

## Project Report: Instagram User Engagement Analysis

### Project Description

The purpose of this project is to provide data-driven insights on Instagram user behavior to assist the product, marketing, and investor teams in making informed business decisions. Utilizing SQL and MySQL Workbench, the analysis identifies patterns and trends in user engagement, helping the product team decide on new features, the marketing team to optimize campaign timing, and investors to assess platform activity and authenticity. The analysis will address key business questions, from identifying loyal users and engagement patterns to detecting potential bot accounts.

### Approach

The project follows a structured approach to extract insights from Instagram user data:

1. **Database Setup:** The provided SQL script was used to create and populate the Instagram-like database with tables, including users, photos, comments, likes, follows, tags, and photo\_tags.
2. **SQL Query Development:** Each business question was addressed with a specific SQL query, targeting relevant tables and applying joins, aggregations, and filtering to extract accurate insights.
3. **Report Creation:** Outputs from SQL queries were compiled into this report along with insights and recommendations based on the findings.

### Tech-Stack Used

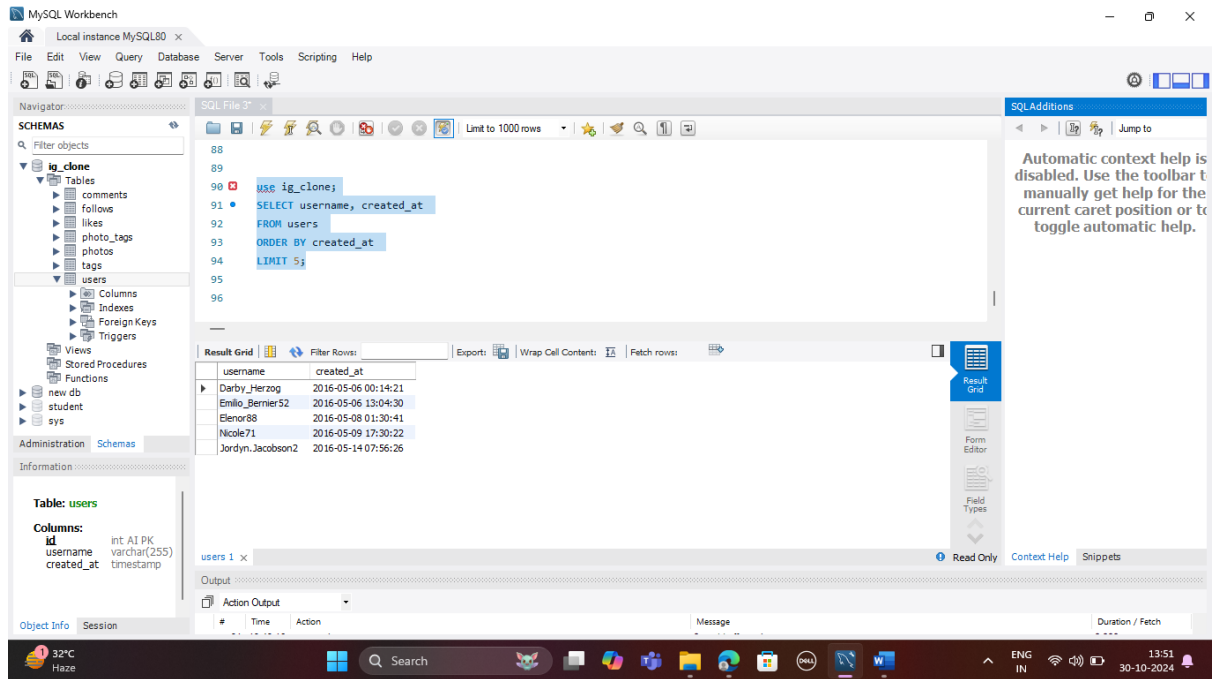
- **MySQL Workbench:** Used for database setup, running SQL queries, and analyzing query outputs.
- **SQL:** Structured Query Language (SQL) was used to extract data from tables efficiently, ensuring correct filtering, grouping, and ordering of results.

*Reason for Choice:* MySQL Workbench provides a reliable and intuitive interface for executing SQL commands and visualizing data, which is ideal for analysis projects.

### SQL Tasks and Findings

#### A) Marketing Analysis

1. **Loyal User Reward**
  - **Objective:** Identify the five oldest users on Instagram to reward them for their loyalty.
  - **SQL Query:**



```
# username      created_at
Darby_Herzog    2016-05-06 00:14:21
Emilio_Bernier52 2016-05-06 13:04:30
Elenor88        2016-05-08 01:30:41
Nicole71        2016-05-09 17:30:22
Jordyn.Jacobson2 2016-05-14 07:56:26
```

**Insight:** These users have shown long-term loyalty, making them suitable candidates for special rewards or recognition campaigns.

## 2. Inactive User Engagement

- **Objective:** Identify users who have never posted a photo, as potential candidates for engagement campaigns.
- **SQL Query:**

MySQL Workbench

Local instance MySQL80 x

File Edit View Query Database Server Tools Scripting Help

Navigator: SQL File 3'

Limit to 1000 rows

94 LIMIT 5;

95

96 use ig\_clone;

97 SELECT username

98 FROM users

99 LEFT JOIN photos ON users.id = photos.user\_id

100 WHERE photos.id IS NULL;

101

102

Result Grid

username
Aniya_Hackett
Kassandra_Homenick
Jadyn81
Rocio33
Maxwell_Halvorson
Tierra_Trantow
Pearl7
Ollie_Ledner37
McKenna17
David_Osinski47

Table: users

Columns:

- id int AI PK
- username varchar(255)
- created\_at timestamp

Object Info Session

Output

Action Output

Message

Duration / Fetch

32°C Haze

Search

ENG IN

13:57 30-10-2024

MySQL Workbench

Local instance MySQL80 x

File Edit View Query Database Server Tools Scripting Help

Navigator: SQL File 3'

Limit to 1000 rows

94 LIMIT 5;

95

96 use ig\_clone;

97 SELECT username

98 FROM users

99 LEFT JOIN photos ON users.id = photos.user\_id

100 WHERE photos.id IS NULL;

101

102

Result Grid

username
McKenna17
David_Osinski47
Morgan_Kassulke
Linnea59
Duane60
Julien_Schmidt
Mike_Auer39
Franco_Keebler64
Na_Haag
Hulda_Macejkovic

Table: users

Columns:

- id int AI PK
- username varchar(255)
- created\_at timestamp

Object Info Session

Output

Action Output

Message

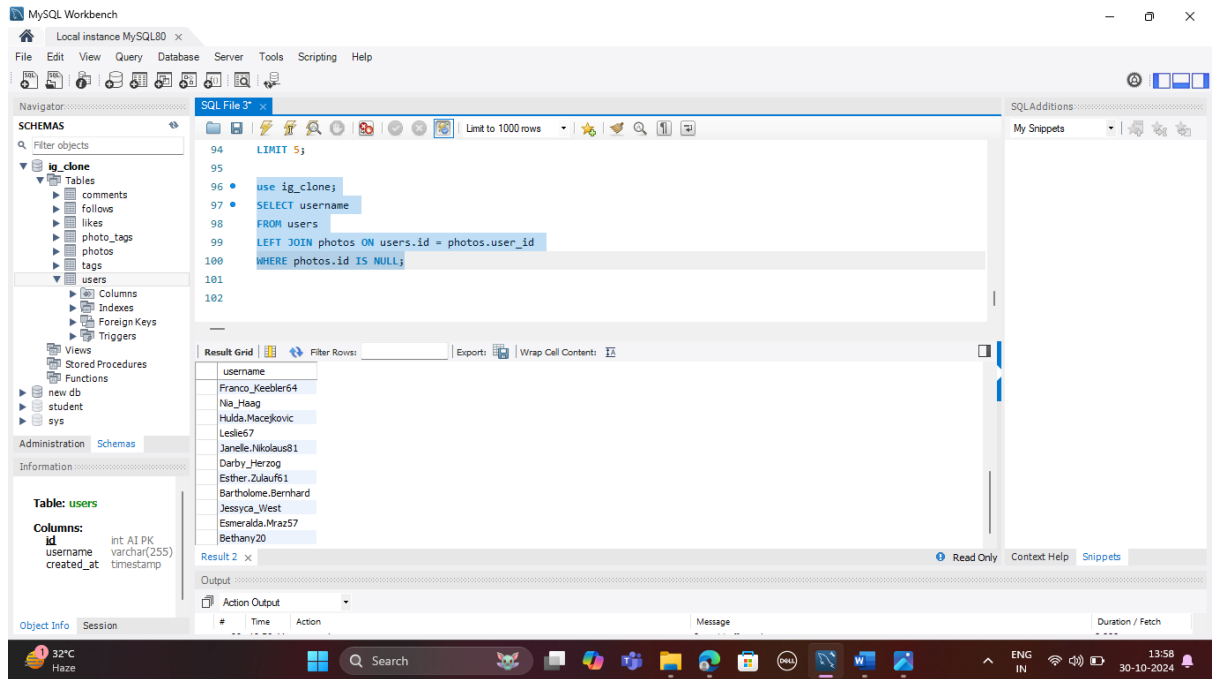
Duration / Fetch

32°C Haze

Search

ENG IN

13:58 30-10-2024



Aniya\_Hackett

Bartholome.Bernhard

Bethany20

Darby\_Herzog

David.Osinski47

Duane60

Esmeralda.Mraz57

Esther.Zulauf61

Franco\_Keebler64

Hulda.Macejkovic

Jaclyn81

Janelle.Nikolaus81

Jessyca\_West

Julien\_Schmidt

Kasandra\_Homenick

Leslie67

Linnea59

Maxwell.Halvorson

Mckenna17

Mike.Auer39

Morgan.Kassulke

Nia\_Haag

Ollie\_Ledner37

Pearl7

Rocio33

Tierra.Trantow

**Insight:** Targeting these inactive users with incentives (e.g., special badges for first posts) could increase engagement.

### 3. Contest Winner Declaration

- **Objective:** Identify the user with the most-liked photo for a contest.
- **SQL Query:**

The screenshot shows the MySQL Workbench interface. On the left, the 'SCHEMAS' pane displays a tree view of the database structure, including tables like 'comments', 'likes', 'photo\_tags', 'photos', 'tags', and 'users'. The 'users' table is selected, and its columns are listed: 'id' (int AI PK), 'username' (varchar(255)), and 'created\_at' (timestamp). The main editor window displays a SQL query in a file named 'SQL File 3'. The query is as follows:

```
102 use ig_clone;
103 SELECT photos.id, photos.image_url, users.username, COUNT(likes.photo_id) AS like_count
104 FROM photos
105 JOIN likes ON photos.id = likes.photo_id
106 JOIN users ON photos.user_id = users.id
107 GROUP BY photos.id
108 ORDER BY like_count DESC
109 LIMIT 1;
110
```

Below the query editor, the 'Result Grid' shows the output of the query. It contains one row with the following data:

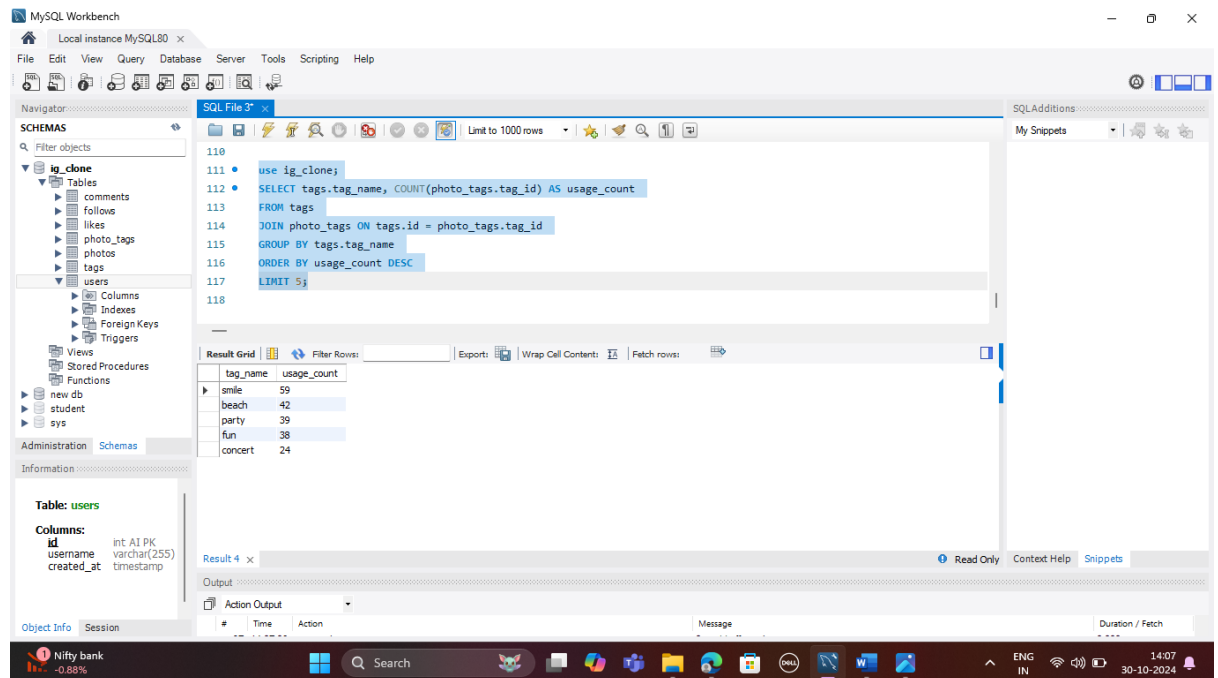
id	image_url	username	like_count
145	https://jarret.name	Zack_Kemmer93	48

The bottom status bar indicates the current session is 'Local instance MySQL80' and the time is 14:04 on 30-10-2024.

**Insight:** This highly liked post can be used in promotions or as a case study for content strategies.

#### 4. Hashtag Research

- **Objective:** Identify the top 5 most-used hashtags for effective campaign planning.
- **SQL Query:**



The screenshot shows the MySQL Workbench interface. The SQL Editor contains the following query:

```

110 use ig_clone;
111 
112 SELECT tags.tag_name, COUNT(photo_tags.tag_id) AS usage_count
113 FROM tags
114 JOIN photo_tags ON tags.id = photo_tags.tag_id
115 GROUP BY tags.tag_name
116 ORDER BY usage_count DESC
117 LIMIT 5;
118
  
```

The Results Grid shows the following data:

tag_name	usage_count
smile	59
beach	42
party	39
fun	38
concert	24

The left sidebar shows the Schemas pane with a tree view of the database structure. The bottom status bar shows the system clock as 14:07 on 30-10-2024.

smile 59

beach 42

party 39

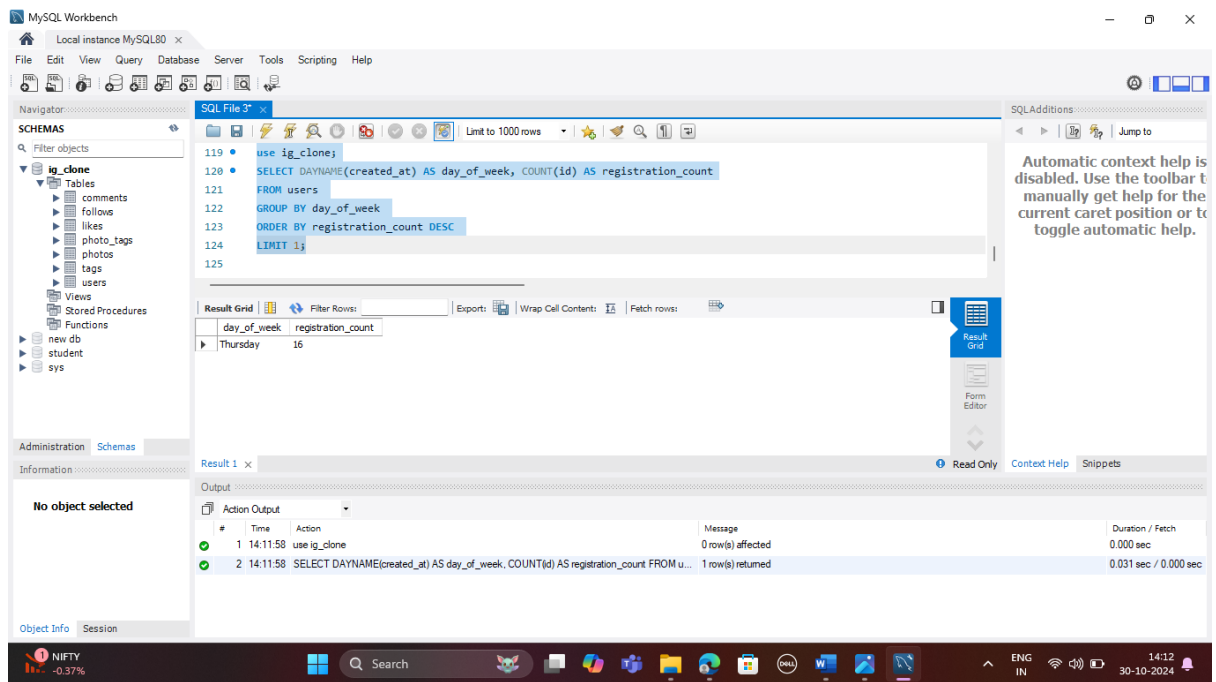
fun 38

concert 24

**Insight:** The identified hashtags can enhance brand reach and visibility for future partner campaigns.

#### 5. Ad Campaign Launch

- **Objective:** Determine the best day to launch ad campaigns based on user registration trends.
- **SQL Query:**

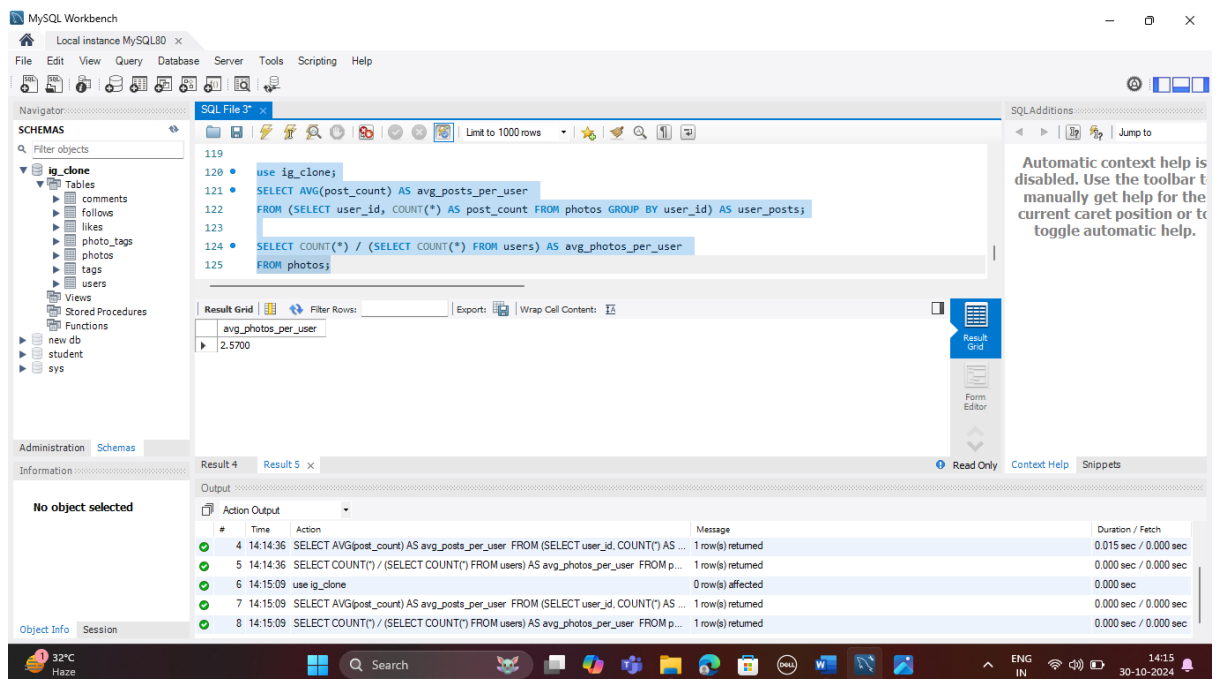


**Insight:** Scheduling ads on this peak day may yield the highest visibility among new users.

## B) Investor Metrics

### 1. User Engagement

- **Objective:** Calculate the average number of posts per user and the photo-to-user ratio.
- **SQL Query:**



2.5700

**Insight:** Helps investors gauge platform engagement by comparing posting behavior across users.

## 2. Bots & Fake Accounts

- **Objective:** Identify potential bot accounts that have liked every single photo.
- **SQL Query:**

The screenshot shows the MySQL Workbench interface. The SQL Editor contains the following query:

```
127 use ig_clone;
128 SELECT username
129 FROM users
130 JOIN likes ON users.id = likes.user_id
131 GROUP BY users.id
132 HAVING COUNT(DISTINCT likes.photo_id) = (SELECT COUNT(*) FROM photos);
133
```

The Results Grid shows the following usernames:

username
Aniya_Hackett
Jadyn81
Rocio33
Maxwell.Halvorson
Olle_Ledher37
McKenna17
Duane60
Julien_Schmidt

The Output pane shows the following actions:

#	Time	Action	Message	Duration / Fetch
6	14:15:09	use ig_clone	0 row(s) affected	0.000 sec
7	14:15:09	SELECT AVG(post_count) AS avg_posts_per_user FROM (SELECT user_id, COUNT(*) AS post_count FROM users JOIN likes ON users.id = likes.user_id GROUP BY users.id)	1 row(s) returned	0.000 sec / 0.000 sec
8	14:15:09	SELECT COUNT(*) / (SELECT COUNT(*) FROM users) AS avg_photos_per_user FROM p...	1 row(s) returned	0.000 sec / 0.000 sec
9	14:19:45	use ig_clone	0 row(s) affected	0.016 sec
10	14:19:45	SELECT username FROM users JOIN likes ON users.id = likes.user_id GROUP BY users.i...	13 row(s) returned	0.015 sec / 0.000 sec

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127 use ig_clone;
128 SELECT username
129 FROM users
130 JOIN likes ON users.id = likes.user_id
131 GROUP BY users.id
132 HAVING COUNT(DISTINCT likes.photo_id) = (SELECT COUNT(*) FROM photos);
133
```

The Results Grid shows the following usernames:

username
Duane60
Julien_Schmidt
Mike.Auer39
Nia_Haag
Leslie67
Janelle.Nikolaus81
Bethany20

The Output pane shows the following actions:

#	Time	Action	Message	Duration / Fetch
6	14:15:09	use ig_clone	0 row(s) affected	0.000 sec
7	14:15:09	SELECT AVG(post_count) AS avg_posts_per_user FROM (SELECT user_id, COUNT(*) AS post_count FROM users JOIN likes ON users.id = likes.user_id GROUP BY users.id)	1 row(s) returned	0.000 sec / 0.000 sec
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Aniya\_Hackett



Jaclyn81

Rocio33

Maxwell.Halvorson

Ollie\_Ledner37

Mckenna17

Duane60

Julien\_Schmidt

Mike.Auer39

Nia\_Haag

Leslie67

Janelle.Nikolaus81

Bethany20

**Insight:** High bot activity could indicate the need for better bot-detection measures to maintain user trust and engagement quality.

### **Insights and Recommendations**

- **Loyalty Campaign:** The oldest users identified are ideal for loyalty rewards. Recognizing these users could enhance retention.
- **Re-Engagement Strategy:** The inactive users identified can be targeted with personalized messages or notifications to encourage posting.
- **Optimal Campaign Day:** The analysis shows that launching ads on the highest registration day could maximize visibility and engagement.
- **Hashtag Utilization:** Popular hashtags provide a valuable tool for brands to increase reach. This insight can aid Instagram's marketing partners in maximizing engagement.
- **Bot Detection:** The potential bot accounts identified should be further analyzed to prevent spam and maintain authentic user interactions.

### **Results**

The analysis successfully addressed each question posed by the marketing and investor teams. By identifying the most loyal and inactive users, top-performing posts, and common hashtags, the insights have provided valuable guidance for user engagement strategies. The project also highlighted possible bot accounts, underscoring the importance of platform security. These

insights provide a foundation for future data-driven decisions to enhance user experience, engagement, and investor confidence.