Advanced Data Analytics Interview Questions

In this article, we'll answer several SQL, Python, and statistics advanced data analytics interview questions, so you get through the interview easier.

Technology has allowed businesses to collect and maintain more data than ever before. Information is no longer stored in thick paper folders but in databases and spreadsheets.

Digitization of information has created new opportunities for analyzing data. Companies are always looking for professionals who can perform data analytics to find useful insights.

In this article, we will explore the meaning of data analytics, and common tasks employees have to perform. We will also walk you through several advanced data analytics interview questions and practice essential skills like SQL, Python, Statistics, and Math.

What is Data Analysis?

Data analysis means working with data to find insights that can be used to make data-based decisions. Companies need qualified professionals to analyze the data and avoid common pitfalls like selection bias or common calculation mistakes.

Data analysis also often needs to prepare data by removing inconsistencies. Depending on the company, data analysts may also need to perform various other tasks:

1. **Define the goal of data analysis.** What information or insights are we looking for?
2. **Collect the data** or identify existing data sources important for answering the question.
3. **Clean the data.** Remove inconsistencies in the data that might lead to inaccurate results. For example - NULL, duplicate, or outlier values. Also, explore the data's structure, value types, important columns, and information in the table.
4. **Analyze the data.** Write the query and calculate the metrics. Return only essential information and discard the rest.
5. **Visualize findings.** Turn your findings into nice graphs and charts

Most of these steps include coding, at least to some extent. This article will focus on calculating metrics using SQL and Python.

What Do Data Analysts Do?

Data analysts' day-to-day duties might vary from one company to another. Generally, data analysts sort through large volumes of data, identify trends and patterns, and find useful information that could influence strategic decisions.

One of the most common tasks is preparing data for analysis. Typically, initially collected data is inconsistent and contains NULL, duplicate, and outlier values. Or you might need to convert values to another type. In short, the data is not clean. Data analysts remove these inconsistencies and lay the groundwork for accurate data analysis.

Data analysts rarely perform advanced duties like data modeling, predictive analytics, or machine learning. Companies usually hire data scientists to do those jobs. If you'd like to do this, you better apply for data scientist jobs. Read our blog post on Data Science Interview Questions to start.

Every data analyst must know two programming languages - SQL and Python. It is also important to have the ability to look at data, quickly comprehend what it represents, and find meaning. To learn more, read our blog post about data analyst skills.

Interview questions reflect common data analyst tasks and test the knowledge of essential skills. Later in this article, we will walk you through answers to actual data analytics interview questions.

Advanced Level Data Analytics Interview Questions

Let's go through some advanced data analytics interview questions to practice SQL, Python, and analytical thinking.

If you like the challenge, we have more Data Analyst Interview Questions on the StrataScratch blog.

The following two SQL questions will require you to know some important data analytics SQL concepts. However, to get more theory behind those (and many others!), refer to our SQL Cheat Sheet.

SQL Data Analytics Interview Questions

Data analysts primarily use SQL to work with data. Let's examine some advanced data analytics interview questions and discuss their best possible solutions.

Question 1: Year Over Year Churn

"Find how the number of drivers that have churned changed in each year compared to the previous one. Output the year (specifically, you can use the year the driver left Lyft) along with the corresponding number of churns in that year, the number of churns in the previous year, and an

indication on whether the number has been increased (output the value 'increase'), decreased (output the value 'decrease') or stayed the same (output the value 'no change').”

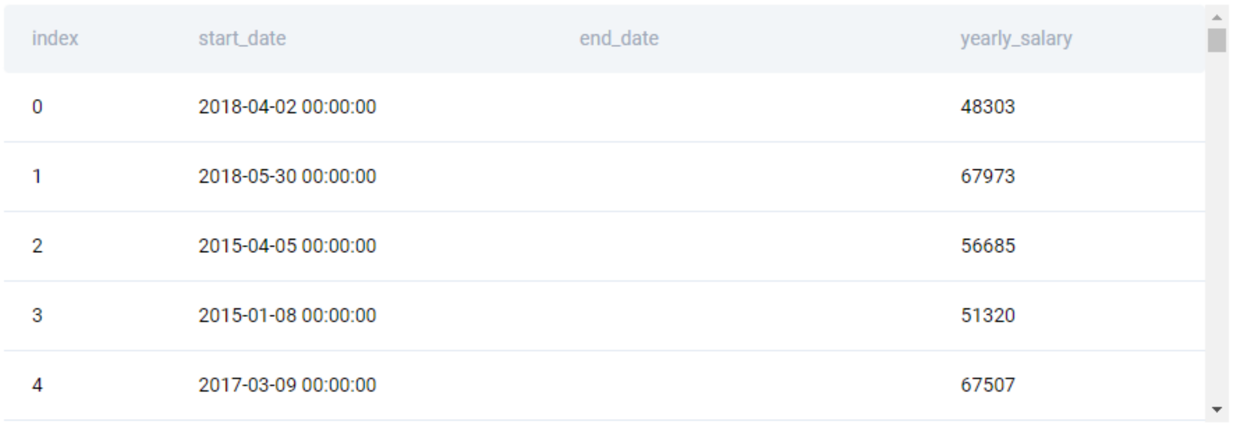
Link to the question: https://platform.stratascratch.com/coding/10017-year-over-year-churn

Understand the Question
For many companies, churn rate is one of the most important metrics. It measures the number of users who stopped using a product or a service. An alarming number of churns could indicate a poor product or other significant problem.

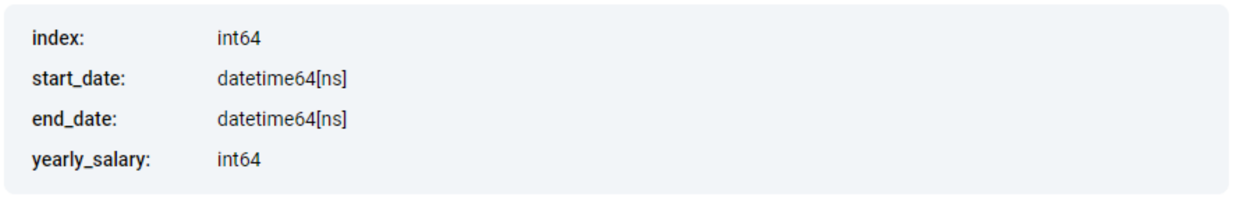
In this case, candidates interviewing at Lyft were asked to find the number of drivers who left the platform in a specific year. The high year-over-year churn might indicate the drivers' dissatisfaction with Lyft.

Available data
Candidates interviewing at Lyft were provided with the **lyft_drivers** table to answer this data analytics interview question.

Every record contains four values.



index	start_date	end_date	yearly_salary
0	2018-04-02 00:00:00		48303
1	2018-05-30 00:00:00		67973
2	2015-04-05 00:00:00		56685
3	2015-01-08 00:00:00		51320
4	2017-03-09 00:00:00		67507



index:	int64
start_date:	datetime64[ns]
end_date:	datetime64[ns]
yearly_salary:	int64

- **index** is a number assigned to every record.
- **start_date** is the date when the driver signed up for Lyft.
- **end_date** is when the driver stopped driving for Lyft.
- **yearly_salary** represents the driver’s earnings per year.

Data analysts should be able to identify important values by looking at available data.

Logical Approach

The question asks us to find the number of drivers who stopped driving in a specific year.

We can do this by grouping records by year and using the **COUNT()** aggregate function to get the number of **end_date** values in each group.

Initially, we do not have a year value – only a date when the driver stopped driving. So let's start by writing a subquery that extracts the year value from every **end_date** value that exists (is not NULL).

The answer should also include churns for the previous year. We can simply use the **LAG()** function to return the number of churns of the previous row.

By now, we have three out of four values needed for an answer **-** the year, the number of churns for that year, and the previous year.

The answer should also include a verbal description of changes in churn numbers. 'increase' if they increased from the previous year, 'decrease' if they decreased, and 'no change' if they stayed the same.

Write the code

1. **Extract years from end_date values**

Let's start by using the **DATE_PART()** function to extract the year from the **end_date** value (which we cast to **date** type).

It's also a good practice to use the **AS** command to give year values a descriptive name - **year_driver_churned**.

```
SELECT DATE_PART('year', end_date::date) AS year_driver_churned
FROM lyft_drivers
WHERE end_date IS NOT NULL
```

NULL **end_date** values represent drivers who did not quit. We only need drivers who quit, so we can use the WHERE clause to discard **end_date** values that are NULL. This query will be a subquery written in the FROM clause of the main query.

year_driver_churned
2018
2018
2019
2017
2018

2. Find churn numbers for the current and previous year

Let’s write another query to work with the result of the query from step 1.

We need to return the year, the number of churned drivers (**end_date** values) for that year, and the previous year.

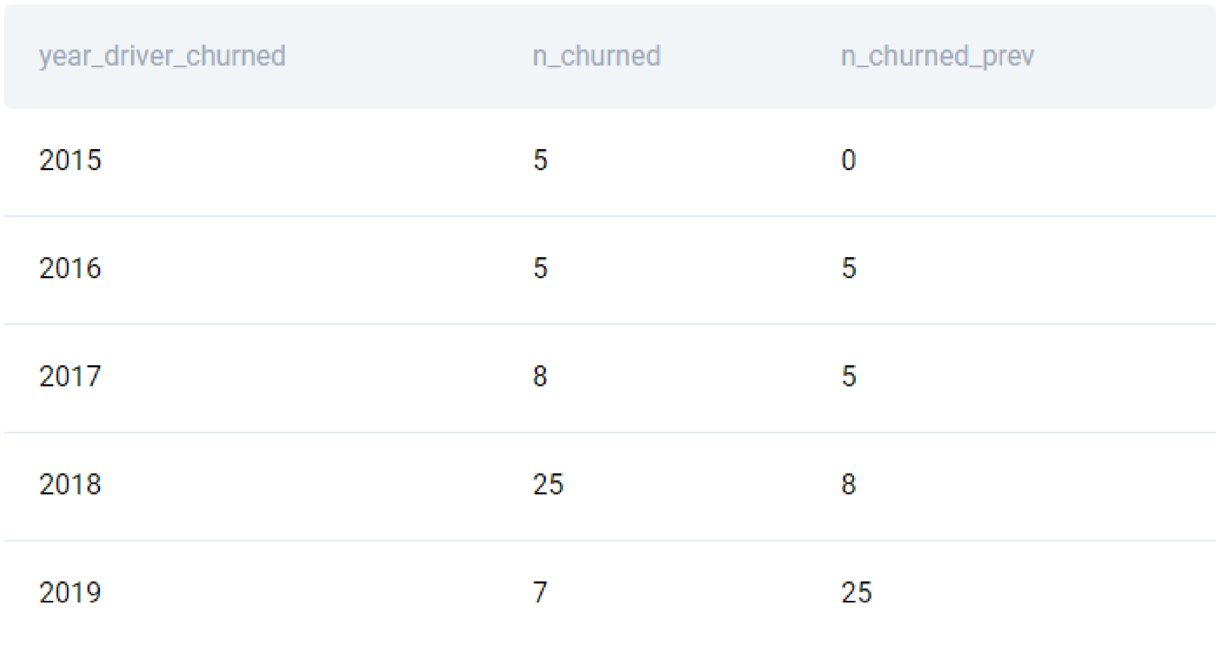
To find the number of churns in each year, simply SELECT **year_driver_churned** values from the subquery and group records by year. Then use the **COUNT()** aggregate function to count the number of records in each group.

We also need to find the number of churns in the previous year. For that, we can use the **LAG()** window function.

The first argument to the **LAG()** function is the **COUNT(*)** aggregate function which counts the number of drivers churned each year. The second argument specifies the number of rows to offset. In this case, it is 1, so **LAG()** will access the value one row before the current one. The third argument to the **LAG()** function is optional and stands for the default value for the first row.

The OVER clause specifies the window frame. In other words, how to apply the window function. We do not have a PARTITION BY subclause, so the function is applied to the entire table. We only order records by **year_driver_churned** value.

```
SELECT year_driver_churned,
          COUNT(*) AS n_churned,
          LAG(COUNT(*), 1, '0') OVER (ORDER BY year_driver_churned) AS
n_churned_prev
   FROM
     (SELECT DATE_PART('year', end_date::date) AS year_driver_churned
      FROM lyft_drivers
      WHERE end_date IS NOT NULL) base
   GROUP BY year_driver_churned
   ORDER BY year_driver_churned ASC
```



year_driver_churned	n_churned	n_churned_prev
2015	5	0
2016	5	5
2017	8	5
2018	25	8
2019	7	25

3. Create a text value to describe change

The previous query returns three of the four necessary values for the final answer - year, churn for that year, and churn for the previous year.

We should SELECT all three values from the result of the query.

Finally, we need to generate the fourth value - a text to describe changes in churn number. We can use a CASE expression to compare churn rates and return corresponding text.

```
SELECT *,
       CASE
           WHEN n_churned > n_churned_prev THEN 'increase'
           WHEN n_churned < n_churned_prev THEN 'decrease'
           ELSE 'no change'
       END
```

```
FROM
  (SELECT year_driver_churned,
          COUNT(*) AS n_churned,
          LAG(COUNT(*), 1, '0') OVER (
                                      ORDER BY year_driver_churned) AS
n_churned_prev
   FROM
     (SELECT DATE_PART('year', end_date::date) AS year_driver_churned
      FROM lyft_drivers
      WHERE end_date IS NOT NULL) base
   GROUP BY year_driver_churned
   ORDER BY year_driver_churned ASC) calc
```

Try running the query to see if it returns the expected answer.

Output
The answer to this data analytics interview question should contain four values: years (ordered in ascending order), drivers churned for this year, for the previous year, and text to represent changes in the churn rate.

year_driver_churned	n_churned	n_churned_prev	case
2015	5	0	increase
2016	5	5	no change
2017	8	5	increase
2018	25	8	increase
2019	7	25	decrease

Question 2: Finding Minimum, Average, and Maximum Prices And Working With Strings

"You're given a table of rental property searches by users. The table consists of search results and outputs host information for searchers. Find the minimum, average, maximum rental prices for each host's popularity rating. The host's popularity rating is defined as below:
0 reviews: New
1 to 5 reviews: Rising
6 to 15 reviews: Trending Up
16 to 40 reviews: Popular
more than 40 reviews: Hot

Tip: The `id` column in the table refers to the search ID. You'll need to create your own host_id by concating price, room_type, host_since, zipcode, and number_of_reviews.

Output host popularity rating and their minimum, average and maximum rental prices."

Link to the question: https://platform.stratascratch.com/coding/9632-host-popularity-rental-prices

Understand the Question
In this data analytics interview question, Airbnb interviewers want us to calculate pricing differences between established and new hosts on its platform.

In data analytics and many of its sub categories (cost analytics, revenue analytics, inventory management) you'll often have to aggregate data for groups based on the company's internal categories and definitions. For example, while doing revenue analytics, you may need to compare revenue from loyalty program members vs regular users.

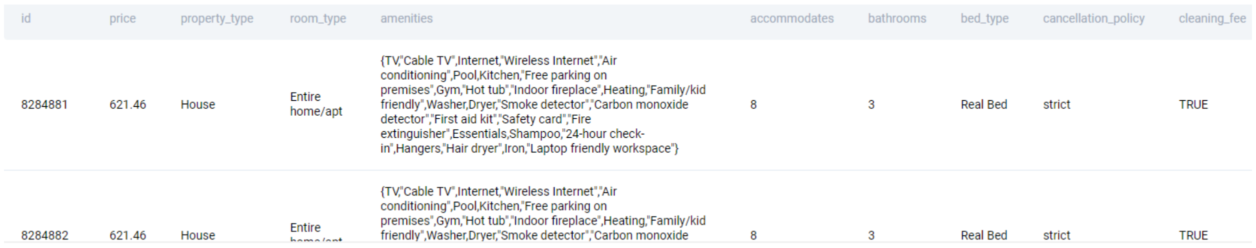
Also, not all data in databases is numerical. Data analysts often have to work with textual data. This question is a great example for that, because we'll need to concatenate several string values into one.

Available data

To answer this question, we need to work with the **airbnb_host_searches** table. It has 20 columns.

When doing advanced data analytics, sometimes you have to sort through a lot of unnecessary information to find important pieces of data.

Let's look at the table and identify important columns.



id	price	property_type	room_type	amenities	accommodates	bathrooms	bed_type	cancellation_policy	cleaning_fee
8284881	621.46	House	Entire home/apt	{TV,"Cable TV",Internet,"Wireless Internet","Air conditioning",Pool,Kitchen,"Free parking on premises",Gym,"Hot tub","Indoor fireplace",Heating,"Family/kid friendly",Washer,Dryer,"Smoke detector","Carbon monoxide detector","First aid kit","Safety card","Fire extinguisher",Essentials,Shampoo,"24-hour check-in",Hangers,"Hair dryer",Iron,"Laptop friendly workspace"}	8	3	Real Bed	strict	TRUE
8284882	621.46	House	Entire	{TV,"Cable TV",Internet,"Wireless Internet","Air conditioning",Pool,Kitchen,"Free parking on premises",Gym,"Hot tub","Indoor fireplace",Heating,"Family/kid friendly",Washer,Dryer,"Smoke detector","Carbon monoxide	8	3	Real Bed	strict	TRUE

- The question tells us to output minimum, maximum and average prices, so the **price** column is most likely important
- **number_of_reviews** values will be used to define host categories, so they are also important.
- We need to concatenate **price**, **room_type**, **host_since**, **zipcode**, **number_of_reviews** values to create unique identifier for each host

Logical Approach

The question asks us to find minimum, average and maximum prices for hosts with different numbers of reviews. We will need to categorize hosts based on the number of reviews.

Also there is no unique identifier for hosts. **id** values identify user searches. The question tells us to create a new **id** value by concatenating the following values: **price**, **room_type**, **host_since**, **zipcode**, and **number_of_reviews**.

Two values are really important for answering this question - number of reviews and price of the rental. Both of these values are already in the table, but the question also tells us to generate a new value to identify each host.

Next, we create a new value - host category depending on the number of reviews. We can use the CASE expression to evaluate **number_of_reviews** and return corresponding text value (‘new’, ‘rising’ and so on). This query should also return the corresponding **price** for each property.

At this point, every record contains two values - host category and rental price. We can group hosts by category and use **MIN()**, **MAX()**, and **AVG()** aggregate functions to find the lowest, highest and average prices for each group.

Write The Code

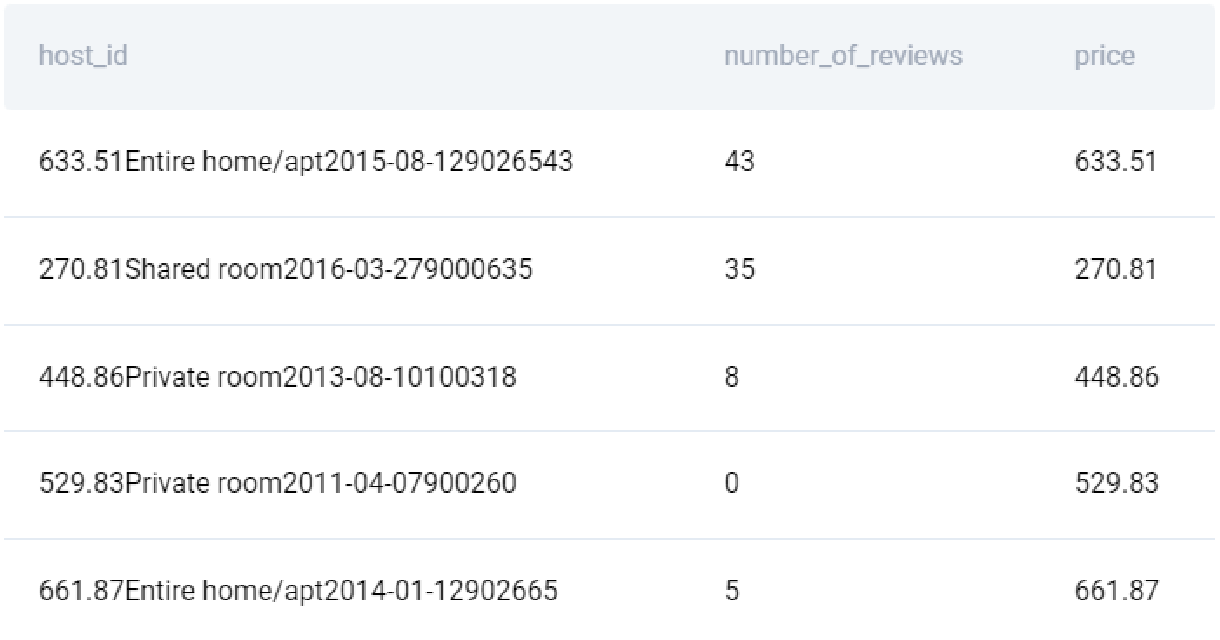
1. **List hosts with the corresponding number of reviews and price**

The table contains much information. Two values are essential for finding an answer - **number_of_reviews,** and **price**. We should SELECT these values.

The question also tells us to create a new value to identify each host. To do this, we concatenate **price**, **room_type**, **host_since**, **zipcode**, and **number_of_reviews** values.

We use the DISTINCT clause to make sure **host_id** values are unique.

```
SELECT DISTINCT CONCAT(price, room_type, host_since, zipcode,
number_of_reviews) AS host_id,
          number_of_reviews,
          price
   FROM airbnb_host_searches
```



host_id	number_of_reviews	price
633.51Entire home/apt2015-08-129026543	43	633.51
270.81Shared room2016-03-279000635	35	270.81
448.86Private room2013-08-10100318	8	448.86
529.83Private room2011-04-07900260	0	529.83
661.87Entire home/apt2014-01-12902665	5	661.87

In the next step, we'll write this query as a CTE and define the host categories.

2. Define host categories

We need to work with the result of the query from step 1.

First, we need a CASE expression that looks at the number of reviews and returns one of these values: 'New', 'Rising', 'Trending Up', 'Popular', and 'Hot'.

Save the result of the CASE expression as ‘host_popularity’.

We also need to SELECT price values to find minimum, maximum, and average prices for each host category.

```
WITH hosts AS
  (SELECT DISTINCT CONCAT(price, room_type, host_since, zipcode,
number_of_reviews) AS host_id,
          number_of_reviews,
          price
   FROM airbnb_host_searches)

SELECT CASE
              WHEN number_of_reviews = 0 THEN 'New'
              WHEN number_of_reviews BETWEEN 1 AND 5 THEN 'Rising'
              WHEN number_of_reviews BETWEEN 6 AND 15 THEN 'Trending Up'
              WHEN number_of_reviews BETWEEN 16 AND 40 THEN 'Popular'
              WHEN number_of_reviews > 40 THEN 'Hot'
          END AS host_popularity,
          price
   FROM hosts
```

3. **Find minimum, maximum, and average prices for each category of hosts**

Let’s SELECT **host_popularity** values and group records by this value.

Then use **MIN(), MAX(), and AVG()** aggregate functions to find the lowest, highest, and average prices for each group.

The query from the previous step will now become a subquery in the FROM clause.

```
WITH hosts AS
  (SELECT DISTINCT CONCAT(price, room_type, host_since, zipcode,
number_of_reviews) AS host_id,
          number_of_reviews,
          price
   FROM airbnb_host_searches)
SELECT host_popularity AS host_pop_rating,
       MIN(price) AS min_price,
       AVG(price) AS avg_price,
       MAX(price) AS max_price
FROM
  (SELECT CASE
              WHEN number_of_reviews = 0 THEN 'New'
              WHEN number_of_reviews BETWEEN 1 AND 5 THEN 'Rising'
              WHEN number_of_reviews BETWEEN 6 AND 15 THEN 'Trending Up'
              WHEN number_of_reviews BETWEEN 16 AND 40 THEN 'Popular'
              WHEN number_of_reviews > 40 THEN 'Hot'
          END AS host_popularity,
          price
   FROM hosts) a
GROUP BY host_pop_rating
```

Run the query to see its result.

Output

The query should return four columns: host category and minimum, maximum, and average prices for that category.

host_pop_rating	min_price	avg_price	max_price
New	313.55	515.92	741.76
Hot	340.12	464.233	633.51
Popular	270.81	472.815	667.83
Rising	355.53	503.847	717.01
Trending Up	361.09	476.277	685.65

Python Data Analytics Interview Questions

Python is another extremely important skill for doing data analytics.

Question 3: Potentially overbudget projects

"Identify projects that are at risk for going overbudget. A project is considered to be overbudget if the cost of all employees assigned to the project is greater than the budget of the project.

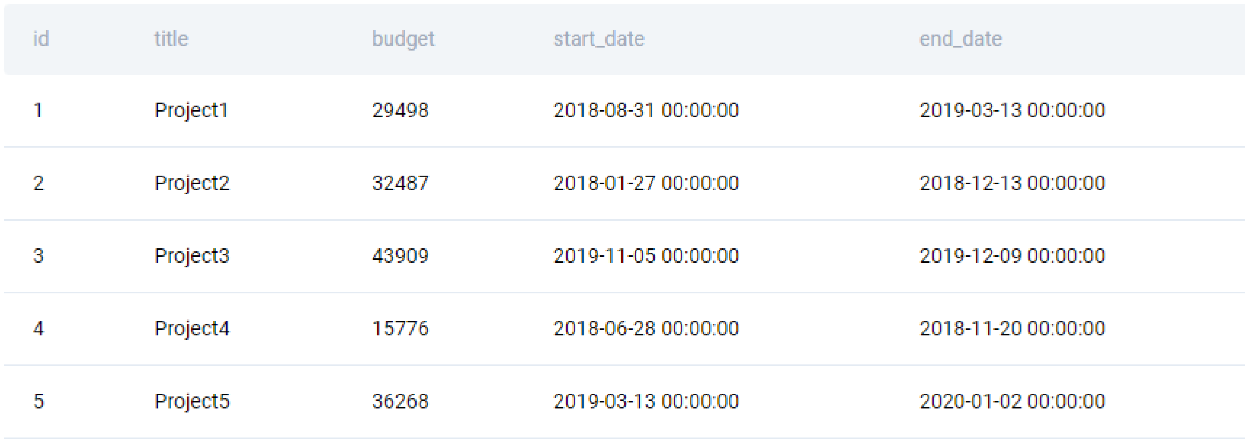
You'll need to prorate the cost of the employees to the duration of the project. For example, if the budget for a project that takes half a year to complete is $10K, then the total half-year salary of all employees assigned to the project should not exceed $10K. Salary is defined on a yearly basis, so be careful how to calculate salaries for the projects that last less or more than one year.

Output a list of projects that are overbudget with their project name, project budget, and prorated total employee expense (rounded to the next dollar amount).”

Link to the question: https://platform.stratascratch.com/coding/10304-risky-projects

Understand the Question
Data analysts often need to analyze internal company data. In this case, we have to analyze data in three separate tables that contain information about projects, employees, and the assignment of employees to projects. Based on our analysis, we must determine whether the total salary of employees assigned to the project exceeds the budget.

Available data
We are given three tables to find the answer. One contains information about projects, one about employees, and a junction table that aligns projects with employees.



id	title	budget	start_date	end_date
1	Project1	29498	2018-08-31 00:00:00	2019-03-13 00:00:00
2	Project2	32487	2018-01-27 00:00:00	2018-12-13 00:00:00
3	Project3	43909	2019-11-05 00:00:00	2019-12-09 00:00:00
4	Project4	15776	2018-06-28 00:00:00	2018-11-20 00:00:00
5	Project5	36268	2019-03-13 00:00:00	2020-01-02 00:00:00

- We’ll use the **id** value to combine **linkedin_projects** with the other two tables.
- We also need to find the difference between **start_date** and **end_date** to calculate project expense for the length of the project.
- We’ll compare project expenses with a **budget** value.
- Project name (**title** column) is also important to find total yearly expenses for the project.

emp_id	project_id
10592	1
10593	2
10594	3
10595	4
10596	5

- **emp_id** identifies employees.
- **project_id** identifies projects.

This is a junction table. Its only purpose is to align employees with projects.

id	first_name	last_name	salary
10592	Jennifer	Roberts	20204
10593	Haley	Ho	33154
10594	Eric	Mccarthy	32360
10595	Gina	Martinez	46388
10596	Jason	Fields	12348

- **id** identifies employees.
- **first_name** and **last_name** values are not important.
- To find total yearly expenses for the project, we need to add up **salary** values for each project.

Logical Approach:
We have information about projects and employees, and need to find projects where the expense is higher than budget.

To calculate project expenses, we need to add up salaries of every employee assigned to the project. First, we need to use the **merge()** function to combine three tables.

Most projects don't last exactly one year. We need to calculate expenses for a specific duration of the project. To do this, calculate the difference between **start_date** and **end_date** values.

To calculate expenses specific duration of a project, first we divide total yearly expense by 365 to find daily expenses. Then multiply that by the number of days the project lasts.

Finally, to answer the question, we should return projects with higher expenses than the allocated budget.

To do this, we should calculate the difference between real expenses (considering project's duration) and allocated budget. The project is over budget if that difference is positive (higher than 0).

We need to return the name, budget, and expenses for the duration of these projects.

Write the Code

1. **Combine three tables**

We need to combine three tables **- linkedin_projects** (contains information about projects), **linkedin_emp_projects** (relationship between employees and projects), **linkedin_employees** (information about employees).

```
import pandas as pd
import numpy as np
from datetime import datetime

df = pd.merge(linkedin_projects, linkedin_emp_projects, how =
'inner',left_on = ['id'], right_on=['project_id'])

df1 = pd.merge(df, linkedin_employees, how = 'inner',left_on = ['emp_id'],
right_on=['id'])
```

We use the **merge()** function to combine **linkedin_projects** and **linkedin_emp_projects** and store the combined result. Then use **merge()** to also combine the **linkedin_employees** table.

In both cases, we use inner join to combine information for projects and employees who work on those projects. We do not need to return projects without employees, or information about employees that do not work on any of the projects in the **linkedin_projects** table.

As a result, the **df1** variable contains information about projects as well as employees. Run the query to see the output.

2. **Calculate expenses for duration of the project**

To do this, first we need to find the duration and total yearly salary cost.

We also need to calculate project duration in days. To do this, find the difference between **end_date** and **start_date** values.

Next, let's find the combined yearly salaries of all employees assigned to each project. Group records by project **title** and aggregate **salary** values.

```
df1['project_duration'] = (pd.to_datetime(df1['end_date']) -
pd.to_datetime(df1['start_date'])).dt.days
df_expense =
df1.groupby('title')['salary'].sum().reset_index(name='expense')
df_budget_expense = pd.merge(df1, df_expense, how = 'left',left_on =
['title'], right_on=['title'])
df_budget_expense['prorated_expense'] =
np.ceil(df_budget_expense['expense']*(df_budget_expense['project_duration']
)/365)
```

Then merge the combined table (**df1**) with **df_expense** to have details of projects, employees, and yearly project expenses in one table. We use left join to return information about all projects, even if we don't have a budget for that project.

Finally, we can calculate expenses for the duration of the project. Multiply the project duration (in days) by total yearly expenses and divide it by 365.

You should give the value a descriptive name, like **prorated_expense**.

Use **np.ceil()** to round expenses to the next dollar amount, as it is specified in the question description.

3. **Output projects that are over budget**

The question tells us to output projects where prorated expenses exceed the budget.

First, we should find a difference between **prorated_expense** and **budget** values. Then create a filtered array **df_over_budget** to store projects where the difference is positive (above 0).

Finally, output **title**, **budget**, and **prorated_expense** values from the filtered table.

```
df_budget_expense['budget_diff'] = df_budget_expense['prorated_expense'] -
df_budget_expense['budget']
df_over_budget = df_budget_expense[df_budget_expense["budget_diff"] > 0]
```

```
result = df_over_budget[['title','budget','prorated_expense']]
result = result.drop_duplicates().sort_values('title')
```

We use the **drop_duplicates()** to remove duplicate records and **sort_values()** to order projects by **title**.

The final answer should look like this:

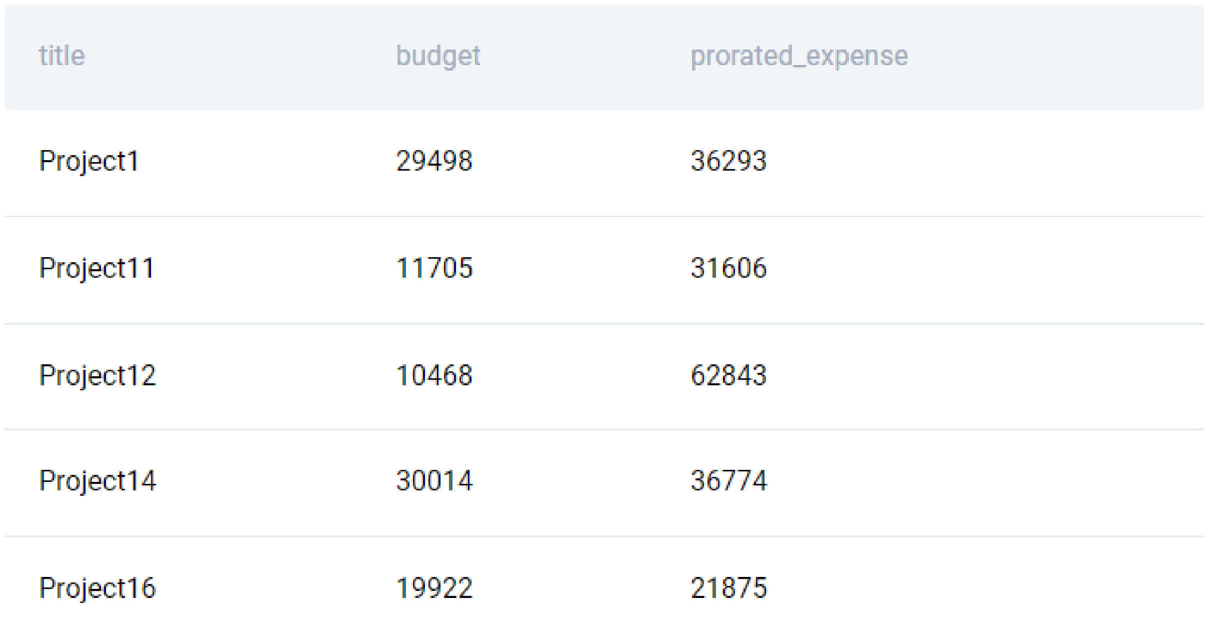
```
import pandas as pd
import numpy as np
from datetime import datetime

df = pd.merge(linkedin_projects, linkedin_emp_projects, how =
'inner',left_on = ['id'], right_on=['project_id'])
df1 = pd.merge(df, linkedin_employees, how = 'inner',left_on = ['emp_id'],
right_on=['id'])
df1['project_duration'] = (pd.to_datetime(df1['end_date']) -
pd.to_datetime(df1['start_date'])).dt.days
df_expense =
df1.groupby('title')['salary'].sum().reset_index(name='expense')
df_budget_expense = pd.merge(df1, df_expense, how = 'left',left_on =
['title'], right_on=['title'])
df_budget_expense['prorated_expense'] =
np.ceil(df_budget_expense['expense']*(df_budget_expense['project_duration']
)/365)
df_budget_expense['budget_diff'] = df_budget_expense['prorated_expense'] -
df_budget_expense['budget']
df_over_budget = df_budget_expense[df_budget_expense["budget_diff"] > 0]
result = df_over_budget[['title','budget','prorated_expense']]
result = result.drop_duplicates().sort_values('title')
```

Run the query to see if it returns the right answer.

Output

The query should return **title** (project name), **budget**, and **prorated_expense** (expense based on the duration of the project). Expenses should be higher than the budget.



title	budget	prorated_expense
Project1	29498	36293
Project11	11705	31606
Project12	10468	62843
Project14	30014	36774
Project16	19922	21875

Question 4: Counting Instances and Working With Strings

“You're given a dataset of searches for properties on Airbnb. For simplicity, let's say that each search result (i.e., each row) represents a unique host. Find the city with the most amenities across all their host's properties. Output the name of the city.”

Link to the question: https://platform.stratascratch.com/coding/9633-city-with-most-amenities

Understand Question

When doing data analytics, sometimes you need to work with millions of records that describe a specific product, event, action, or any other instance. During an interview, you may be asked to aggregate records to get insights about a certain segment or category, e.g., the number of products, buyers, orders, etc.

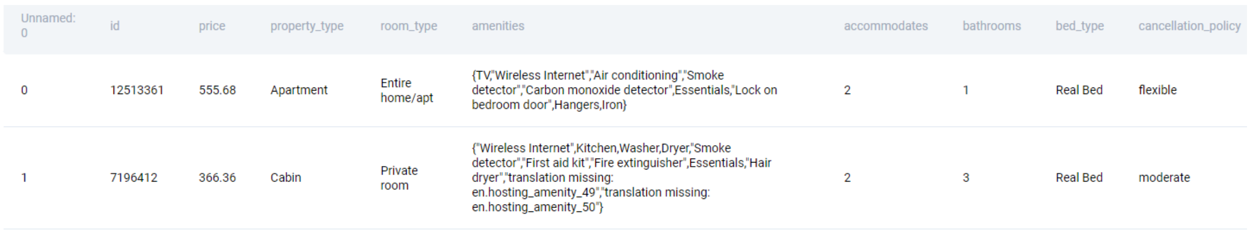
In this data analytics interview question, we need to aggregate individual search results to find the number of amenities in each city and then return the city with the most amenities.

We’ll again need to work with string values, but this time in Python.

Available data

We are given information about Airbnb searches and have to perform data analytics to find the city with the most amenities.

Let’s look at the **airbnb_search_details** table. It contains many values.



Unnamed: 0	id	price	property_type	room_type	amenities	accommodates	bathrooms	bed_type	cancellation_policy
0	12513361	555.68	Apartment	Entire home/apt	{TV,"Wireless Internet","Air conditioning","Smoke detector","Carbon monoxide detector",Essentials,"Lock on bedroom door",Hangers,Iron}	2	1	Real Bed	flexible
1	7196412	366.36	Cabin	Private room	{"Wireless Internet",Kitchen,Washer,Dryer,"Smoke detector","First aid kit","Fire extinguisher",Essentials,"Hair dryer","translation missing: en.hosting_amenity_49","translation missing: en.hosting_amenity_50"}	2	3	Real Bed	moderate

Out of these values, we’ll need only two:
- **amenities** contains the list of amenities for every individual search result.
- We need to group records by **city**

Logical Approach

This is a little challenging. Values in the **amenities** column are lists of amenities for each host. We need to find the number of amenities by city across all host properties.

First, we need to find the number of amenities for each host. Save this number. Then group hosts by **city** and find the total number of amenities by all hosts in a specific city.

Finally, we can use the **MAX()** aggregate function to find the city with the highest number of amenities.

Write the Code

1. Find the number of amenities for each host

The question tells us to treat each row as if it represents one host. Amenities value is an object that contains the list of all amenities.

Each string in the column amenities is separated by a comma, so we can simply convert the **amenities** to a string and count the instances of a comma (‘,’) in the string.

Lists don’t have a comma at the beginning or the end. The number of items separated by a comma is the number of commas + 1.

```
import pandas as pd
import numpy as np

df = airbnb_search_details
```

```python
df['amenities_count'] = df['amenities'].str.count(',')+1
```

2. **Find the number of amenities in each city**

Next, we need to use the **df.groupby()** function to group records by **city** values. Then use the **agg()** function to sum the total of **amenities_count** values for each group.

```python
grouped_asd = df.groupby('city',as_index=False).agg({'amenities_count':'sum'})
```

3. **Return the city with the highest number of amenities**

In the previous step, we created a **grouped_asd** variable that contains cities and their corresponding number of amenities.

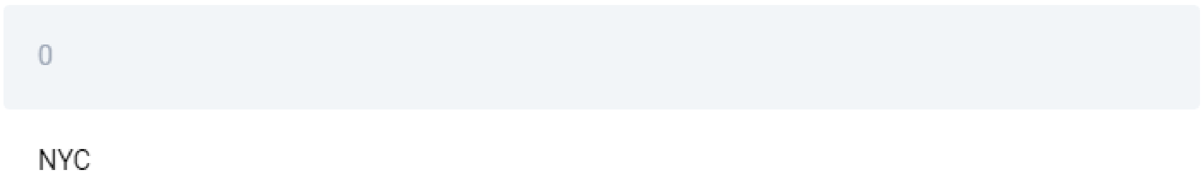
We must filter the **group_asd** array to find the record with the highest **amenities_count** value. Then access the **city** value of that record.

```python
max_city = grouped_asd[grouped_asd['amenities_count'] ==
max(grouped_asd['amenities_count'])]['city'].tolist()
result = max_city
```

Try running the query to see if it matches the expected outcome.

Output

Final answer should include a single value - the city with the highest number of amenities. Yes, it's New York City.



0
NYC

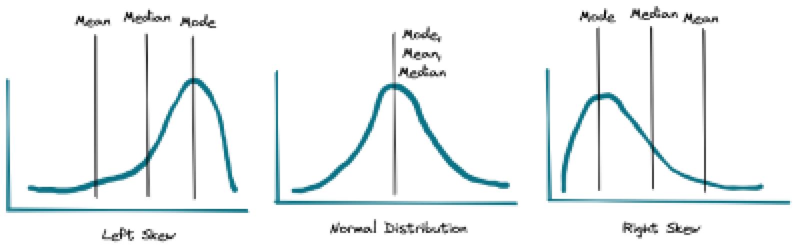
Data Analytics Interview Questions on Probability and Statistics

When interviewing for a senior data analytics role, you might be asked about probability and statistics.

We will here focus on the non-coding statistical questions. However, you might also be required to show your statistical knowledge in Python, too. For that, we have a Python Cheat Sheet where you can find practical examples of doing summary statistics in Python, as well as other helpful Python concepts.

Statistics Question: Analyzing Skewed Data

Analysts sometimes need to work with data with an uneven distribution where mode, median, and mean values are far apart from one another.



Skewed data can prevent us from doing (quality) statistical analysis. Important statistical tools like Z-test, t-test, and ANOVA work under the assumption that the error is normally distributed.

When interviewing for a senior position, interviewers might ask you to explain your approach to working with skewed data to get accurate results.

Let's look at the specific wording of the question:

"What methods can be used when analysing skewed data?"

Link to the question: https://platform.stratascratch.com/technical/2332-skewed-data

Answer:
There are two ways to approach skewed data. One is to transform it into the square root or log representations. This eliminates the worst side effects of skewed data. Then we can conduct statistical tests as if it's normally distributed.

The second is to conduct non-parametric statistical tests. This is especially effective for small samples of data. When working with skewed data, it's better to make inference about the median, not the mean.

The most useful non-parametric statistical tests are: the Mann-Whitney test, Friedman test, Spearman rank correlation, and Kruskall-Walis test.

Probability Question: Expected Cost of Promotion

Data analysts sometimes need to use probability concepts and formulas to measure and predict things that haven't yet happened.

This data analytics interview question is a prime example. Ride-hailing company Lyft plans to run a promotion, and it's your job to estimate the cost of the promotion.

The company plans to give out $5 discounts to its riders. You need to calculate the total cost of the campaign.

Let's look at the specific wording of the question:

"A $5 discount coupon is given to N riders. The probability of using a coupon is P. What is the expected cost for the company?"

Link to the question: https://platform.stratascratch.com/technical/2310-cost-of-discount-coupons

Answer:
We'll use the probability distribution function to answer this question. The output of the function depends on two variables: P and N.

P is the probability of customers using the coupon. The specific number is not given, so we can simply use P in the formula.

N is the number of riders who receive the discount.

A general formula for calculating the dollar amount of N number of customers using the coupon with a probability of P would be:

$E(x) = N * P$

But this doesn't account for the dollar value of each discount, which is 5. So the final answer would be:

$E(x) * 5 = N * P * 5$

Read Probability and Statistics Interview Questions (https://www.stratascratch.com/blog/30-probability-and-statistics-interview-questions-for-data-scientists/) for more.

Summary

Data analytics is an important process of finding stories in seemingly meaningless series of numbers, texts, dates, and other bits of data. Executives at big companies often use these insights to make important decisions.

In this article, we looked at advanced data analytics interview questions you can expect when interviewing for data analyst positions.

If you enjoyed going through these data analytics interview questions, you can find many more on the StrataScratch platform. There are hundreds of coding and non-coding challenges of varying difficulty levels. The platform allows you to practice writing SQL and Python code, as well as important concepts of probability and statistics.