고객을 세그먼테이션하자 [프로젝트]

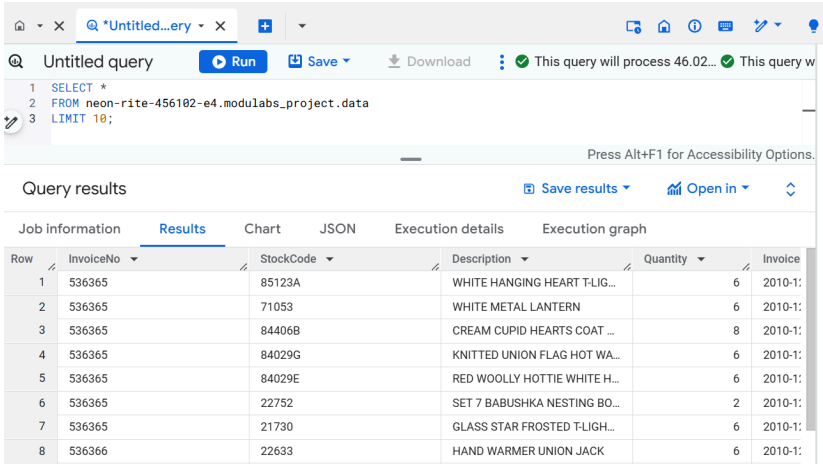
11-2. 데이터 불러오기

데이터 살펴보기

- **테이블에 있는 10개의 행만 출력하기**

```
SELECT *
FROM neon-rite-456102-e4.modulabs_project.data
LIMIT 10;
```

[결과 이미지를 넣어주세요]

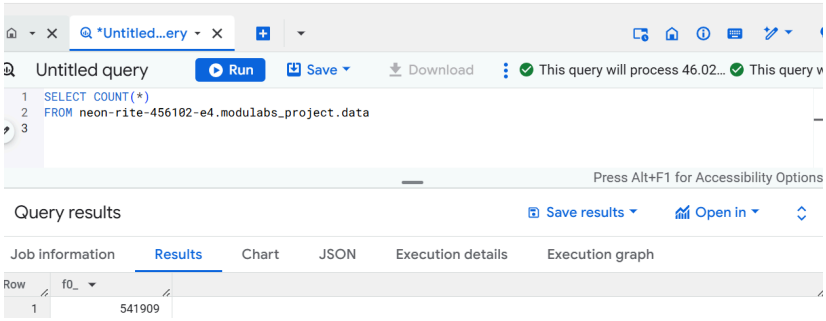


Row	InvoiceNo	StockCode	Description	Quantity	Invoice
1	536365	85123A	WHITE HANGING HEART T-LIG...	6	2010-1:
2	536365	71053	WHITE METAL LANTERN	6	2010-1:
3	536365	84406B	CREAM CUPID HEARTS COAT ...	8	2010-1:
4	536365	84029G	KNITTED UNION FLAG HOT WA...	6	2010-1:
5	536365	84029E	RED WOOLLY HOTTIE WHITE H...	6	2010-1:
6	536365	22752	SET 7 BABUSHKA NESTING BO...	2	2010-1:
7	536365	21730	GLASS STAR FROSTED T-LIGH...	6	2010-1:
8	536366	22633	HAND WARMER UNION JACK	6	2010-1:

- **전체 데이터는 몇 행으로 구성되어 있는지 확인하기**

```
SELECT COUNT(*)
FROM neon-rite-456102-e4.modulabs_project.data

[결과 이미지를 넣어주세요]
```



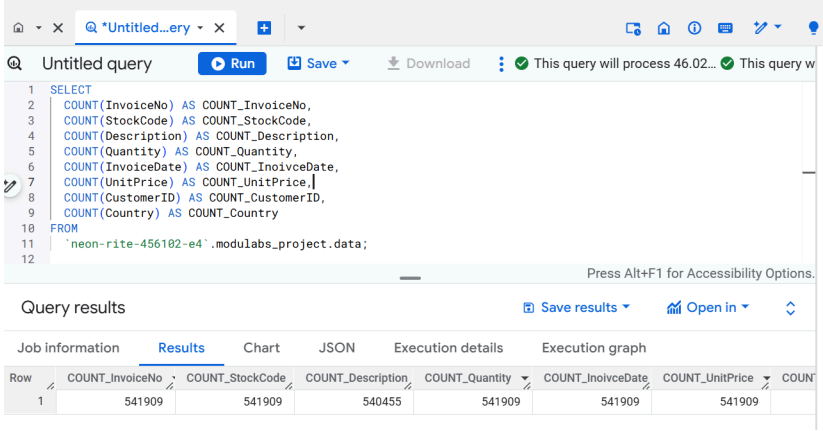
Row	f0_
1	541909

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_InoivceDate,
  COUNT(UnitPrice) AS COUNT_UnitPrice,
  COUNT(CustomerID) AS COUNT_CustomerID,
  COUNT(Country) AS COUNT_Country
FROM
  `neon-rite-456102-e4`.modulabs_project.data;
```

[결과 이미지를 넣어주세요]



11-4. 데이터 전처리 방법(1): 결측치 제거

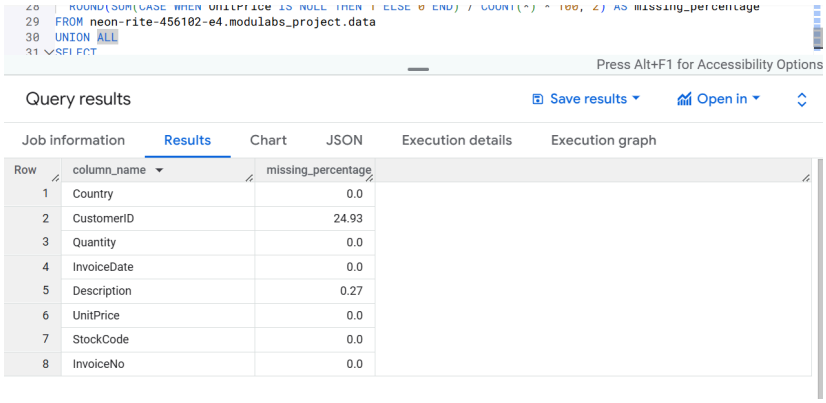
컬럼 별 누락된 값의 비율 계산

- **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 neon-rite-456102-e4.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 neon-rite-456102-e4.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 neon-rite-456102-e4.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 neon-rite-456102-e4.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 neon-rite-456102-e4.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 neon-rite-456102-e4.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 neon-rite-456102-e4.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 neon-rite-456102-e4.modulabs_project.data
```

[결과 이미지를 넣어주세요]



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

결측치 처리 전략

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

```
SELECT DISTINCT Description
FROM neon-rite-456102-e4.modulabs_project.data
WHERE StockCode = '85123A';
```

[결과 이미지를 넣어주세요]

LMS 예시와 다르게 ascending sort 했습니다.

Query results

Job information | Results | Chart | JSON | Execution details | Execution graph

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

결측치 처리

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

```
DELETE FROM neon-rite-456102-e4.modulabs_project.data
WHERE CustomerID IS NULL OR Description IS NULL;
```

[결과 이미지를 넣어주세요]

영어환경이어 결과가 영어로 나옵니다.

Press Alt+F1 for Accessibility Options

Query results Save results Open in

Job information | Results | Execution details | Execution graph

This statement removed 135,080 rows from data. Go to table

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 *
FROM neon-rite-456102-e4.modulabs_project.data
GROUP BY
  InvoiceNo,
  StockCode,
  Description,
  Quantity,
  InvoiceDate,
  UnitPrice,
  CustomerID,
  Country
 HAVING COUNT(*) > 1;
```

[결과 이미지를 넣어주세요]

마지막 행이 보이게 이미지 잘랐습니다.

Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	InvoiceNo	StockCode	Description	Quantity	InvoiceDate
4831	575668	23209	LUNCH BAG VINTAGE DOILY	1	2011-11-10 14:59:
4832	578262	22383	LUNCH BAG SUKI DESIGN	1	2011-11-23 13:27:
4833	578262	22952	60 CAKE CASES VINTAGE CHR...	5	2011-11-23 13:27:
4834	578262	84992	72 SWEETHEART FAIRY CAKE ...	1	2011-11-23 13:27:
4835	578262	21212	PACK OF 72 RETROSPOT CAKE...	1	2011-11-23 13:27:
4836	578262	84991	60 TEATIME FAIRY CAKE CASES	2	2011-11-23 13:27:
4837	579673	23208	LUNCH BAG VINTAGE LEAF DE...	1	2011-11-30 12:59:

Results per page: 50 4801 – 4837 of 4837

중복값 처리

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

```
CREATE OR REPLACE TABLE neon-rite-456102-e4.modulabs_project.data AS
SELECT
  DISTINCT *
FROM neon-rite-456102-e4.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

영문환경이어서 결과가 영어로 나옵니다.

Query results

Save results Open in

Job information | Results | Execution details | Execution graph

This statement replaced the table named data. Go to table

11-6. 데이터 전처리(3): 오류값 처리

InvoiceNo 살펴보기

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

```
SELECT COUNT(DISTINCT InvoiceNo)
FROM neon-rite-456102-e4.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	f0_
1	22190

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

```
SELECT DISTINCT InvoiceNo
FROM neon-rite-456102-e4.modulabs_project.data
LIMIT 100;
```

[결과 이미지를 넣어주세요]

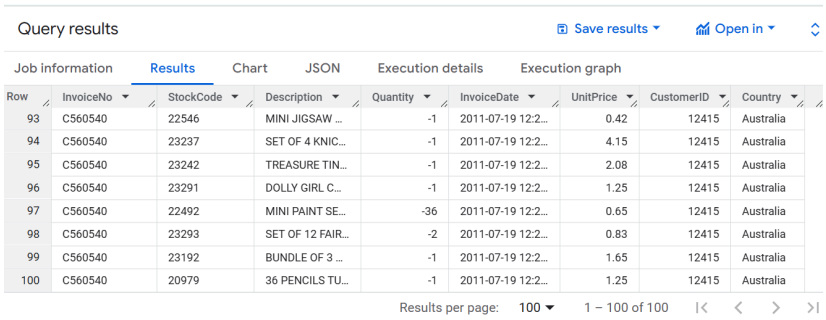
LMS의 예시와 다르지만 C로 시작되는 invoice 찾을 수 있습니다.

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

```
SELECT *
FROM neon-rite-456102-e4.modulabs_project.data
WHERE InvoiceNo LIKE 'C%'
LIMIT 100;
```

[결과 이미지를 넣어주세요]

마지막 100이 보이게 이미지 잘랐습니다.

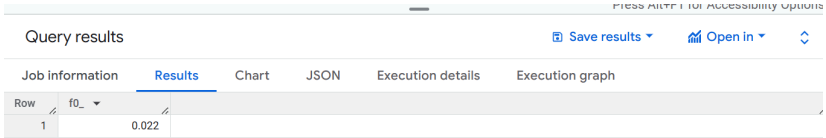


- **구매 건 상태가** `Canceled` **인 데이터의 비율(%) - 소수점 첫번째 자리까지**

```
SELECT ROUND(SUM(CASE WHEN InvoiceNo LIKE 'C%' THEN 1 ELSE 0 END)/ COUNT(*), 3)
FROM neon-rite-456102-e4.modulabs_project.data
```

[결과 이미지를 넣어주세요]

Big Query에서 percentage로 결과를 보여주는 함수를 찾을 수 없어서 소수점 세째 자리에서 반올림 하여 결과 도출했습니다.

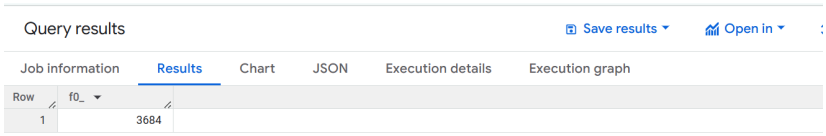


StockCode 살펴보기

- **고유한 StockCode 의 개수를 출력하기**

```
SELECT COUNT(DISTINCT StockCode)
FROM neon-rite-456102-e4.modulabs_project.data;
```

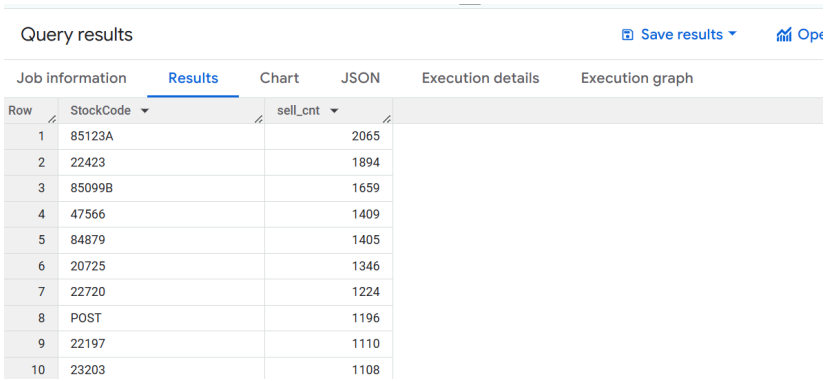
[결과 이미지를 넣어주세요]



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

```
SELECT StockCode, COUNT(*) AS sell_cnt
FROM neon-rite-456102-e4.modulabs_project.data
GROUP BY StockCode
ORDER BY sell_cnt DESC
LIMIT 10;
```

[결과 이미지를 넣어주세요]



Row	StockCode	sell_cnt
1	85123A	2065
2	22423	1894
3	85099B	1659
4	47566	1409
5	84879	1405
6	20725	1346
7	22720	1224
8	POST	1196
9	22197	1110
10	23203	1108

- **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 neon-rite-4456102-e4.modulabs_project.data
)
WHERE number_count BETWEEN 0 AND 1;
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	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 StockCode IN ('POST', 'M', 'C2','D','BANK CHARGES','PADS','DOT','CRUK') THEN 1
      ELSE 0 END) / COUNT(*),4)
FROM neon-rite-456102-e4.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

Big Query에서 percentage로 결과를 보여주는 함수를 찾을 수 없어서 소수점 네째 자리에서 반올림 하여 결과 도출했습니다.

Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	f0_
1	0.0048

- **제품과 관련되지 않은 거래 기록을 제거하기**

```
DELETE FROM neon-rite-456102-e4.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 neon-rite-456102-e4.modulabs_project.data)
WHERE number_count BETWEEN 0 AND 1);
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Execution details | Execution graph

This statement removed 1,915 rows from data. Go to table

Description 살펴보기

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

```
SELECT Description, COUNT(*) AS description_cnt
FROM neon-rite-456102-e4.modulabs_project.data
GROUP BY Description
ORDER BY description_cnt DESC
LIMIT 30;
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	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
10	SPOTTY BUNTING	1026

Results per page: 50 1 – 30 of 30

- **서비스 관련 정보를 포함하는 행들을 제거하기**

```
DELETE
FROM neon-rite-456102-e4.modulabs_project.data
WHERE Description IN('High Resolution Image','Next Day Carriage')
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Execution details | Execution graph

This statement removed 83 rows from data. Go to table

- **대소문자를 혼합하고 있는 데이터를 대문자로 표준화 하기**

```
CREATE OR REPLACE TABLE neon-rite-456102-e4.modulabs_project.data AS
SELECT
  * EXCEPT (Description),
  UPPER(Description) AS Description
FROM neon-rite-456102-e4.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Execution details | Execution graph

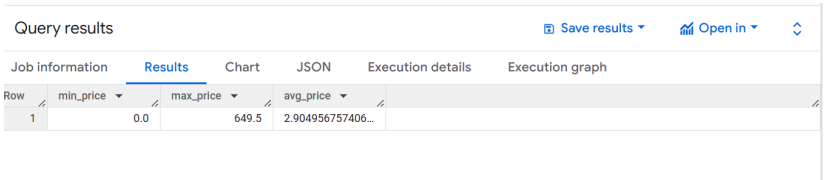
This statement replaced the table named data. Go to table

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 neon-rite-456102-e4.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

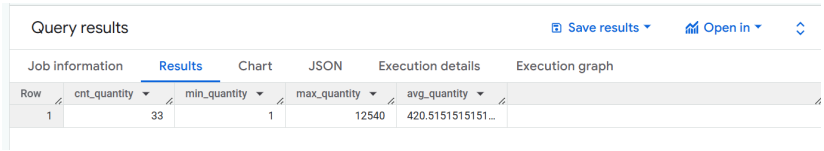


Row	min_price	max_price	avg_price
1	0.0	649.5	2.904956757406...

- **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, AVG(Quantity) AS avg_
FROM neon-rite-456102-e4.modulabs_project.data
WHERE UnitPrice=0
```

[결과 이미지를 넣어주세요]



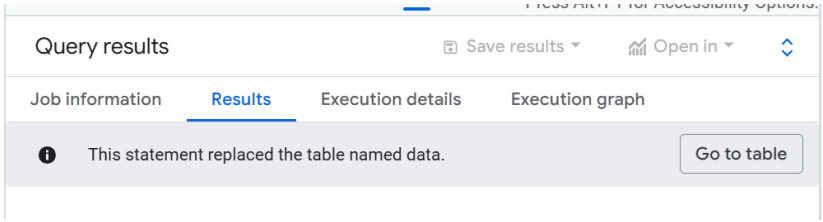
Row	cnt_quantity	min_quantity	max_quantity	avg_quantity
1	33	1	12540	420.5151515151...

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

```
CREATE OR REPLACE TABLE neon-rite-456102-e4.modulabs_project.data AS
SELECT *
FROM neon-rite-456102-e4.modulabs_project.data
WHERE UnitPrice >0;
```

[결과 이미지를 넣어주세요]

데이터 처리후 남은 행은 399,573으로 확인됩니다.



Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	InvoiceNo	StockCode	Quantity	InvoiceDate	UnitPrice	CustomerID	Country
1	541431	23166	74215	2011-01-18 10:01:00 UTC	1.04	12346	United Kingdom
2	C541433	23166	-74215	2011-01-18 10:17:00 UTC	1.04	12346	United Kingdom
3	537626	21064	6	2010-12-07 14:57:00 UTC	5.95	12347	Iceland
4	537626	85167B	30	2010-12-07 14:57:00 UTC	1.25	12347	Iceland
5	537626	84997C	6	2010-12-07 14:57:00 UTC	3.75	12347	Iceland
6	537626	84969	6	2010-12-07 14:57:00 UTC	4.25	12347	Iceland
7	537626	22773	12	2010-12-07 14:57:00 UTC	1.25	12347	Iceland
8	537626	84997B	6	2010-12-07 14:57:00 UTC	3.75	12347	Iceland

Results per page: 50 1 – 50 of 399573

11-7. RFM 스코어

Recency

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

```
SELECT DATE(InvoiceDate) AS InvoiceDay, *
FROM neon-rite-456102-e4.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	InvoiceDay	InvoiceNo	StockCode	Quantity	InvoiceDate
1	2011-01-18	541431	23166	74215	2011-01-18 10:01:00 UTC
2	2011-01-18	C541433	23166	-74215	2011-01-18 10:17:00 UTC
3	2010-12-07	537626	21064	6	2010-12-07 14:57:00 UTC
4	2010-12-07	537626	85167B	30	2010-12-07 14:57:00 UTC
5	2010-12-07	537626	84997C	6	2010-12-07 14:57:00 UTC
6	2010-12-07	537626	84969	6	2010-12-07 14:57:00 UTC
7	2010-12-07	537626	22773	12	2010-12-07 14:57:00 UTC
8	2010-12-07	537626	84997B	6	2010-12-07 14:57:00 UTC

Results per page: 50 1 – 50 of 399573

- **가장 최근 구매 일자를 MAX() 함수로 찾아보기**

```
SELECT MAX(InvoiceDate) AS most_recent_date
FROM neon-rite-456102-e4.modulabs_project.data;
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

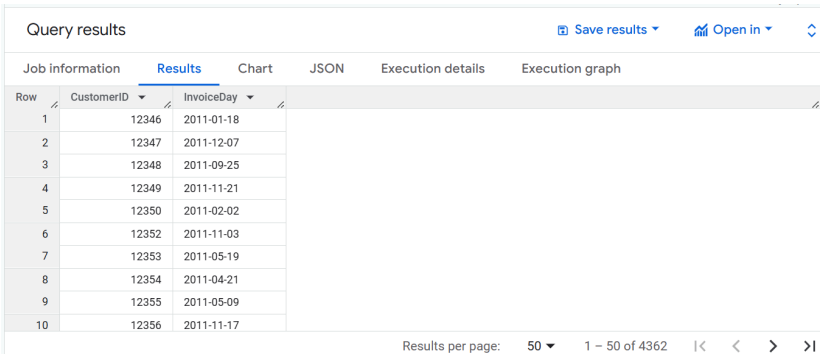
Row	most_recent_date
1	2011-12-09 12:50:00 UTC

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

```
SELECT
  CustomerID,
```

```
  MAX(DATE(InvoiceDate)) AS InvoiceDay
FROM neon-rite-456102-e4.modulabs_project.data
GROUP BY CustomerID;
```

[결과 이미지를 넣어주세요]

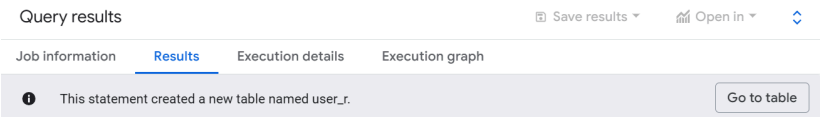


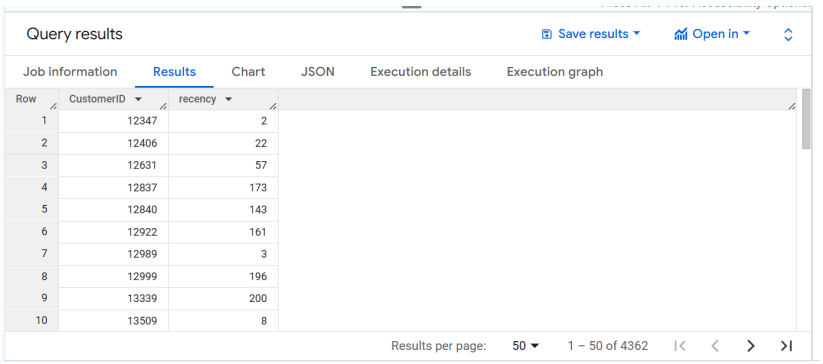
Row	CustomerID	InvoiceDay
1	12346	2011-01-18
2	12347	2011-12-07
3	12348	2011-09-25
4	12349	2011-11-21
5	12350	2011-02-02
6	12352	2011-11-03
7	12353	2011-05-19
8	12354	2011-04-21
9	12355	2011-05-09
10	12356	2011-11-17

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

```
CREATE OR REPLACE TABLE neon-rite-456102-e4.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 neon-rite-456102-e4.modulabs_project.data
  GROUP BY CustomerID
);
```

[결과 이미지를 넣어주세요]

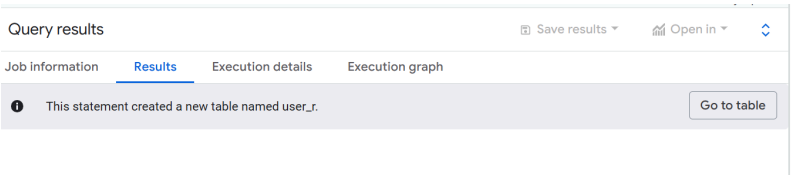




Row	CustomerID	recency
1	12347	2
2	12406	22
3	12631	57
4	12837	173
5	12840	143
6	12922	161
7	12989	3
8	12999	196
9	13339	200
10	13509	8

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

  [결과 이미지를 넣어주세요]

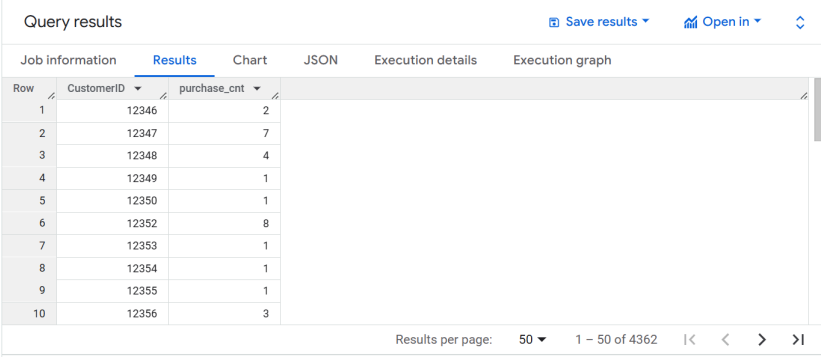


Frequency

- **고객마다 고유한 InvoiceNo의 수를 세어보기**

```
SELECT CustomerID, COUNT(DISTINCT InvoiceNo) AS purchase_cnt
FROM neon-rite-456102-e4.modulabs_project.data
GROUP BY CustomerID;
```

  [결과 이미지를 넣어주세요]

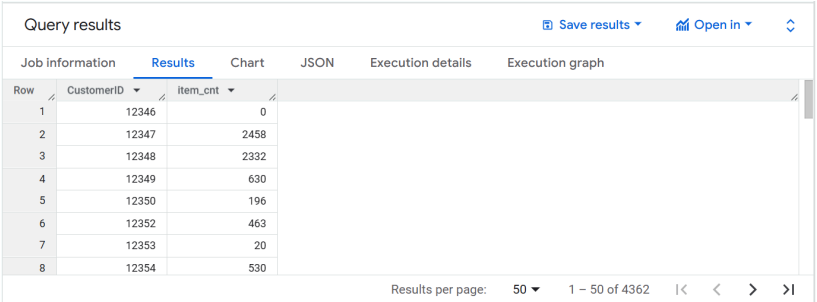


Row	CustomerID	purchase_cnt
1	12346	2
2	12347	7
3	12348	4
4	12349	1
5	12350	1
6	12352	8
7	12353	1
8	12354	1
9	12355	1
10	12356	3

- **각 고객 별로 구매한 아이템의 총 수량 더하기**

```
SELECT CustomerID, SUM(Quantity) AS item_cnt
FROM neon-rite-456102-e4.modulabs_project.data
GROUP BY CustomerID;
```

  [결과 이미지를 넣어주세요]



Row	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

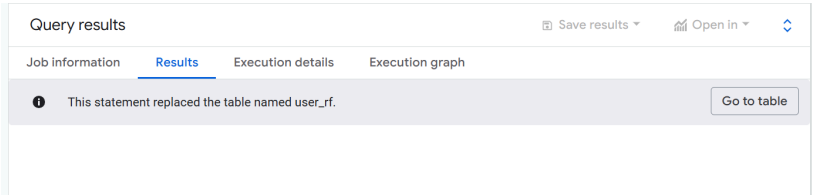
- **전체 거래 건수 계산와 구매한 아이템의 총 수량 계산의 결과를 합쳐서 `user_rf` 라는 이름의 테이블에 저장하기**

```
CREATE OR REPLACE TABLE neon-rite-456102-e4.modulabs_project.user_rf AS

-- (1) 전체 거래 건수 계산
WITH purchase_cnt AS (
   SELECT
     CustomerID,
     COUNT(DISTINCT InvoiceNo) AS purchase_cnt
   FROM
     `neon-rite-456102-e4`.modulabs_project.data
   GROUP BY
     CustomerID
      ),
-- (2) 구매한 아이템 총 수량 계산
item_cnt AS (
   SELECT
     CustomerID,
     SUM(Quantity) AS item_cnt
   FROM
     `neon-rite-456102-e4`.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 neon-rite-456102-e4.modulabs_project.user_r AS ur
  ON pc.CustomerID = ur.CustomerID;
```

[결과 이미지를 넣어주세요]



Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	CustomerID	purchase_cnt	item_cnt	recency
1	12713	1	505	0
2	13436	1	76	1
3	14569	1	79	1
4	15520	1	314	1
5	13298	1	96	1
6	15471	1	256	2
7	15195	1	1404	2
8	14204	1	72	2
9	12442	1	181	3
10	16569	1	93	3

Results per page: 50 1 – 50 of 4362

Monetary

- **고객별 총 지출액 계산 (소수점 첫째 자리에서 반올림)**

```
SELECT CustomerID, ROUND(SUM(UnitPrice),1) AS user_total
FROM neon-rite-456102-e4.modulabs_project.data
GROUP BY CustomerID;
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	CustomerID	user_total
1	12346	2.1
2	12347	481.2
3	12348	18.7
4	12349	305.1
5	12350	25.3
6	12352	330.5
7	12353	24.3
8	12354	261.2

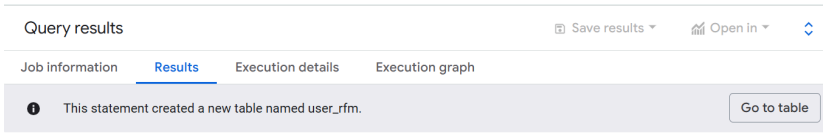
Results per page: 50 1 – 50 of 4362

- **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 neon-rite-456102-e4.modulabs_project.user_rfm AS
SELECT
  rf.CustomerID,
  rf.purchase_cnt,
  rf.item_cnt,
  rf.recency,
  ut.user_total,
  AVG(rf.purchase_cnt) AS user_average
FROM neon-rite-456102-e4.modulabs_project.user_rf AS rf
LEFT JOIN (
  SELECT
    data.CustomerID,
    ROUND(SUM(data.UnitPrice), 1) AS user_total
  FROM neon-rite-456102-e4.modulabs_project.data AS data
  GROUP BY data.CustomerID
) AS ut
```

```
ON rf.CustomerID = ut.CustomerID
GROUP BY rf.CustomerID, rf.purchase_cnt, rf.item_cnt, rf.recency, ut.user_total;
```

[결과 이미지를 넣어주세요]

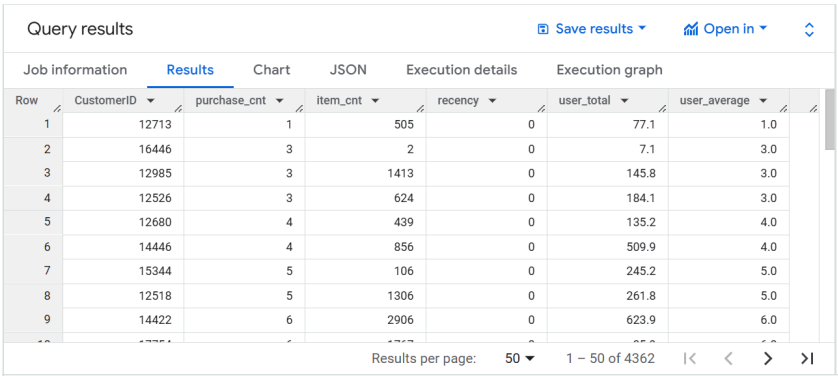


RFM 통합 테이블 출력하기

- **최종 user_rfm 테이블을 출력하기**

```
SELECT *
FROM neon-rite-456102-e4.modulabs_project.user_rfm
```

[결과 이미지를 넣어주세요]



Row	CustomerID	purchase_cnt	item_cnt	recency	user_total	user_average
1	12713	1	505	0	77.1	1.0
2	16446	3	2	0	7.1	3.0
3	12985	3	1413	0	145.8	3.0
4	12526	3	624	0	184.1	3.0
5	12680	4	439	0	135.2	4.0
6	14446	4	856	0	509.9	4.0
7	15344	5	106	0	245.2	5.0
8	12518	5	1306	0	261.8	5.0
9	14422	6	2906	0	623.9	6.0

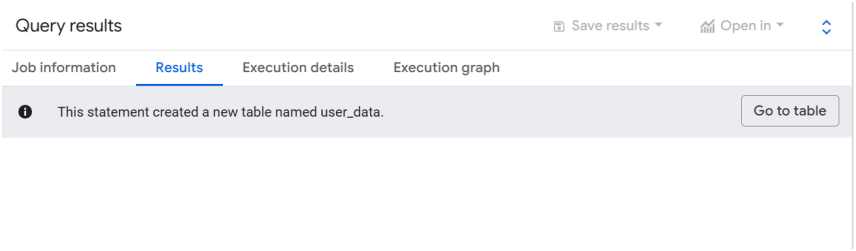
1-8. 추가 Feature 추출

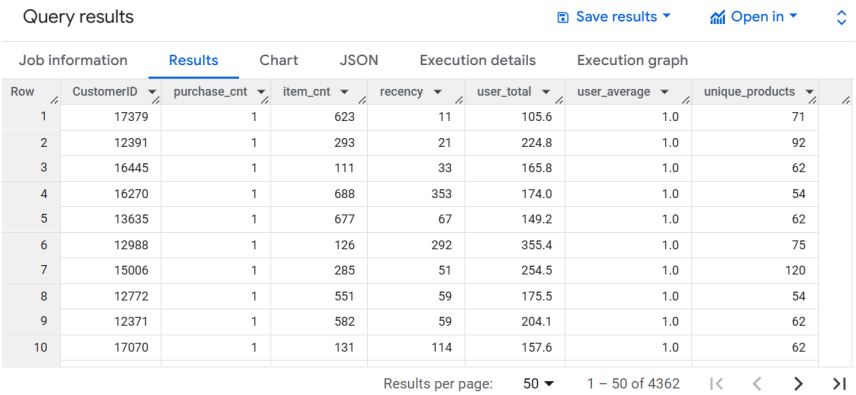
1. 구매하는 제품의 다양성

- **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 neon-rite-456102-e4.modulabs_project.user_data AS
WITH unique_products AS (
  SELECT
    CustomerID,
    COUNT(DISTINCT StockCode) AS unique_products
  FROM neon-rite-456102-e4.modulabs_project.data
  GROUP BY CustomerID
)
SELECT ur.*, up.* EXCEPT (CustomerID)
FROM neon-rite-456102-e4.modulabs_project.user_rfm AS ur
JOIN unique_products AS up
ON ur.CustomerID = up.CustomerID;
```

[결과 이미지를 넣어주세요]





Row	CustomerID	purchase_cnt	item_cnt	recency	user_total	user_average	unique_products
1	17379	1	623	11	105.6	1.0	71
2	12391	1	293	21	224.8	1.0	92
3	16445	1	111	33	165.8	1.0	62
4	16270	1	688	353	174.0	1.0	54
5	13635	1	677	67	149.2	1.0	62
6	12988	1	126	292	355.4	1.0	75
7	15006	1	285	51	254.5	1.0	120
8	12772	1	551	59	175.5	1.0	54
9	12371	1	582	59	204.1	1.0	62
10	17070	1	131	114	157.6	1.0	62

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 neon-rite-456102-e4.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
      neon-rite-456102-e4.modulabs_project.data
    WHERE CustomerID IS NOT NULL
  )
  GROUP BY CustomerID
)

SELECT u.*, pi.* EXCEPT (CustomerID)
FROM neon-rite-456102-e4.modulabs_project.user_data AS u
LEFT JOIN purchase_intervals AS pi
ON u.CustomerID = pi.CustomerID;
```

[결과 이미지를 넣어주세요]

Query results

Save results Open in

Job information | Results | Execution details | Execution graph

This statement replaced the table named user_data.

Go to table

Query results

Save results Open in

Job information | Results | Chart | JSON | Execution details | Execution graph

Row	CustomerI	purchase_	item_cnt	recency	user_total	user_average	unique_products	average_interval
1	12391	1	293	21	224.8	1.0	92	0.0
2	15464	1	348	338	656.9	1.0	155	0.0
3	12890	1	256	24	144.9	1.0	78	0.0
4	17052	1	251	28	159.4	1.0	72	0.0
5	12965	1	282	89	397.3	1.0	108	0.0
6	15720	1	281	24	315.7	1.0	128	0.0
7	14093	1	391	12	151.6	1.0	95	0.0
8	15721	1	388	11	174.4	1.0	80	0.0
9	18022	1	703	35	287.2	1.0	141	0.0

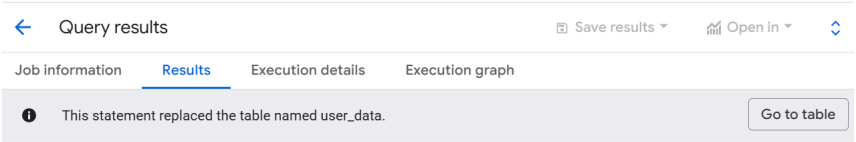
Results per page: 50 1 – 50 of 4362

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 neon-rite-456102-e4.modulabs_project.user_data AS
WITH TransactionInfo AS (
  SELECT
    CustomerID,
    COUNT(InvoiceNo) AS total_transactions,
    SUM(CASE WHEN InvoiceNo LIKE 'C%' THEN 1 ELSE 0 END) AS cancel_frequency
  FROM neon-rite-456102-e4.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 neon-rite-456102-e4.modulabs_project.user_data AS u
LEFT JOIN TransactionInfo AS t
ON u.CustomerID = t.CustomerID;
```

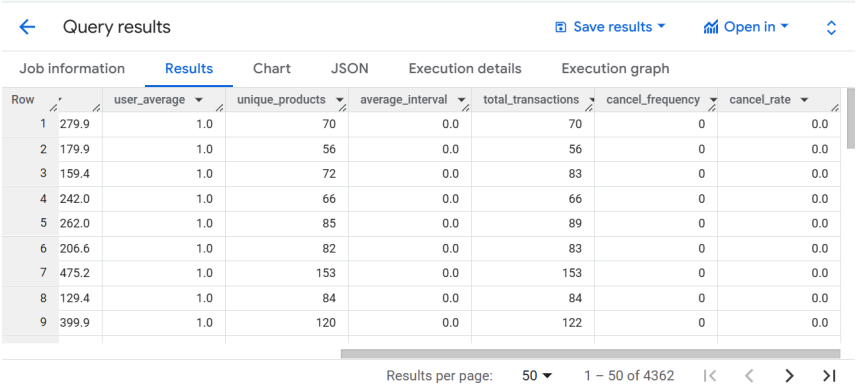
[결과 이미지를 넣어주세요]



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

```
SELECT *
FROM neon-rite-456102-e4.modulabs_project.user_data
```

[결과 이미지를 넣어주세요]



Row	r	user_average	unique_products	average_interval	total_transactions	cancel_frequency	cancel_rate
1	279.9	1.0	70	0.0	70	0	0.0
2	179.9	1.0	56	0.0	56	0	0.0
3	159.4	1.0	72	0.0	83	0	0.0
4	242.0	1.0	66	0.0	66	0	0.0
5	262.0	1.0	85	0.0	89	0	0.0
6	206.6	1.0	82	0.0	83	0	0.0
7	475.2	1.0	153	0.0	153	0	0.0
8	129.4	1.0	84	0.0	84	0	0.0
9	399.9	1.0	120	0.0	122	0	0.0

회고

[회고 내용을 작성해주세요]

Keep : step by step 학습 내용을 잘 따라갔고, 몇개의 명령어는 익숙해졌다. 자잘한 실수도 줄어들었다.(e.g. 콤마 사용, 괄호사용, 따옴표 사용등과 파일명 변경등)

Problem : WITH 구문등 좀 더 익숙해져야 할 명령문이 많다. SELECT / FROM / WHERE 에 각각 쓸 수 있는 구문들이 헷갈린다. 예를들어 WHERE는 함수가 쓰일 수 없다는 것 등.... 단계가 좀 복잡해지면 당황하는데, 차근차근 구문을 읽어보는 연습을 해야할 거 같다.

Try : 자주 연습해보는 방법이 최선 인 것 같다. 시간을 더 들여야 할듯.