Introduction to data driven decision making

DATA-DRIVEN DECISION MAKING IN SQL

SQL

Irene Ortner

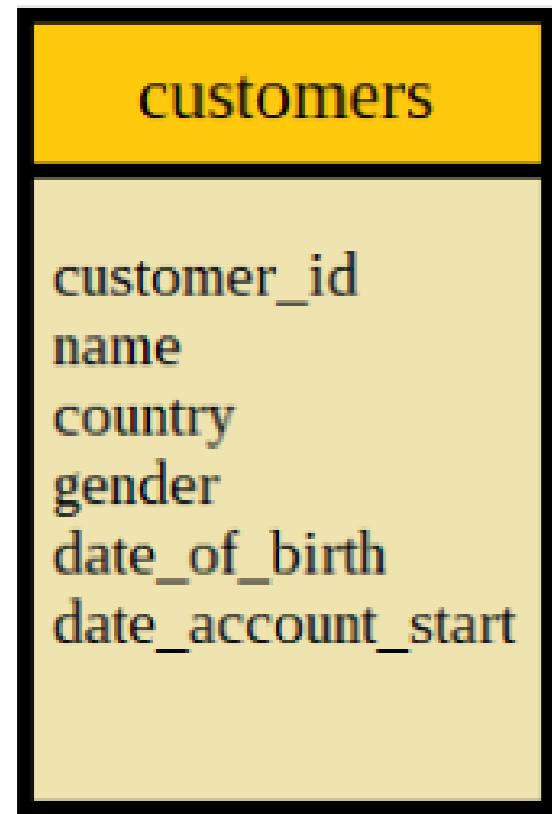Data Scientist at Applied Statistics

datacamp

Aim of this course

- A short review of SQL know-how

- Apply your SQL know-how to extract business insights from data

- Learn about new SQL statements to summarize data
  - OLAP extensions were developed specifically for business intelligence

  - Examples are CUBE, ROLLUP and GROUPING SETS

MovieNow: an online movie rental company

- Platform to stream movies

- Additional information for each movie: genre, main actors, etc.

- Customer information

- Customers can give a rating after watching a movie

MovieNow data structure

customers
customer_id
name
country
gender
date_of_birth
date_account_start

MovieNow data structure

customers
customer_id
name
country
gender
date_of_birth
date_account_start

movies
movie_id
title
genre
runtime
year_of_releas
renting_price

MovieNow data structure

customers
customer_id
name
country
gender
date_of_birth
date_account_start

movies
movie_id
title
genre
runtime
year_of_releas
renting_price

renting
renting_id
customer_id
movie_id
rating
date_renting

MovieNow data structure

customers

customer_id
name
country
gender
date_of_birth
date_account_start

movies

movie_id
title
genre
runtime
year_of_releas
renting_price

renting

renting_id
customer_id
movie_id
rating
date_renting

actors

actor_id
name
year_of_birth
nationality
gender

MovieNow data structure

customers

customer_id
name
country
gender
date_of_birth
date_account_start

movies

movie_id
title
genre
runtime
year_of_releas
renting_price

renting

renting_id
customer_id
movie_id
rating
date_renting

actors

actor_id
name
year_of_birth
nationality
gender

actsin

actsin_id
movie_id
actor_id

Objectives of data driven decision making

- Information for operational decisions
  - Popularity of actors to decide which movies to invest in.

  - Revenue of the last months to estimate budget for short term investments.

- Information for strategic decisions
  - Success across countries to decide on market extensions.

  - Longterm development of revenue for long term investments.

KPIs: Key Performance Indicators

Extract information from the data which is relevant to measure the success of MovieNow.

- Total number of rentals: revenue

- The average rating of all movies: customer satisfaction

- Number of active customers: customer engagement

Let's get started!

DATA-DRIVEN DECISION MAKING IN SQL

Filtering and ordering

DATA-DRIVEN DECISION MAKING IN SQL

SQL

Tim Verdonck
Professor Statistics and Data Science

WHERE

Select all customers from Italy:

```sql
SELECT *
FROM customers
WHERE country = 'Italy';
```

```
|customer_id | name             | country | gender | date_of_birth | date_account_start|
|------------|------------------|---------|--------|---------------|-------------------|
| 53         | Teresio Panicucci | Italy  | male   | 1999-07-21    | 2018-11-06        |
| 54         | Demetrio Palermo | Italy   | male   | 1997-10-10    | 2018-10-17        |
| 55         | Facino Milano    | Italy   | male   | 1973-05-23    | 2018-01-02        |
```

Operators in the WHERE clause

- Comparison operators:
  - Equal `=`
  - Not equal `<>`
  - Less than `<`
  - Less than or equal to `<=`
  - Greater than `>`
  - Greater than or equal to `>=`
- `BETWEEN` operator
- `IN` operator
- `IS NULL` and `IS NOT NULL` operators

Example comparison operators

Select all columns from `movies` where the genre is not Drama.

```sql
SELECT *
FROM movies
WHERE genre <> 'Drama';
```

Select all columns from `movies` where the price for renting is larger equal 2.

```sql
SELECT *
FROM movies
WHERE renting_price >= 2;
```

Example: BETWEEN operator

Select all columns of `customers` where the date when the account was created is between 2018-01-01 and 2018-09-30.

```sql
SELECT *
FROM customers
WHERE date_account_start BETWEEN '2018-01-01' AND '2018-09-30';
```

Example: IN operator

Select all actors with nationality USA or Australia.

```sql
SELECT *
FROM actors
WHERE nationality IN ('USA', 'Australia')
```

Example: NULL operator

Select all columns from `renting` where `rating` is `NULL`.

```
SELECT *
FROM renting
WHERE rating IS NULL
```

Select all columns from `renting` where `rating` is not `NULL`.

```
SELECT *
FROM renting
WHERE rating IS NOT NULL
```

Boolean operators AND

Select customer name and the date when they created their account for customers who are from **Italy** *AND* who **created an account between 2018-01-01 and 2018-09-30**.

```sql
SELECT name, date_account_start
FROM customers
WHERE country = 'Italy'
AND date_account_start BETWEEN '2018-01-01' AND '2018-09-30';
```

```
| name              | date_account_start |
|-------------------|--------------------|
| Facino Milano     | 2018-01-02         |
| Mario Lettiere    | 2018-01-30         |
| Rocco Buccho      | 2018-02-27         |
| Cristoforo Mancini | 2018-01-12        |
```

Boolean operators OR

Select customer name and the date when they created their account for customers who are from **Italy** _OR_ who **created an account between 2018-01-01 and 2018-09-30.**

```sql
SELECT name, date_account_start
FROM customers
WHERE country = 'Italy'
OR date_account_start BETWEEN '2018-01-01' AND '2018-09-30';
```

```
| name                  | country | date_account_start |
|-----------------------|-------- |--------------------|
| Rowanne Couperus      | Belgium | 2018-08-26         |
| Annelous Sneep        | Belgium | 2018-05-12         |
| Jaëla van den Dolder  | Belgium | 2018-02-08         |
| ...                   | ...     | ...                |
```

ORDER BY

Order the results of a query by rating.

```sql
SELECT *
FROM renting
WHERE rating IS NOT NULL
ORDER BY rating;
```

renting_id	customer_id	movie_id	rating	date_renting
552	28	56	1	2017-03-27
558	41	19	3	2019-01-13
444	120	59	3	2018-08-10
200	86	46	3	2018-08-26
234	104	28	4	2018-10-04

ORDER BY ... DESC

Order the results of a query by rating in descending order.

```sql
SELECT *
FROM renting
WHERE rating IS NOT NULL
ORDER BY rating DESC;
```

renting_id	customer_id	movie_id	rating	date_renting
243	7	5	10	2019-01-11
18	36	39	10	2019-03-20
396	7	40	10	2018-09-11
487	61	48	10	2017-08-14
476	78	42	10	2018-07-04

Let's practice!

DATA-DRIVEN DECISION MAKING IN SQL

Aggregations - summarizing data

DATA-DRIVEN DECISION MAKING IN SQL

SQL

Bart Baesens

Professor Data Science and Analytics

datacamp

Overview aggregations

```sql
SELECT AVG(renting_price)
FROM movies;
```

Overview aggregations

```sql
SELECT AVG(renting_price)
FROM movies;
```

Some aggregate functions in SQL

- `AVG()`

- `SUM()`

- `COUNT()`

- `MIN()`

- `MAX()`

Aggregation with NULL values

```sql
SELECT COUNT(*)
FROM actors;
```

- Result: 145

```sql
SELECT COUNT(name)
FROM actors;
```

- Result: 145

```sql
SELECT COUNT(year_of_birth)
FROM actors;
```

- Result: 143

DISTINCT

```
SELECT DISTINCT country
FROM customers;
```

```
| country        |
|----------------|
| Spain          |
| Great Britain  |
| Austria        |
| Poland         |
| ............   |
```

```
SELECT COUNT(DISTINCT country)
FROM customers;
```

- Result: 11

DISTINCT with `NULL` values

```sql
SELECT DISTINCT rating
FROM renting
ORDER BY rating;
```

```
| rating |
|--------|
| 1      |
| ...... |
| 10     |
| null   |
```

Give an alias to column names

```sql
SELECT AVG(renting_price) AS average_price,
       COUNT(DISTINCT genre) AS number_genres
FROM movies;
```

```
| average_price | number_genres |
|---------------|---------------|
| 2.21          | 8             |
```

- Helps to understand the results when column names are self-explaining.

Let's practice!

DATA-DRIVEN DECISION MAKING IN SQL