PDA

고객을 세그먼테이션하자 [프로젝트]

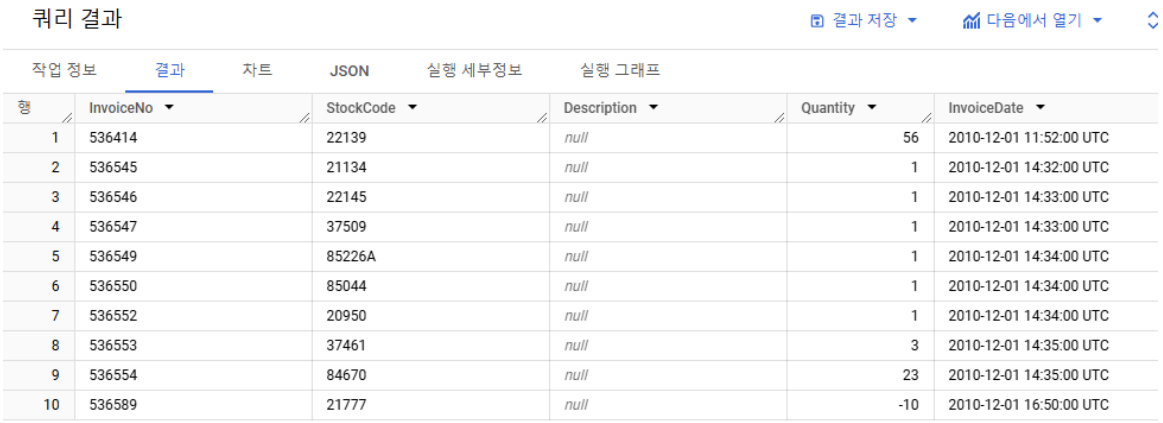
5-2. 데이터 불러오기

데이터 살펴보기

- **테이블에 있는 10개의 행만 출력하기**

```
SELECT *
FROM modulabs_project.data
LIMIT 10;
```

[결과 이미지를 넣어주세요]



쿼리 결과

결과 저장 ▾ 다음에서 열기 ▾

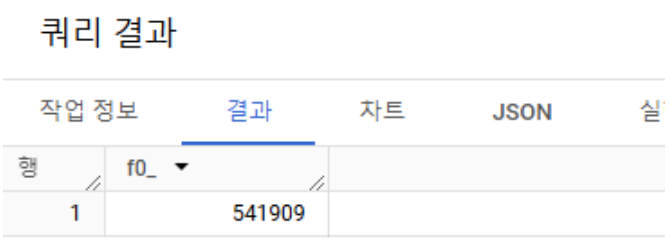
작업 정보 | 결과 | 차트 | JSON | 실행 세부정보 | 실행 그래프

행	InvoiceNo	StockCode	Description	Quantity	InvoiceDate
1	536414	22139	null	56	2010-12-01 11:52:00 UTC
2	536545	21134	null	1	2010-12-01 14:32:00 UTC
3	536546	22145	null	1	2010-12-01 14:33:00 UTC
4	536547	37509	null	1	2010-12-01 14:33:00 UTC
5	536549	85226A	null	1	2010-12-01 14:34:00 UTC
6	536550	85044	null	1	2010-12-01 14:34:00 UTC
7	536552	20950	null	1	2010-12-01 14:34:00 UTC
8	536553	37461	null	3	2010-12-01 14:35:00 UTC
9	536554	84670	null	23	2010-12-01 14:35:00 UTC
10	536589	21777	null	-10	2010-12-01 16:50:00 UTC

- **전체 데이터는 몇 행으로 구성되어 있는지 확인하기**

```
SELECT COUNT(*)
FROM modulabs_project.data;
```

[결과 이미지를 넣어주세요]

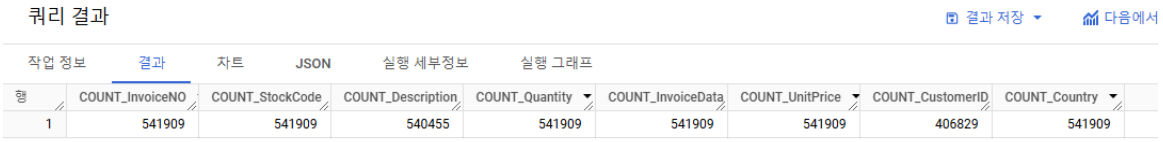


데이터 수 세기

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

```
SELECT COUNT(InvoiceNo) AS COUNT_InvoiceNO,
  COUNT(StockCode) AS COUNT_StockCode,
  COUNT(Description) AS COUNT_Description,
  COUNT(Quantity) AS COUNT_Quantity,
  COUNT(InvoiceDate) AS COUNT_InvoiceData,
  COUNT(UnitPrice) AS COUNT_UnitPrice,
  COUNT(CustomerID) AS COUNT_CustomerID,
  COUNT(Country) AS COUNT_Country
FROM modulabs_project.data;
```

[결과 이미지를 넣어주세요]



5-4. 데이터 전처리 방법(1): 결측치 제거

컬럼 별 누락된 값의 비율 계산

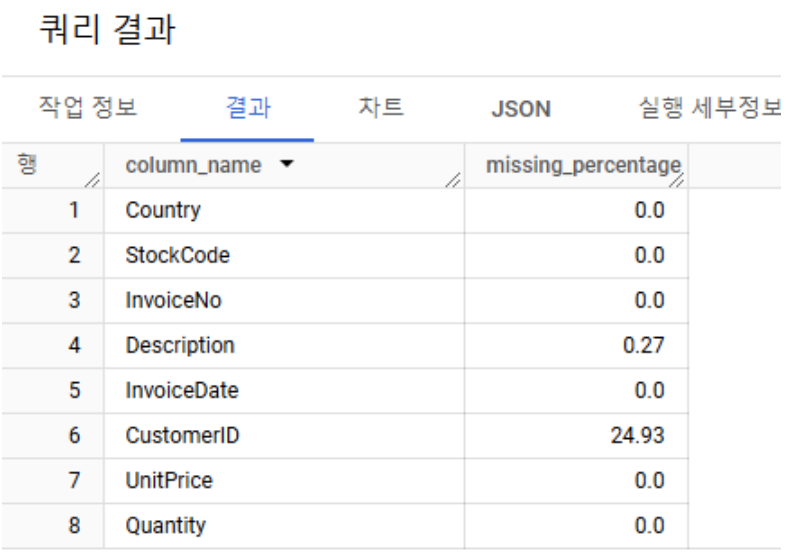
- **각 컬럼 별 누락된 값의 비율을 계산**
  - **각 컬럼에 대해서 누락 값을 계산한 후, 계산된 누락 값을 UNION ALL을 통해 합치기**

```
SELECT
    'InvoiceNo' AS column_name,
    ROUND(SUM(CASE WHEN InvoiceNo IS NULL THEN 1 ELSE 0 END) / CO
FROM modulabs_project.data
```

```
UNION ALL

SELECT
    'StockCode' AS column_name,
    ROUND(SUM(CASE WHEN StockCode IS NULL THEN 1 ELSE 0 END) / CO
FROM modulabs_project.data

UNION ALL

SELECT
    'Description' AS column_name,
    ROUND(SUM(CASE WHEN Description IS NULL THEN 1 ELSE 0 END) /
FROM modulabs_project.data

UNION ALL

SELECT
    'Quantity' AS column_name,
    ROUND(SUM(CASE WHEN Quantity IS NULL THEN 1 ELSE 0 END) / COU
FROM modulabs_project.data

UNION ALL

SELECT
    'InvoiceDate' AS column_name,
    ROUND(SUM(CASE WHEN InvoiceDate IS NULL THEN 1 ELSE 0 END) /
FROM modulabs_project.data

UNION ALL

SELECT
    'UnitPrice' AS column_name,
    ROUND(SUM(CASE WHEN UnitPrice IS NULL THEN 1 ELSE 0 END) / CO
FROM modulabs_project.data

UNION ALL

SELECT
    'CustomerID' AS column_name,
    ROUND(SUM(CASE WHEN CustomerID IS NULL THEN 1 ELSE 0 END) / C
FROM modulabs_project.data

UNION ALL
```

```
SELECT
    'Country' AS column_name,
    ROUND(SUM(CASE WHEN Country IS NULL THEN 1 ELSE 0 END) / COUN
FROM modulabs_project.data
```

[결과 이미지를 넣어주세요]



쿼리 결과

작업 정보 | 결과 | 차트 | JSON | 실행 세부정보

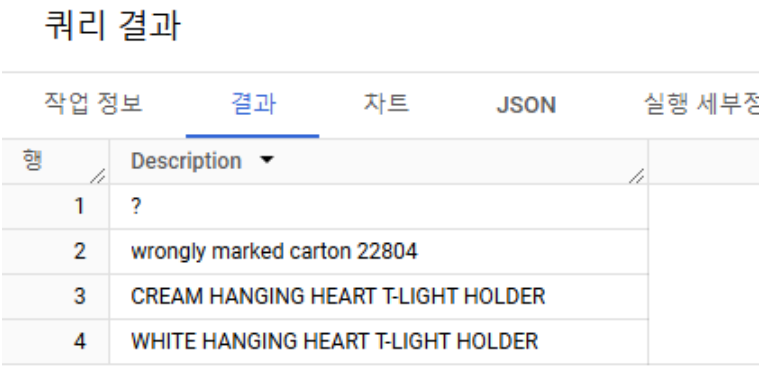
행	column_name	missing_percentage
1	Country	0.0
2	StockCode	0.0
3	InvoiceNo	0.0
4	Description	0.27
5	InvoiceDate	0.0
6	CustomerID	24.93
7	UnitPrice	0.0
8	Quantity	0.0

결측치 처리 전략

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

```
SELECT DISTINCT Description
FROM modulabs_project.data
WHERE StockCode = '85123A';
```

[결과 이미지를 넣어주세요]



쿼리 결과

작업 정보 | 결과 | 차트 | JSON | 실행 세부정

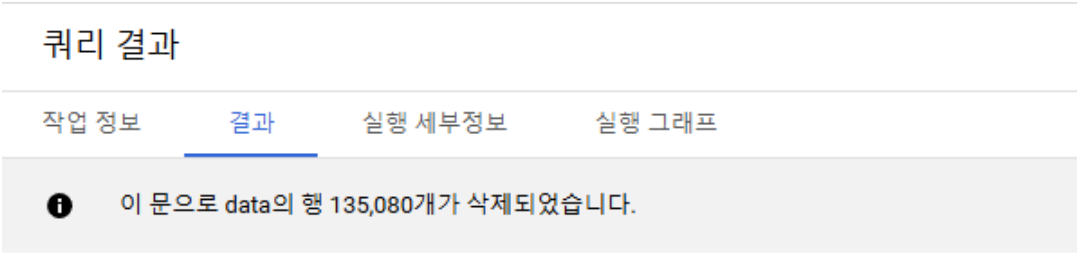
행	Description
1	?
2	wrongly marked carton 22804
3	CREAM HANGING HEART T-LIGHT HOLDER
4	WHITE HANGING HEART T-LIGHT HOLDER

결측치 처리

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

```
DELETE FROM modulabs_project.data
WHERE Description IS NULL OR CustomerID IS NULL;
```

[결과 이미지를 넣어주세요]



5-5. 데이터 전처리(2): 중복값 처리

중복값 확인

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

```
SELECT COUNT(*)
FROM (
  SELECT *, COUNT(*) AS DupleCount
  FROM modulabs_project.data
  GROUP BY InvoiceNo, StockCode, Description, Quantity, InvoiceDa
  HAVING DupleCount >  1
);
```

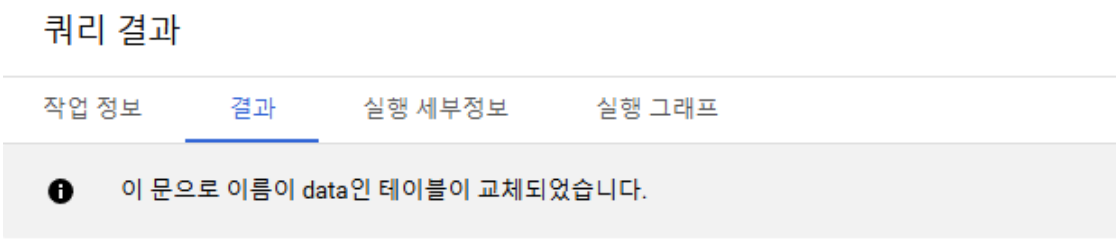
[결과 이미지를 넣어주세요]

중복값 처리

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

```
CREATE OR REPLACE TABLE `modulabs_project.data` AS
  SELECT DISTINCT *
  FROM `modulabs_project.data`;
```

[결과 이미지를 넣어주세요]



5-6. 데이터 전처리(3): 오류값 처리

`InvoiceNo` 살펴보기

- **고유(unique)한 `InvoiceNo`의 개수를 출력하기**

```
SELECT COUNT(DISTINCT InvoiceNo)
FROM modulabs_project.data;
```

[결과 이미지를 넣어주세요]

- **고유한 `InvoiceNo`를 앞에서부터 100개를 출력하기**

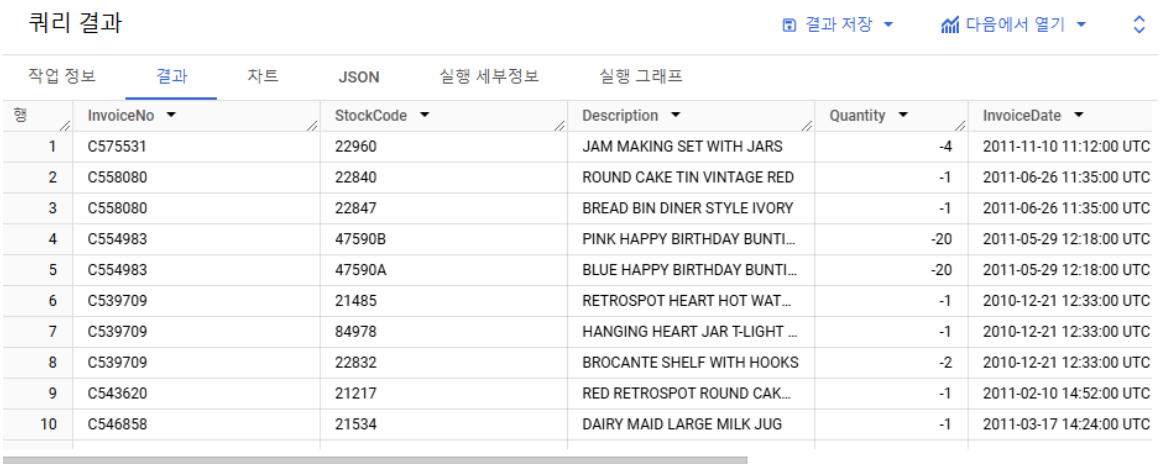
```
SELECT DISTINCT InvoiceNo
FROM modulabs_project.data
LIMIT 100;
```

[결과 이미지를 넣어주세요]

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

```
SELECT *
FROM modulabs_project.data
WHERE InvoiceNo LIKE 'C%'
LIMIT 100;
```

[결과 이미지를 넣어주세요]



행	InvoiceNo	StockCode	Description	Quantity	InvoiceDate
1	C575531	22960	JAM MAKING SET WITH JARS	-4	2011-11-10 11:12:00 UTC
2	C558080	22840	ROUND CAKE TIN VINTAGE RED	-1	2011-06-26 11:35:00 UTC
3	C558080	22847	BREAD BIN DINER STYLE IVORY	-1	2011-06-26 11:35:00 UTC
4	C554983	47590B	PINK HAPPY BIRTHDAY BUNTI...	-20	2011-05-29 12:18:00 UTC
5	C554983	47590A	BLUE HAPPY BIRTHDAY BUNTI...	-20	2011-05-29 12:18:00 UTC
6	C539709	21485	RETROSPOT HEART HOT WAT...	-1	2010-12-21 12:33:00 UTC
7	C539709	84978	HANGING HEART JAR T-LIGHT ...	-1	2010-12-21 12:33:00 UTC
8	C539709	22832	BROCANTE SHELF WITH HOOKS	-2	2010-12-21 12:33:00 UTC
9	C543620	21217	RED RETROSPOT ROUND CAK...	-1	2011-02-10 14:52:00 UTC
10	C546858	21534	DAIRY MAID LARGE MILK JUG	-1	2011-03-17 14:24:00 UTC

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

```
SELECT ROUND(SUM(CASE WHEN SUBSTR(InvoiceNo, 1, 1) = 'C' THEN 1 E
FROM modulabs_project.data;
```

[결과 이미지를 넣어주세요]

행	CancelRatio
1	2.2

`StockCode` 살펴보기

- **고유한 `StockCode` 의 개수를 출력하기**

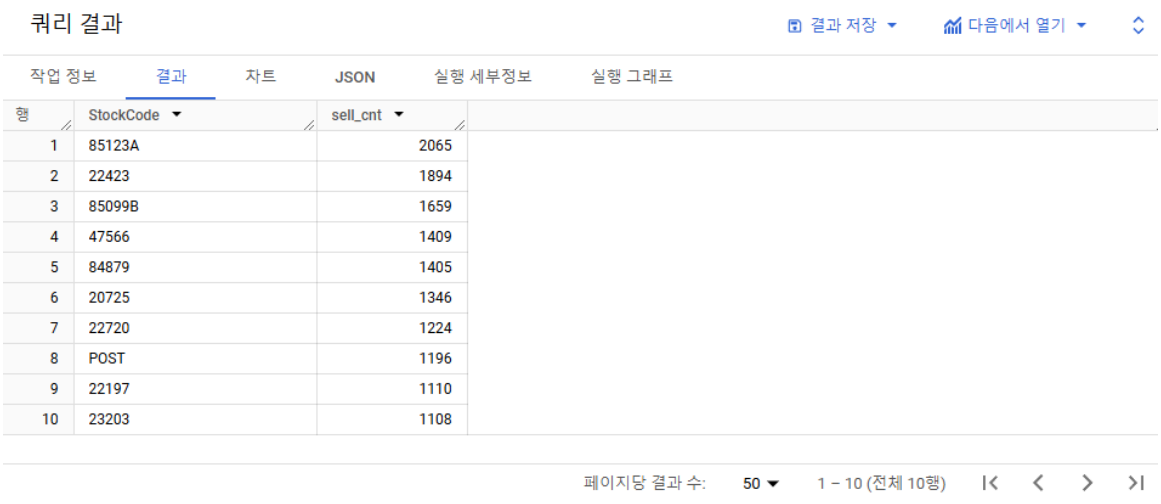
```
SELECT COUNT(DISTINCT StockCode)
FROM modulabs_project.data;
```

[결과 이미지를 넣어주세요]

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

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

[결과 이미지를 넣어주세요]

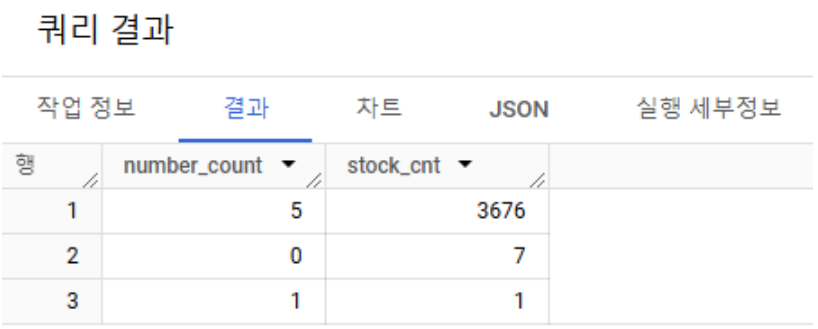


- **`StockCode`의 문자열 내 숫자의 길이를 구해보기**

```
WITH UniqueStockCodes AS (
  SELECT DISTINCT StockCode
  FROM project_name.modulabs_project.data
)
```

```
SELECT
  LENGTH(StockCode) - LENGTH(REGEXP_REPLACE(StockCode, r'[0-9]',
  COUNT(*) AS stock_cnt
FROM UniqueStockCodes
GROUP BY number_count
ORDER BY stock_cnt DESC;
```

[결과 이미지를 넣어주세요]



쿼리 결과

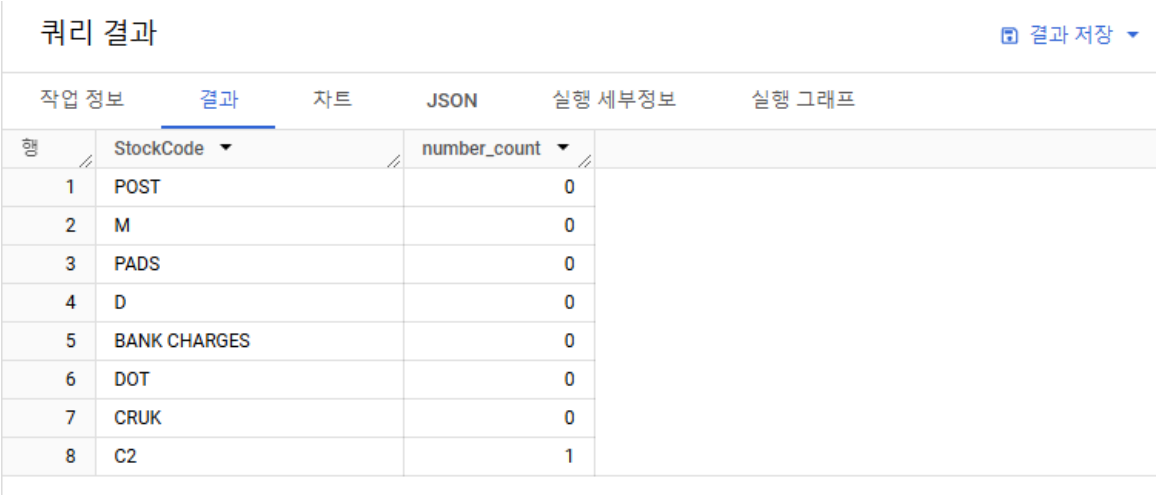
작업 정보 | 결과 | 차트 | JSON | 실행 세부정보

행	number_count	stock_cnt
1	5	3676
2	0	7
3	1	1

- `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]'
  FROM modulabs_project.data
)
WHERE number_count IN (0, 1);
```

[결과 이미지를 넣어주세요]



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

```
-- version 1

SELECT ROUND(SUM(CASE WHEN StockCode IN ('POST', 'D', 'C2', 'M',
FROM modulabs_project.data;

-- version 2
SELECT ROUND(SUM(CASE WHEN StockCode IN (
      SELECT DISTINCT StockCode
      FROM (
        SELECT StockCode,
          LENGTH(StockCode) - LENGTH(REGEXP_REPLACE(StockCode, r'
        FROM modulabs_project.data
      )
      WHERE number_count IN (0, 1))
  THEN 1 ELSE 0 END) / COUNT(*) * 100, 2) AS StockCodeBiasRatio
FROM modulabs_project.data;
```

[결과 이미지를 넣어주세요]

- **제품과 관련되지 않은 거래 기록을 제거하기**

```
DELETE FROM modulabs_project.data
WHERE StockCode IN (
      SELECT DISTINCT StockCode
      FROM (
        SELECT StockCode,
          LENGTH(StockCode) - LENGTH(REGEXP_REPLACE(StockCode, r'
        FROM modulabs_project.data
      )
      WHERE number_count IN (0, 1)
);
```

[결과 이미지를 넣어주세요]

`Description` 살펴보기

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

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

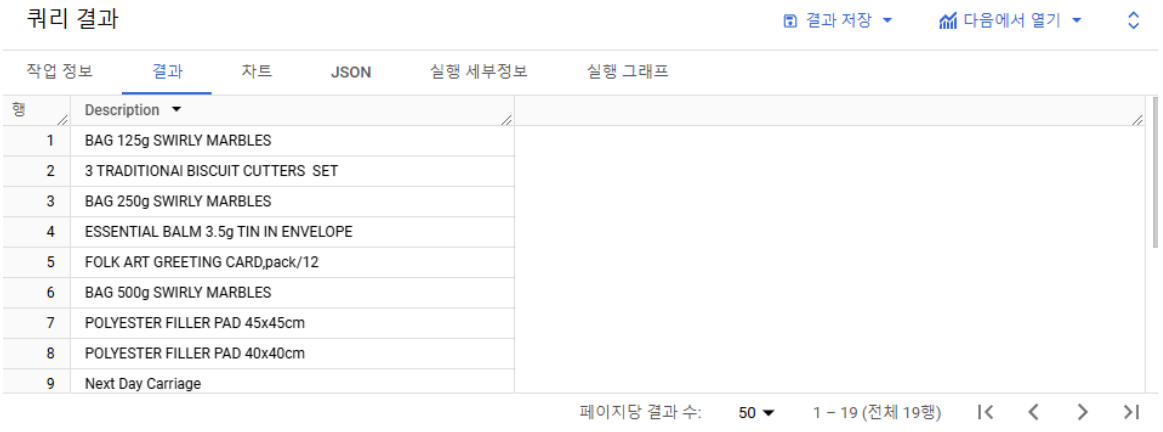
[결과 이미지를 넣어주세요]

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

- **대소문자가 혼합된 Description이 있는지 확인하기**

```
SELECT DISTINCT Description
FROM project_name.modulabs_project.data
WHERE REGEXP_CONTAINS(Description, r'[a-z]');
```

[결과 이미지를 넣어주세요]



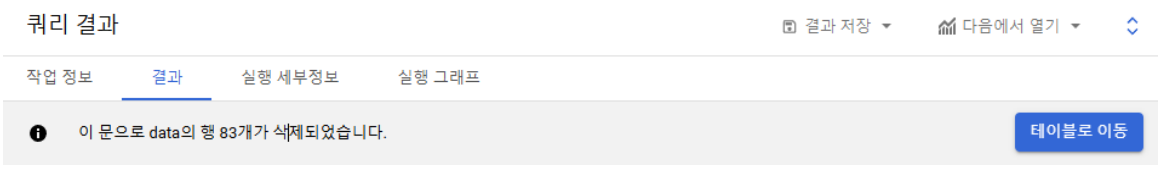
행	Description
1	BAG 125g SWIRLY MARBLES
2	3 TRADITIONAI BISCUIT CUTTERS SET
3	BAG 250g SWIRLY MARBLES
4	ESSENTIAL BALM 3.5g TIN IN ENVELOPE
5	FOLK ART GREETING CARD,pack/12
6	BAG 500g SWIRLY MARBLES
7	POLYESTER FILLER PAD 45x45cm
8	POLYESTER FILLER PAD 40x40cm
9	Next Day Carriage

- **서비스 관련 정보를 포함하는 행들을 제거하기**

```
DELETE
FROM modulabs_project.data
```

```
WHERE Description IN ('Next Day Carriage', 'High Resolution Image
```

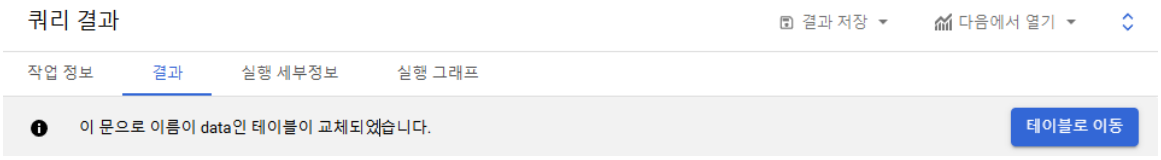
[결과 이미지를 넣어주세요]



- **대소문자를 혼합하고 있는 데이터를 대문자로 표준화 하기**

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

[결과 이미지를 넣어주세요]

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

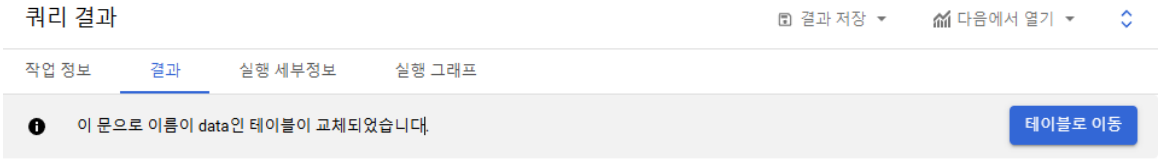
```
SELECT COUNT(Quantity) AS cnt_quantity,
  MIN(Quantity) AS min_quantity,
  MAX(Quantity) AS max_quantity
FROM modulabs_project.data
WHERE UnitPrice = 0;
```

[결과 이미지를 넣어주세요]

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

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

[결과 이미지를 넣어주세요]



5-7. RFM 스코어

Recency

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

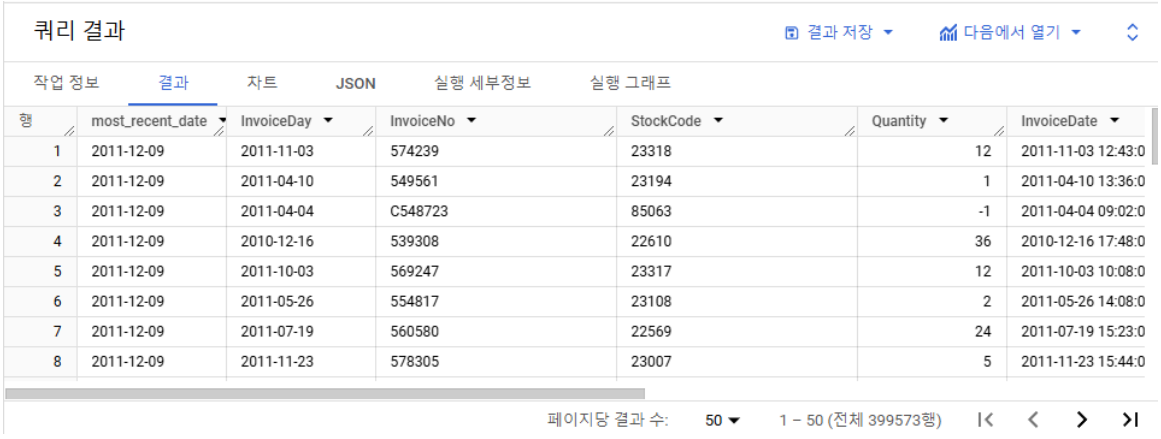
```
SELECT DATE(InvoiceDate) AS InvoiceDay, *
FROM modulabs_project.data;
```

[결과 이미지를 넣어주세요]

- **가장 최근 구매 일자를 MAX() 함수로 찾아보기**

```
-- version 1
SELECT
  (SELECT DATE(MAX(InvoiceDate)) FROM modulabs_project.data) AS m
  DATE(InvoiceDate) AS InvoiceDay,
  *
FROM modulabs_project.data;

-- version 2
SELECT
  DATE(MAX(InvoiceDate) OVER ()) AS most_recent_date,
  DATE(InvoiceDate) AS InvoiceDay,
  *
FROM modulabs_project.data;
```

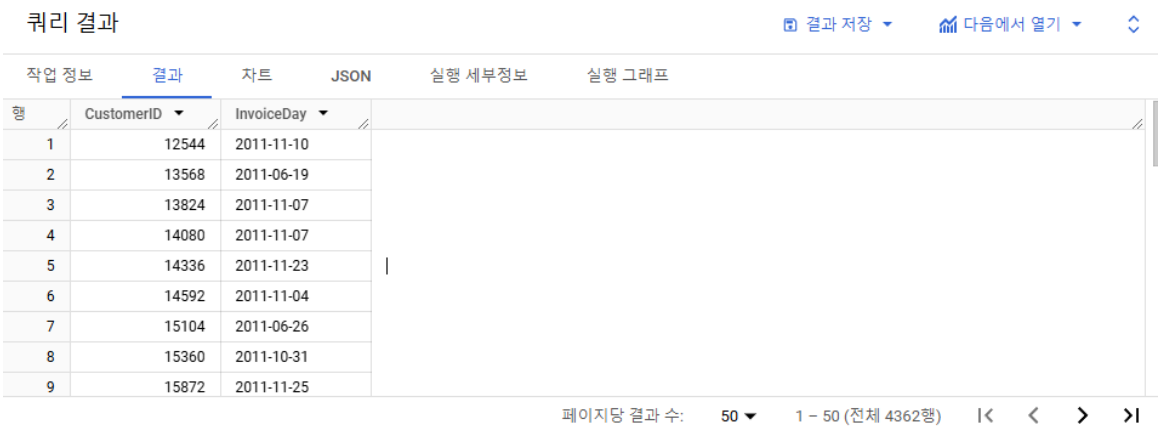
[결과 이미지를 넣어주세요]



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

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

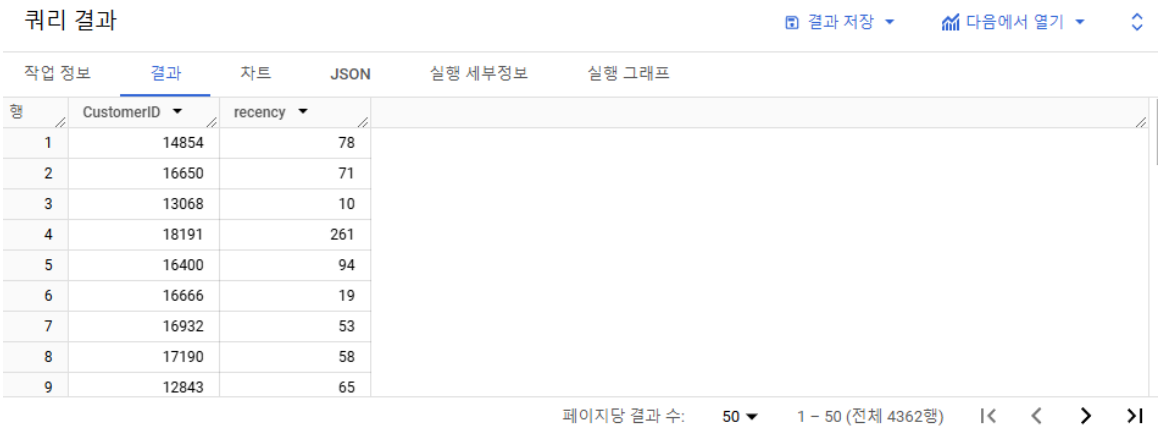
[결과 이미지를 넣어주세요]



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

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

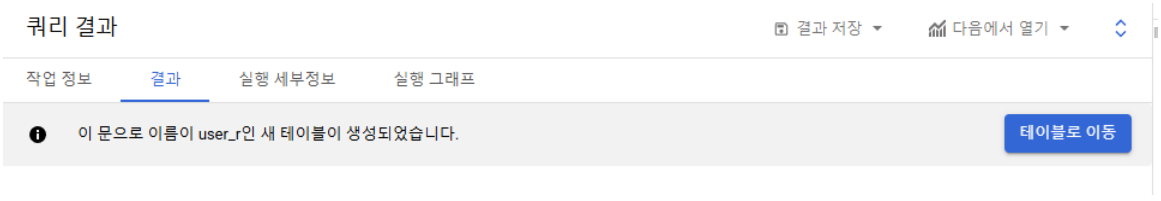
[결과 이미지를 넣어주세요]



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

```
CREATE OR REPLACE TABLE modulabs_project.user_r AS

SELECT CustomerID,
  EXTRACT(DAY FROM MAX(InvoiceDay) over () - InvoiceDay) AS recen
FROM (
    SELECT CustomerID,
      MAX(DATE(InvoiceDate)) AS InvoiceDay
    FROM modulabs_project.data
    GROUP BY CustomerID
);
```

[결과 이미지를 넣어주세요]



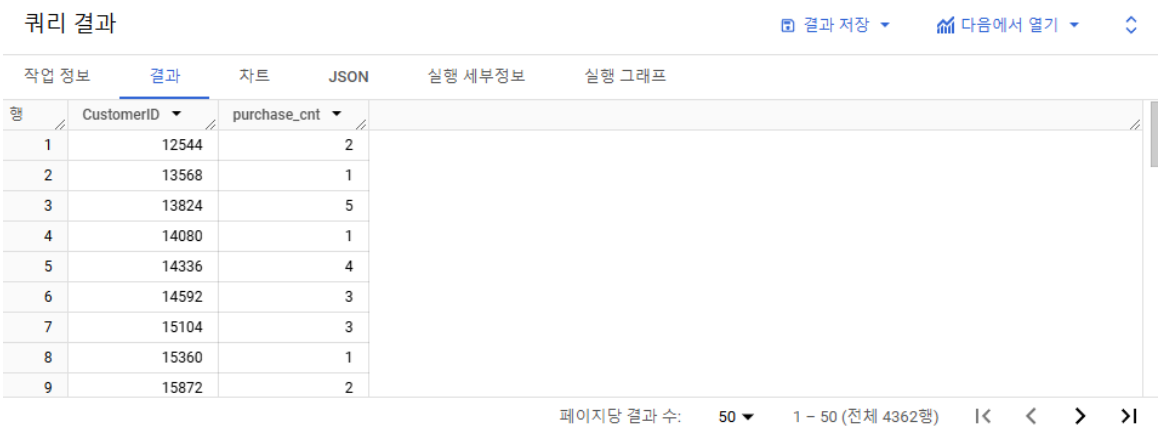
Frequency

- **고객마다 고유한 InvoiceNo의 수를 세어보기**

```
SELECT CustomerID,
  COUNT(DISTINCT InvoiceNo) AS purchase_cnt
```

```
FROM modulabs_project.data
GROUP BY CustomerID;
```

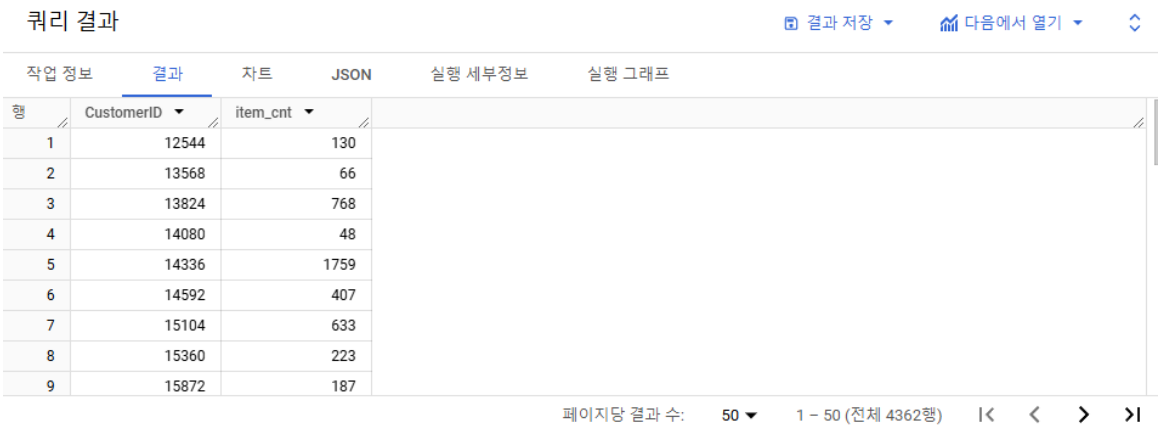
[결과 이미지를 넣어주세요]



- **각 고객 별로 구매한 아이템의 총 수량 더하기**

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

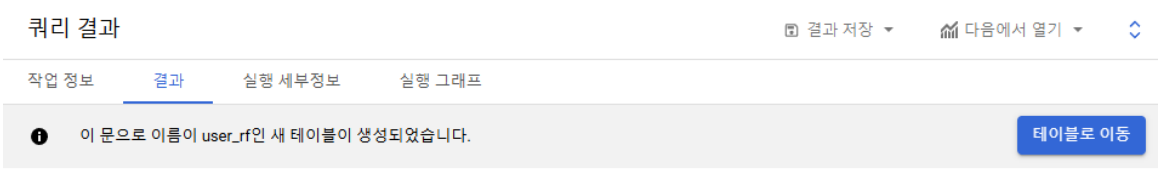
[결과 이미지를 넣어주세요]

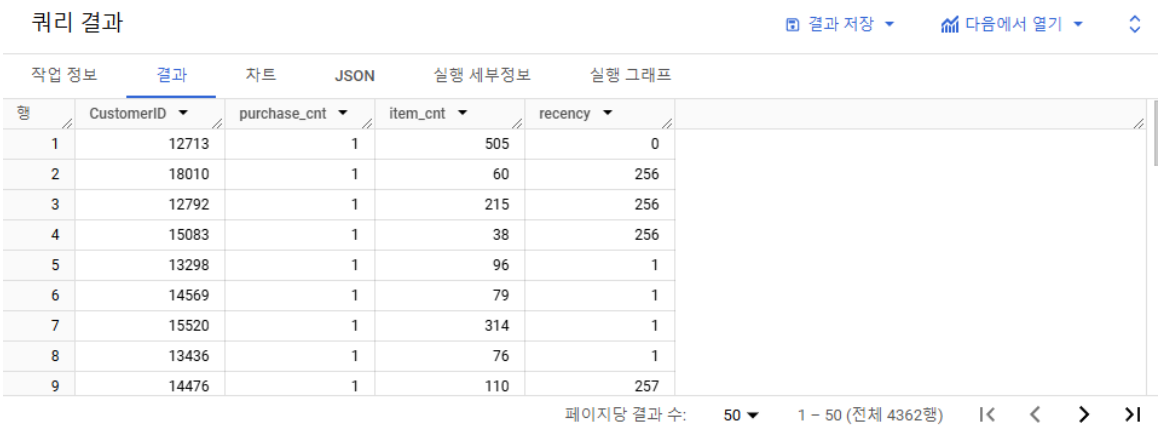


- **전체 거래 건수 계산와 구매한 아이템의 총 수량 계산의 결과를 합쳐서 `user_rf` 라는 이름의 테이블에 저장하기**

```
CREATE OR REPLACE TABLE modulabs_project.user_rf AS

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

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

[결과 이미지를 넣어주세요]





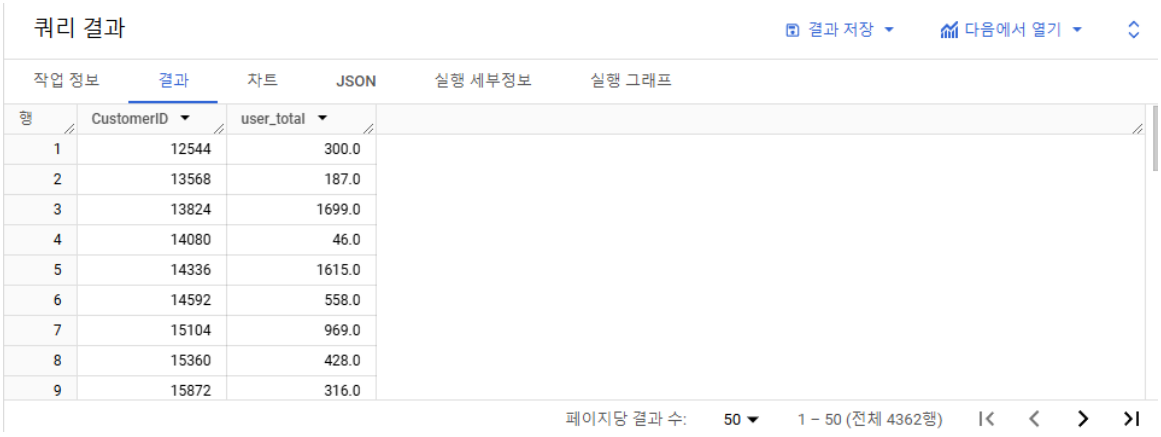
행	CustomerID	purchase_cnt	item_cnt	recency
1	12713	1	505	0
2	18010	1	60	256
3	12792	1	215	256
4	15083	1	38	256
5	13298	1	96	1
6	14569	1	79	1
7	15520	1	314	1
8	13436	1	76	1
9	14476	1	110	257

Monetary

- **고객별 총 지출액 계산 (소수점 첫째 자리에서 반올림)**

```
SELECT CustomerID,
  ROUND(SUM(UnitPrice * Quantity), 0) AS user_total
FROM modulabs_project.data
GROUP BY CustomerID;
```

[결과 이미지를 넣어주세요]



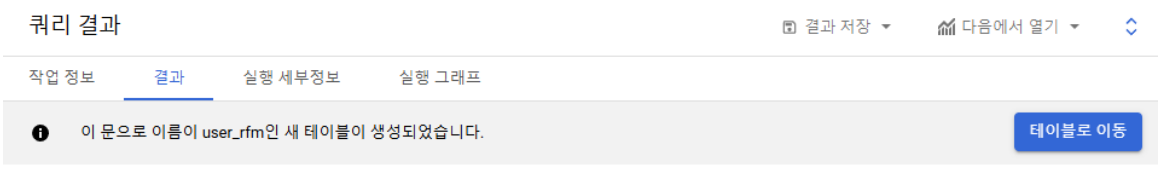
행	CustomerID	user_total
1	12544	300.0
2	13568	187.0
3	13824	1699.0
4	14080	46.0
5	14336	1615.0
6	14592	558.0
7	15104	969.0
8	15360	428.0
9	15872	316.0

- **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 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 modulabs_project.user_rf AS rf
  LEFT JOIN (
    SELECT CustomerID,
      ROUND(SUM(UnitPrice * Quantity), 0) AS user_total
    FROM modulabs_project.data
    GROUP BY CustomerID
  ) AS ut
  ON rf.CustomerID = ut.CustomerID;
```

[결과 이미지를 넣어주세요]

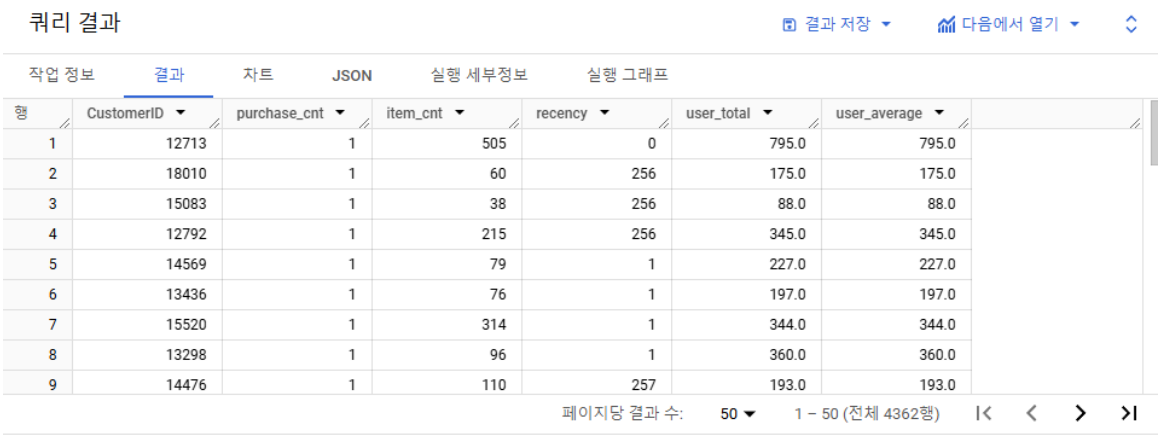


RFM 통합 테이블 출력하기

- **최종 user_rfm 테이블을 출력하기**

```
SELECT * FROM modulabs_project.user_rfm;
```

[결과 이미지를 넣어주세요]



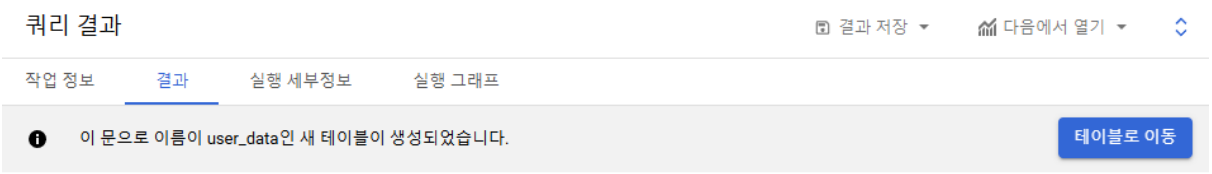
5-8. 추가 Feature 추출

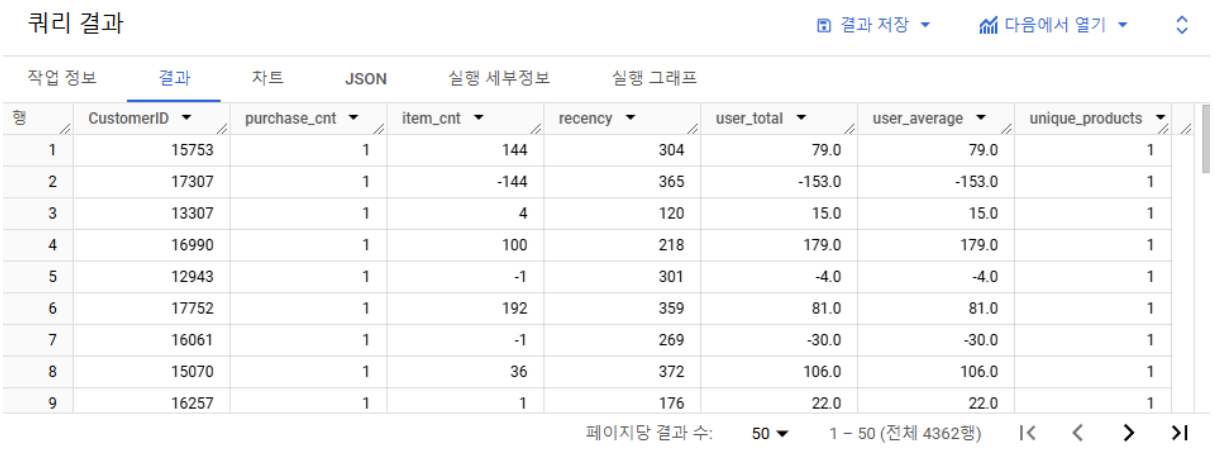
1. 구매하는 제품의 다양성

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

[결과 이미지를 넣어주세요]





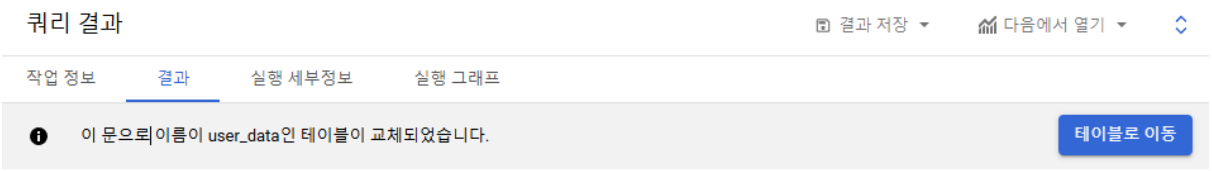
행	CustomerID	purchase_cnt	item_cnt	recency	user_total	user_average	unique_products
1	15753	1	144	304	79.0	79.0	1
2	17307	1	-144	365	-153.0	-153.0	1
3	13307	1	4	120	15.0	15.0	1
4	16990	1	100	218	179.0	179.0	1
5	12943	1	-1	301	-4.0	-4.0	1
6	17752	1	192	359	81.0	81.0	1
7	16061	1	-1	269	-30.0	-30.0	1
8	15070	1	36	372	106.0	106.0	1
9	16257	1	1	176	22.0	22.0	1

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 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
  FROM (
    -- (1) 구매와 구매 사이에 소요된 일수
    SELECT
      CustomerID,
      DATE_DIFF(InvoiceDate, LAG(InvoiceDate) OVER (PARTITION BY Cus
    FROM
      modulabs_project.data
    WHERE CustomerID IS NOT NULL
  )
  GROUP BY CustomerID
)

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

[결과 이미지를 넣어주세요]



쿼리 결과 결과 저장 다음에서 열기

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

행	CustomerID	purchase_cn	item_cnt	recency	user_total	user_average	unique_products	average_interval
1	14432	6	2013	9	2248.0	374.6666666666...	256	0.2
2	12428	11	3477	25	6366.0	578.7272727272...	256	0.87
3	13268	14	3525	17	3106.0	221.8571428571...	256	0.56
4	16737	1	288	53	418.0	418.0	1	0.0
5	17923	1	50	282	208.0	208.0	1	0.0
6	17331	1	16	123	175.0	175.0	1	0.0
7	17986	1	10	56	21.0	21.0	1	0.0
8	13307	1	4	120	15.0	15.0	1	0.0
9	16061	1	-1	269	-30.0	-30.0	1	0.0

페이지당 결과 수: 50 1 – 50 (전체 4362행)

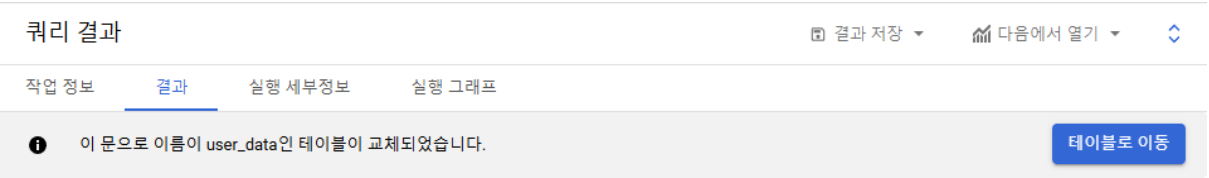
3. 구매 취소 경향성

- **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 modulabs_project.user_data AS

WITH TransactionInfo AS (
  SELECT CustomerID,
    COUNT(InvoiceNo) AS total_transactions,
    SUM(CASE WHEN Quantity < 0 THEN 1 ELSE 0 END) AS cancel_frequenc
  FROM modulabs_project.data
  GROUP BY CustomerID
)

SELECT u.*, t.* EXCEPT (CustomerID),
  ROUND(t.cancel_frequency / t.total_transactions * 100, 2) AS cance
FROM 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 modulabs_project.user_data;
```

[결과 이미지를 넣어주세요]

쿼리 결과

결과 저장 다음에서 열기

작업 정보 결과 차트 JSON 실행 세부정보 실행 그래프

행	CustomerID	purchase_cnt	item_cnt	recency	user_total	user_average	unique_products	average_interval	total_transaction	cancel_frequency	cancel_rate
1	18233	1	4	325	440.0	440.0	1	0.0	1	0	0.0
2	15510	1	2	330	250.0	250.0	1	0.0	1	0	0.0
3	15657	1	24	22	30.0	30.0	1	0.0	1	0	0.0
4	18184	1	60	15	50.0	50.0	1	0.0	1	0	0.0
5	16881	1	600	66	432.0	432.0	1	0.0	1	0	0.0
6	13391	1	4	203	60.0	60.0	1	0.0	1	0	0.0
7	18068	1	6	289	102.0	102.0	1	0.0	1	0	0.0
8	12943	1	-1	301	-4.0	-4.0	1	0.0	1	1	100.0
9	17382	1	24	65	50.0	50.0	1	0.0	1	0	0.0

페이지당 결과 수: 50 1 – 50 (전체 4362행)