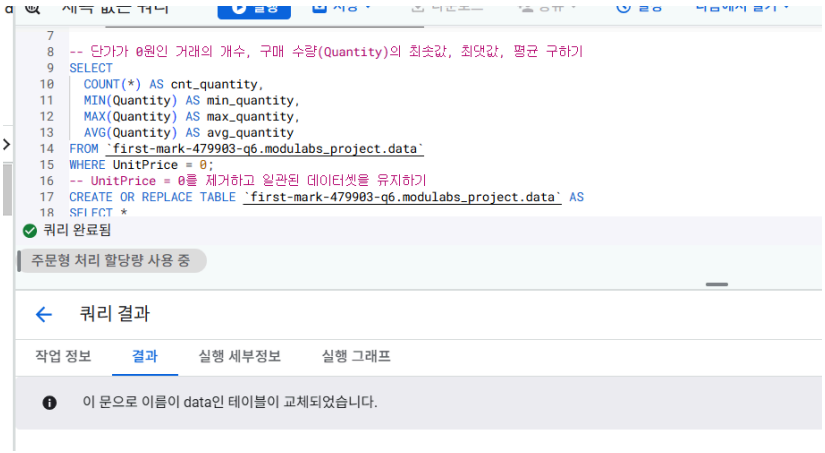
- **단가가 0원인 거래의 개수, 구매 수량(Quantity)의 최솟값, 최댓값, 평균 구하기**

```
SELECT
  COUNT(*) AS cnt_quantity,
```

```
  MIN(Quantity) AS min_quantity,
  MAX(Quantity) AS max_quantity,
  AVG(Quantity) AS avg_quantity
FROM `first-mark-479903-q6.modulabs_project.data`
WHERE UnitPrice = 0;
```

- `UnitPrice = 0` **를 제거하고 일관된 데이터셋을 유지하기**

```
CREATE OR REPLACE TABLE `first-mark-479903-q6.modulabs_project.data` AS
SELECT *
FROM `first-mark-479903-q6.modulabs_project.data`
WHERE UnitPrice != 0;
```

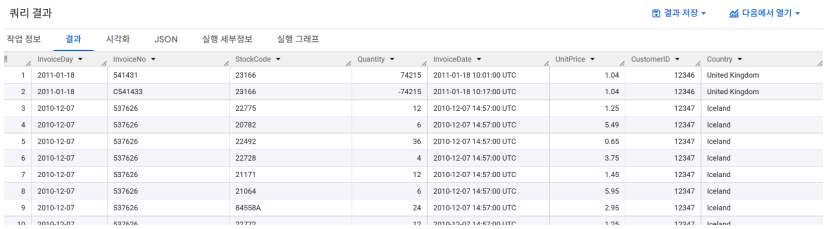


11-7. RFM 스코어

Recency

- `InvoiceDate` **컬럼을 연월일 자료형으로 변경하기**

```
SELECT
  DATE(InvoiceDate) AS InvoiceDay,
  *
FROM `first-mark-479903-q6.modulabs_project.data`;
```



	InvoiceDay	InvoiceNo	StockCode	Quantity	InvoiceDate	UnitPrice	CustomerID	Country
1	2011-01-18	541431	23166	74215	2011-01-18 10:01:00 UTC	1.04	12346	United Kingdom
2	2011-01-18	C541433	23166	-74215	2011-01-18 10:17:00 UTC	1.04	12346	United Kingdom
3	2010-12-07	537626	22775	12	2010-12-07 14:57:00 UTC	1.25	12347	Iceland
4	2010-12-07	537626	20782	6	2010-12-07 14:57:00 UTC	5.49	12347	Iceland
5	2010-12-07	537626	22492	36	2010-12-07 14:57:00 UTC	0.65	12347	Iceland
6	2010-12-07	537626	22728	4	2010-12-07 14:57:00 UTC	3.75	12347	Iceland
7	2010-12-07	537626	21171	12	2010-12-07 14:57:00 UTC	1.45	12347	Iceland
8	2010-12-07	537626	21064	6	2010-12-07 14:57:00 UTC	5.95	12347	Iceland
9	2010-12-07	537626	84558A	24	2010-12-07 14:57:00 UTC	2.95	12347	Iceland

- **가장 최근 구매 일자를 MAX() 함수로 찾아보기**

```
SELECT
  MAX(InvoiceDate) OVER () AS most_recent_date,
  DATE(InvoiceDate) AS InvoiceDay,
  *
FROM `first-mark-479903-q6.modulabs_project.data`;
```

행	most_recent_date	InvoiceDay	InvoiceNo	StockCode	Quantity	InvoiceDate
1	2011-12-09 12:50:00 UTC	2011-01-18	541431	23166	74215	2011-01-18 10:0
2	2011-12-09 12:50:00 UTC	2011-01-18	C541433	23166	-74215	2011-01-18 10:1
3	2011-12-09 12:50:00 UTC	2010-12-07	537626	22775	12	2010-12-07 14:5
4	2011-12-09 12:50:00 UTC	2010-12-07	537626	20782	6	2010-12-07 14:5
5	2011-12-09 12:50:00 UTC	2010-12-07	537626	22492	36	2010-12-07 14:5
6	2011-12-09 12:50:00 UTC	2010-12-07	537626	22728	4	2010-12-07 14:5
7	2011-12-09 12:50:00 UTC	2010-12-07	537626	21171	12	2010-12-07 14:5

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

```
SELECT
    CustomerID,
    # [[YOUR QUERY]] AS InvoiceDay
FROM project_name.modulabs_project.data
# [[YOUR QUERY]];
```

```
14  -- 유저 별로 가장 큰 InvoiceDay를 찾아서 가장 최근 구매일로 저장하
15  SELECT
16      CustomerID,
17      MAX(DATE(InvoiceDate)) AS InvoiceDay
18  FROM `first-mark-479903-q6.modulabs_project.data`
```

쿼리 완료됨

주문형 처리 할당량 사용 중

쿼리 결과

작업 정보 | 결과 | 시각화 | JSON | 실행 세부정보 | 실행

행	CustomerID	InvoiceDay
1	12346	2011-01-18
2	12347	2011-12-07
3	12348	2011-09-25
4	12349	2011-11-21

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

```
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
);
```

쿼리 결과

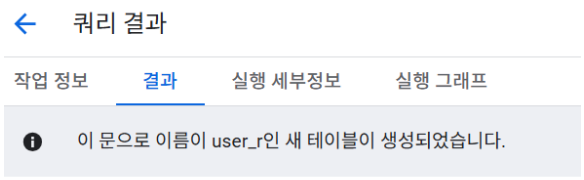
작업 정보 | 결과 | 시각화 | JSON | 실

	CustomerID	recency
1	12609	78
2	12716	3
3	12744	56
4	12906	11
5	12956	306
6	13130	94
7	13261	268

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

```
CREATE OR REPLACE TABLE `first-mark-479903-q6.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 `first-mark-479903-q6.modulabs_project.data`
```

```
  GROUP BY CustomerID
);
```



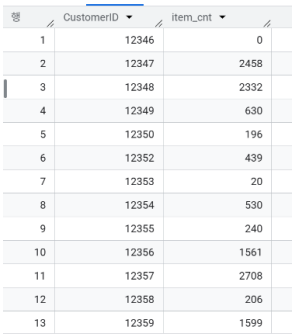
Frequency

- **고객마다 고유한 InvoiceNo의 수를 세어보기**

```
SELECT
  CustomerID,
  COUNT(DISTINCT InvoiceNo) AS purchase_cnt
FROM `first-mark-479903-q6.modulabs_project.data`
GROUP BY CustomerID;
```

- **각 고객 별로 구매한 아이템의 총 수량 더하기**

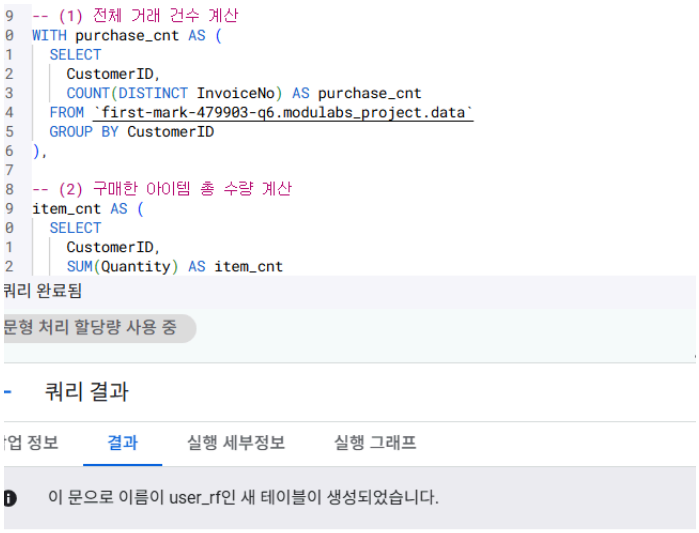
```
SELECT
  CustomerID,
  SUM(Quantity) AS item_cnt
FROM `first-mark-479903-q6.modulabs_project.data`
GROUP BY CustomerID;
```



행	CustomerID	item_cnt
1	12346	0
2	12347	2458
3	12348	2332
4	12349	630
5	12350	196
6	12352	439
7	12353	20
8	12354	530
9	12355	240
10	12356	1561
11	12357	2708
12	12358	206
13	12359	1599

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

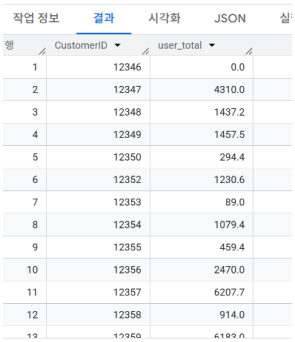
```
CREATE OR REPLACE TABLE `first-mark-479903-q6.modulabs_project.user_rf` AS

-- (1) 전체 거래 건수 계산
WITH purchase_cnt AS (
  SELECT
    CustomerID,
    COUNT(DISTINCT InvoiceNo) AS purchase_cnt
  FROM `first-mark-479903-q6.modulabs_project.data`
  GROUP BY CustomerID
),

-- (2) 구매한 아이템 총 수량 계산
item_cnt AS (
  SELECT
    CustomerID,
    SUM(Quantity) AS item_cnt
  FROM `first-mark-479903-q6.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 `first-mark-479903-q6.modulabs_project.user_r` AS ur
  ON pc.CustomerID = ur.CustomerID;
```



Monetary

- **고객별 총 지출액 계산 (소수점 첫째 자리에서 반올림)**

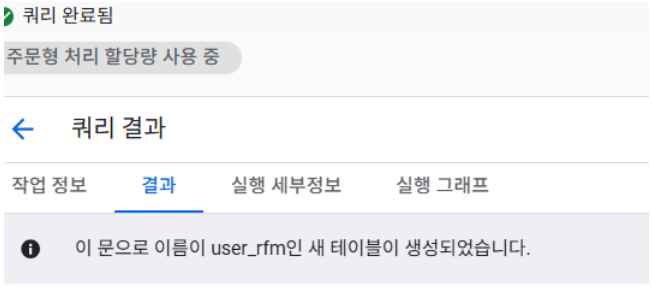
```
SELECT
  CustomerID,
  ROUND(SUM(Quantity * UnitPrice), 1) AS user_total
FROM `first-mark-479903-q6.modulabs_project.data`
GROUP BY CustomerID;
```



- **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 `first-mark-479903-q6.modulabs_project.user_rfm` AS
SELECT
  rf.CustomerID AS CustomerID,
  rf.purchase_cnt,
  rf.item_cnt,
```

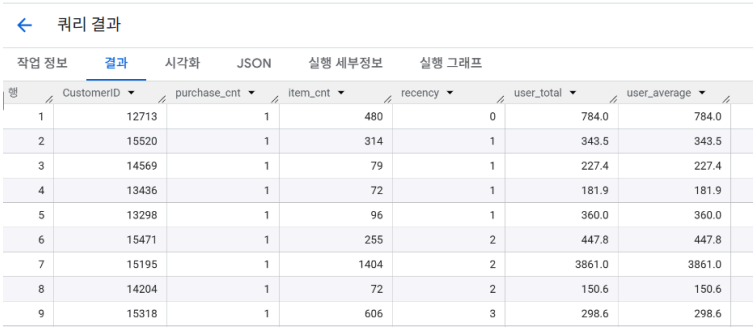
```
  rf.recency,
  ut.user_total,
  ut.user_total / rf.purchase_cnt AS user_average
FROM `first-mark-479903-q6.modulabs_project.user_rf` rf
LEFT JOIN (
  -- 고객 별 총 지출액
  SELECT
    CustomerID,
    ROUND(SUM(Quantity * UnitPrice), 1) AS user_total
  FROM `first-mark-479903-q6.modulabs_project.data`
  GROUP BY CustomerID
) ut
ON rf.CustomerID = ut.CustomerID;
```



RFM 통합 테이블 출력하기

- **최종 user_rfm 테이블을 출력하기**

```
SELECT *
FROM `first-mark-479903-q6.modulabs_project.user_rfm`;
```



행	CustomerID	purchase_cnt	item_cnt	recency	user_total	user_average
1	12713	1	480	0	784.0	784.0
2	15520	1	314	1	343.5	343.5
3	14569	1	79	1	227.4	227.4
4	13436	1	72	1	181.9	181.9
5	13298	1	96	1	360.0	360.0
6	15471	1	255	2	447.8	447.8
7	15195	1	1404	2	3861.0	3861.0
8	14204	1	72	2	150.6	150.6
9	15318	1	606	3	298.6	298.6

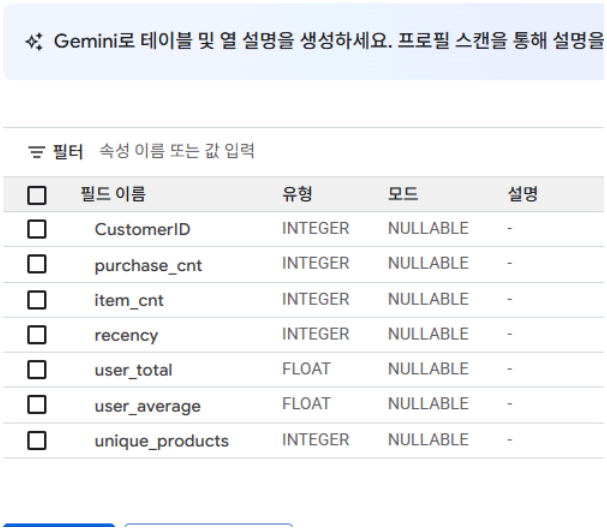
11-8. 추가 Feature 추출

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 `first-mark-479903-q6.modulabs_project.user_data` AS
WITH unique_products AS (
  SELECT
    CustomerID,
    COUNT(DISTINCT StockCode) AS unique_products
  FROM `first-mark-479903-q6.modulabs_project.data`
  GROUP BY CustomerID
)
SELECT
  ur.*,
  up.* EXCEPT (CustomerID)
FROM `first-mark-479903-q6.modulabs_project.user_rfm` AS ur
JOIN unique_products AS up
ON ur.CustomerID = up.CustomerID;
```

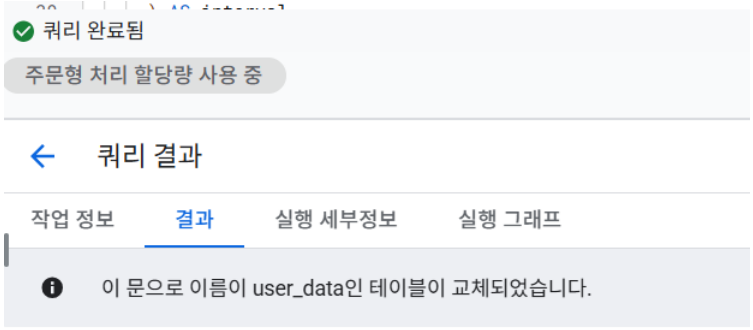


2. 평균 구매 주기

- **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 `first-mark-479903-q6.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(
```

```
      DATE(InvoiceDate),
      LAG(DATE(InvoiceDate)) OVER (PARTITION BY CustomerID ORDER BY InvoiceDate),
      DAY
    ) AS interval_
  FROM
    `first-mark-479903-q6.modulabs_project.data`
  WHERE CustomerID IS NOT NULL
 )
 GROUP BY CustomerID
)

SELECT
 u.*,
 pi.* EXCEPT (CustomerID)
FROM `first-mark-479903-q6.modulabs_project.user_data` AS u
LEFT JOIN purchase_intervals AS pi
ON u.CustomerID = pi.CustomerID;
```

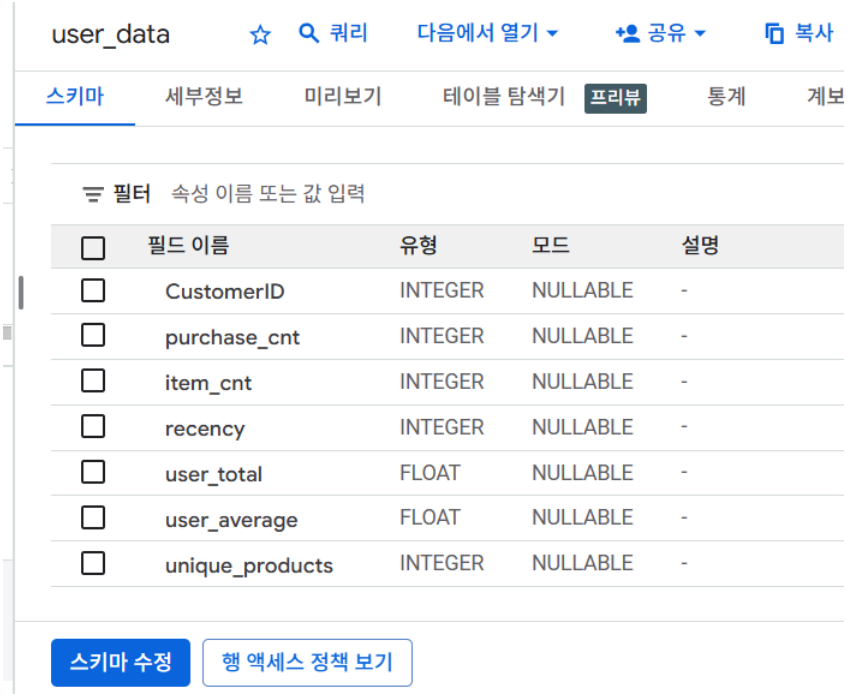


3. 구매 취소 경향성

- **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)

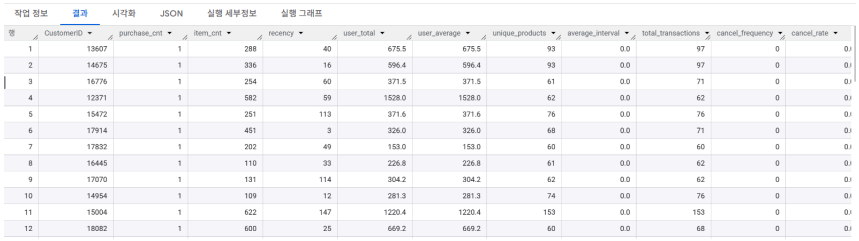
```
CREATE OR REPLACE TABLE `first-mark-479903-q6.modulabs_project.user_data` AS

WITH TransactionInfo AS (
 SELECT
  CustomerID,
  COUNT(*) AS total_transactions,
  SUM(CASE WHEN InvoiceNo LIKE 'C%' THEN 1 ELSE 0 END) AS cancel_frequency
 FROM `first-mark-479903-q6.modulabs_project.data`
 GROUP BY CustomerID
)

SELECT
 u.*,
 t.* EXCEPT (CustomerID),
```

```
  ROUND(
    IFNULL(t.cancel_frequency, 0) / NULLIF(t.total_transactions, 0) * 100,
    2
  ) AS cancel_rate
FROM `first-mark-479903-q6.modulabs_project.user_data` AS u
LEFT JOIN TransactionInfo AS t
ON u.CustomerID = t.CustomerID;
```



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

```
SELECT *
FROM `first-mark-479903-q6.modulabs_project.user_data`;
```



회고

[회고 내용을 작성해주세요]

Keep : BigQuery 환경에서 차근차근 SQL 실습을 진행하였다.

Problem :윈도우 함수, DATE 처리, 조건 조합 에서 개념과 문법이 헷갈렸다.

Try : 틀린 쿼리는 바로 고치기보다 어디서부터 틀렸는지 단계별로 검증하는 습관 만들기