SQL

PROJECT

PRESENTED BY | MAHESH

Credit Card Analysis
Spending Habits in India

TOOLS USED

Datasets

Written using VS Code

Data Visualization

1.

Query: write a query to print top 5 cities with highest spends and their percentage contribution of total credit card spends

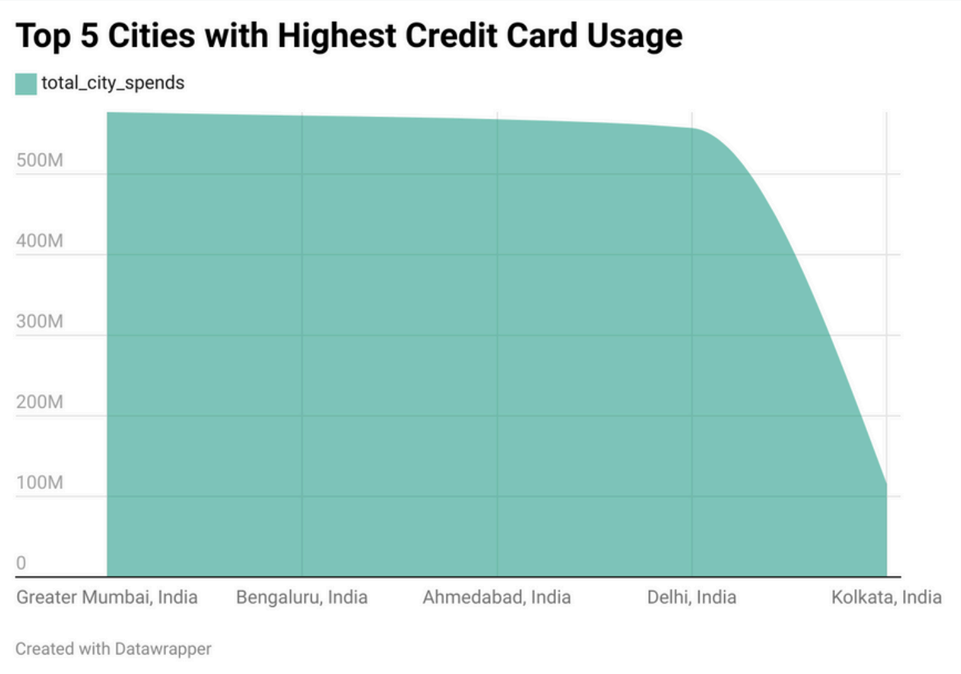
```
SELECT TOP 5 city, SUM(amount) total_city_spends,
    ROUND((SUM(amount) / (SELECT SUM(c1.amount) FROM credit_card_transactions c1))*100, 2) spend_percentage
FROM credit_card_transactions
GROUP BY city
ORDER BY total_city_spends DESC
```

Output:

RESULTS

	city	total_city_spends	spend_percentage
1	Greater Mumb...	576751476	14.15
2	Bengaluru, India	572326739	14.05
3	Ahmedabad, In...	567794310	13.93
4	Delhi, India	556929212	13.67
5	Kolkata, India	115466943	2.83

Visual:



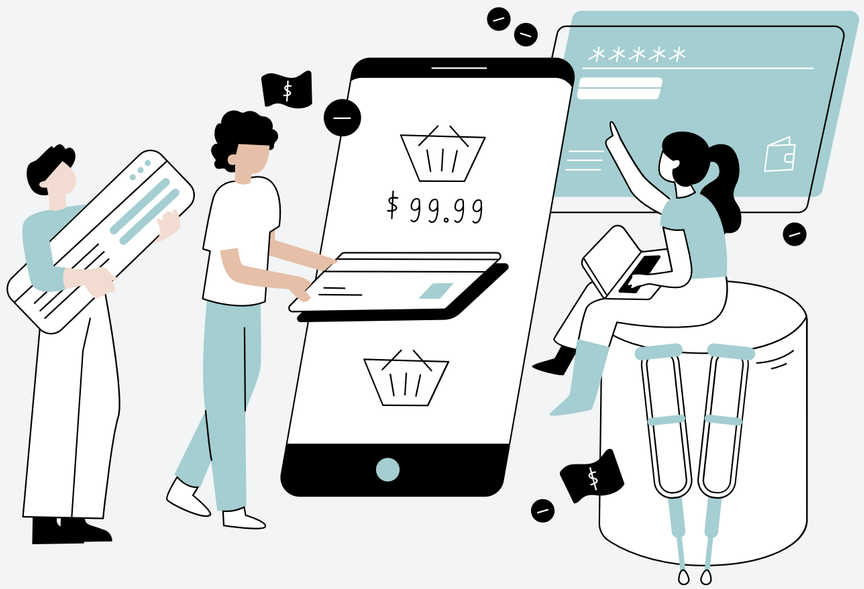
2. **Query:** write a query to print highest spend month and amount in that month for each card type

```sql
WITH transactions AS (SELECT
    card_type,
    DATEPART(YEAR, transaction_date) T_Year,
    DATEPART(MONTH,  transaction_date) T_Month,
    sum(amount) as total_spend
FROM credit_card_transactions
GROUP BY card_type, DATEPART(YEAR, transaction_date), DATEPART(MONTH,  transaction_date)
),
type_rank as (
SELECT *, rank() OVER(PARTITION BY card_type ORDER BY total_spend DESC) AS rnk
FROM transactions
)
SELECT card_type, T_Year, T_Month, total_spend
FROM type_rank
WHERE rnk = 1
```

Output:

RESULTS

	card_type	T_Year	T_Month	total_spend
1	Gold	2015	1	55455064
2	Platinum	2014	8	57936507
3	Signature	2013	12	58799522
4	Silver	2015	3	59723549



Insight: Highest Spend Month and Amount for Each Card Type

Our analysis reveals the highest spend month and corresponding amount for each credit card type, providing valuable insights into customer spending behavior.

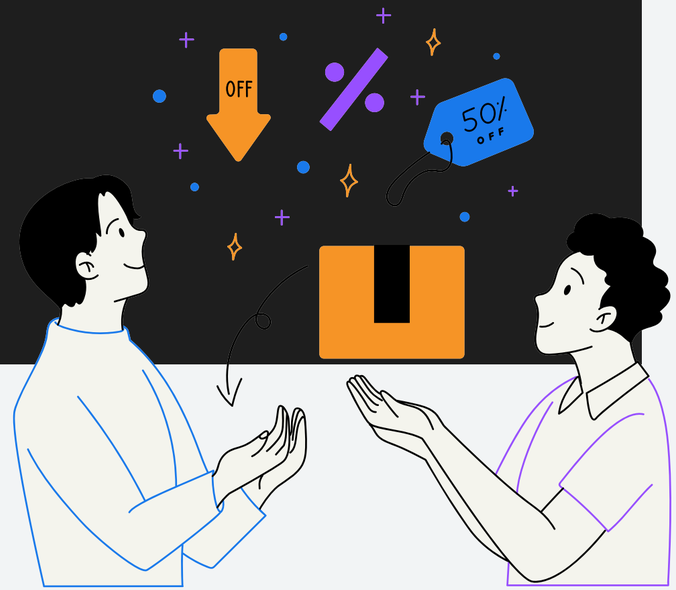
Key Findings:

- **Gold Card:** The highest spend month for Gold cardholders is January 2015, with a total spend of ₹55,455,064. This suggests that Gold cardholders tend to spend more during the beginning of the year, possibly due to New Year's sales.
- **Platinum Card:** Platinum cardholders recorded their highest spend in August 2014, with a total amount of ₹57,936,507. This could indicate a peak in Independence Day sale promotion or back-to-school expenses or Pre-festive season shopping (e.g., Raksha Bandhan, Ganesh Chaturthi)
- **Signature Card:** The highest spend month for Signature cardholders is December 2013, with a total spend of ₹58,799,522. This is likely due to year-end expenses.
- **Silver Card:** Silver cardholders had their highest spend in March 2015, with a total amount of ₹59,723,549. This may be attributed to festive season shopping or Pre-summer vacation expenses.

3. **Query:** Identify the transaction details for each card type when the cumulative total spend reaches ₹1,000,000, and provide all transaction details for those specific transactions?

```sql
WITH cumulative_amount AS (
SELECT *,
    SUM(amount) OVER(PARTITION BY card_type ORDER BY transaction_date, transaction_id) AS total_spend
FROM credit_card_transactions
)

SELECT *
FROM (SELECT *,
        RANK() OVER(PARTITION BY card_type ORDER BY total_spend) rn
    FROM cumulative_amount
    WHERE total_spend >= 1000000
) AS cumulative_spend
WHERE rn = 1
```



Output:

RESULTS

	transaction_id	city	year	month	card_type	exp_type	gender	amount	total_spend
1	1521	Delhi, India	2013	10	Gold	Food	M	281924	1272624
2	190	Ahmedabad, In...	2013	10	Platinum	Bills	F	612572	1537482
3	72	Delhi, India	2013	10	Signature	Bills	F	550782	1285819
4	7564	Bengaluru, India	2013	10	Silver	Food	F	205179	1115582

Insights:

This output helps identify the transaction details for each card type when the cumulative total spend reaches ₹1,000,000, providing insights into:

- The spending habits and patterns of high-value customers
- The categories and cities driving high spends for each card type
- The potential for targeted marketing and loyalty programs
- The differences in spending behavior across card types and demographics

These insights can inform marketing strategies, product offerings, and customer retention efforts.

4. **Query:** What is the total spend for each card type, ranked in descending order?

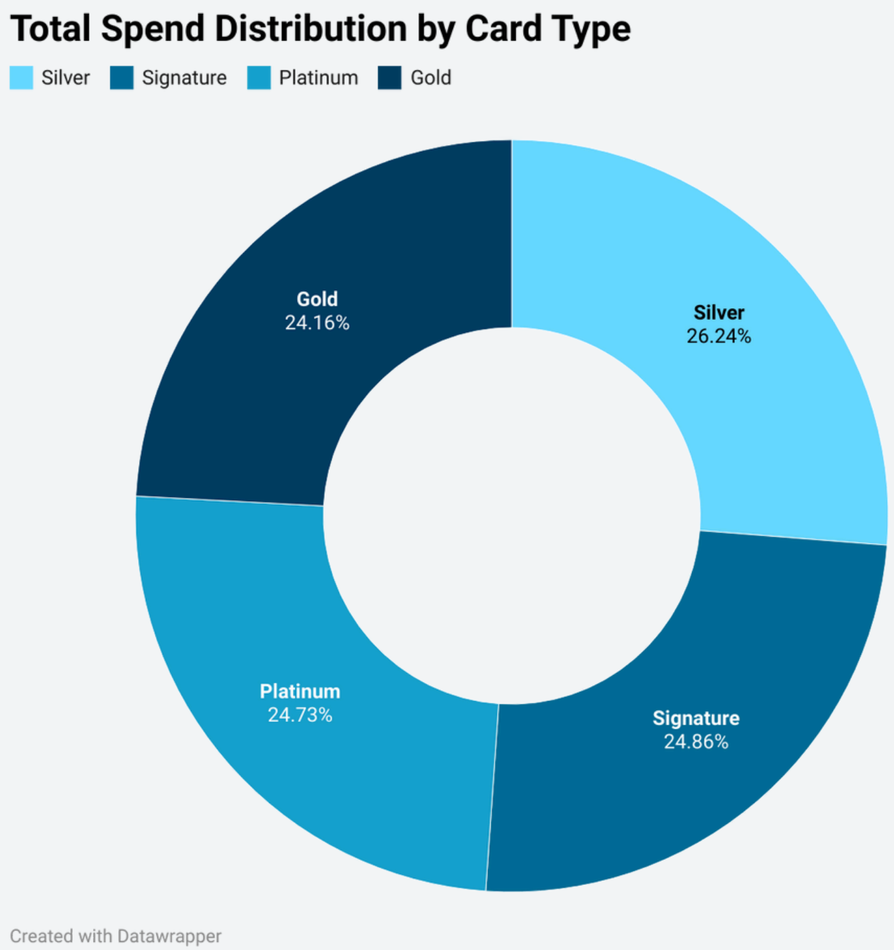
```
SELECT  card_type, SUM(amount) total_spend
FROM credit_card_transactions
GROUP BY card_type
ORDER BY total_spend DESC
```

Output:

RESULTS

	card_type	total_spend
1	Silver	1069613713
2	Signature	1013041105
3	Platinum	1007639019
4	Gold	984539536

Visual:



5. **Query:** What is the percentage of total spend by females and males for each expense type, along with the total spend amount

```sql
SELECT *,
    ROUND((female_spend / total_spend)*100, 2) female_spend_Pct,
    total_spend - female_spend male_spend,
    100 - ROUND((female_spend / total_spend)*100, 2) male_spend_Pct
FROM(
SELECT exp_type, SUM(amount) total_spend,
    SUM(CASE WHEN gender = 'F' THEN amount END) AS female_spend
FROM credit_card_transactions
GROUP BY exp_type) female_spend_analysis
ORDER BY total_spend DESC;
```

Output:

RESULTS

	exp_type	total_spend	female_spend	female_spend_Pct	male_spend	male_spend_Pct
1	Bills	907072473	580035469	63.95	327037004	36.05
2	Food	824724009	452817279	54.91	371906730	45.09
3	Fuel	789135821	392282421	49.71	396853400	50.29
4	Entertainment	726437536	358663333	49.37	367774203	50.63
5	Grocery	718207923	365646998	50.91	352560925	49.09
6	Travel	109255611	55865530	51.13	53390081	48.87

Insights:

This query provides insights into the gender-wise spending habits across different expense types, revealing:

- Varying levels of gender participation in different expense categories
- Expense types where females or males dominate spending
- Opportunities to target specific gender groups with tailored marketing strategies
- Potential biases in spending behavior across different expense types

These insights can inform targeted marketing, product development, and customer engagement strategies.

6. **Query:** Which city has the highest average spend on weekends?

```sql
SELECT TOP 1 city, SUM(amount) total_spend, COUNT(*) no_of_transaction, FLOOR(AVG(amount)) transaction_ratio
FROM credit_card_transactions
WHERE DATEPART(WEEKDAY,transaction_date) in (1,7)
GROUP BY city
ORDER BY transaction_ratio DESC;
```

Output:

RESULTS

	city	total_spend	no_of_transacti...	transaction_ratio
1	Sonepur, India	299905	1	299905

Insights: This query reveals that Sonepur, India has the highest average spend during weekends, indicating:

- A high-value customer base in Sonepur, with a significant average transaction amount
- Potential opportunities for targeted marketing and loyalty programs in this city
- Insights into weekend spending habits, which can inform business strategies and resource allocation

Note: The low number of transactions (1) in the output may indicate a need for further analysis to confirm the trend.

Note: This query builds upon the previous one by filtering out cities with very few transactions, providing more reliable insights into weekend spending habits.

Query: Which cities have the highest average weekend spend, with a minimum of 200 transactions, and what are the total spends and number of transactions for these cities?

```sql
SELECT city, SUM(amount) total_spend, COUNT(*) no_of_transaction, FLOOR(AVG(amount)) transaction_ratio
FROM credit_card_transactions
WHERE DATEPART(WEEKDAY,transaction_date) in (1,7)
GROUP BY city
HAVING count(*) > 200
ORDER BY transaction_ratio DESC;
```

Output:

RESULTS

	city	total_spend	no_of_transacti...	transaction_ratio
1	Greater Mumb...	172418991	1017	169536
2	Delhi, India	164810553	983	167660
3	Bengaluru, India	166140238	1050	158228
4	Lucknow, India	33877673	217	156118
5	Ahmedabad, In...	161356124	1036	155749
6	Surat, India	32766659	211	155292
7	Hyderabad, India	35996951	242	148747
8	Kolkata, India	31179970	210	148476
9	Kanpur, India	31834380	215	148066
10	Chennai, India	32838233	223	147256
11	Jaipur, India	33909676	232	146162
12	Pune, India	29494294	206	143176

Insight:

This query provides insights into weekend spending habits in cities with a significant number of transactions (>200), revealing:

- Top cities with high average weekend spends, indicating strong consumer demand
- Cities with a large number of transactions, suggesting busy commercial centers
- Opportunities for targeted marketing and resource allocation in these cities

7. **Query:** What is the total spend for each card type, ranked in descending order?

```sql
WITH rn_cte AS(
SELECT *, ROW_NUMBER() OVER(PARTITION BY city ORDER BY transaction_date) rn
FROM credit_card_transactions)
SELECT TOP 1 city, datediff(day, min(transaction_date), max(transaction_date)) no_of_days
FROM rn_cte
WHERE rn = 1 or rn = 500
GROUP BY city
HAVING COUNT(*) = 2
ORDER BY no_of_days
```

Output:

RESULTS

	city	no_of_days
1	Bengaluru, India	81

Insight:

This query reveals the city with the shortest time span between the first and 500th transactions, indicating:

- Bengaluru, India has the fastest growth in transactions, reaching 500 transactions in just 81 days
- Potential for rapid business expansion and market penetration in this city

8. **Query:** Which card type and expense type combination experienced the highest month-over-month growth in January 2024, and what was the percentage increase?

```sql
WITH prev_month AS(
SELECT *, LAG(total_spend, 1) OVER(PARTITION BY card_type, exp_type ORDER BY ty, tm)  prev_spend
FROM (
SELECT card_type, exp_type, SUM(amount) total_spend, DATEPART(YEAR, transaction_date) ty, DATEPART(MONTH, transaction_date) tm
FROM credit_card_transactions
GROUP BY card_type, exp_type, DATEPART(YEAR, transaction_date) , DATEPART(MONTH, transaction_date)
)year_month_transactions
)
SELECT top 1 *, (total_spend - prev_spend) growth_in_spend, ROUND(((total_spend - prev_spend) / prev_spend)*100 ,2) growth_percentage
FROM prev_month
WHERE prev_spend IS NOT NULL  AND ty =2014 AND tm=01
ORDER BY growth_in_spend DESC
```

Output:

RESULTS

	card_type	exp_type	total_spend	ty	tm	prev_spend	growth_in_spend	growth_percentage
1	Platinum	Grocery	12256343	2014	1	7757562	4498781	57.99

Insight:

This query identifies the card type and expense type combination with the highest month-over-month growth in January 2024, revealing:

- Platinum card holders' grocery expenses saw a significant 57.99% growth in January 2024
- Opportunities for targeted marketing and loyalty programs for Platinum card holders in the grocery segment

Note: This query is similar to the previous one, but with a key difference - it orders the results by growth percentage instead of growth in spend, providing insights into the highest percentage increase rather than the absolute growth amount.

9. **Query:** Which card type and expense type combination experienced the highest month-over-month growth percentage in January 2024?

```
WITH prev_month AS(
SELECT *, LAG(total_spend, 1) OVER(PARTITION BY card_type, exp_type ORDER BY ty, tm)  prev_spend
FROM (
SELECT card_type, exp_type, SUM(amount) total_spend, DATEPART(YEAR, transaction_date) ty, DATEPART(MONTH, transaction_date) tm
FROM credit_card_transactions
GROUP BY card_type, exp_type, DATEPART(YEAR, transaction_date) , DATEPART(MONTH, transaction_date)
)year_month_transactions
)
SELECT top 1 *, (total_spend - prev_spend) growth_in_spend, ROUND(((total_spend - prev_spend) / prev_spend)*100 ,2) growth_percentage
FROM prev_month
WHERE prev_spend IS NOT NULL  AND ty =2014 AND tm=01
ORDER BY growth_percentage DESC
```

Output:

RESULTS

	card_type	exp_type	total_spend	ty	tm	prev_spend	growth_in_spend	growth_percen...
1	Gold	Travel	2092554	2014	1	1113534	979020	87.92

Insight:

This query identifies the card type and expense type combination with the highest month-over-month growth percentage in January 2024, revealing:

- Gold card holders' travel expenses saw the highest growth, with an impressive 87.92% increase
- Opportunities for targeted marketing and loyalty programs for Gold card holders in the travel segment, focusing on high-growth areas

10. **Query:** What are the highest and lowest expense types for each city, based on total spend?

```sql
WITH total_transactions AS(
SELECT city, exp_type, SUM(amount) AS total_amount FROM credit_card_transactions
GROUP BY city, exp_type),
city_rank AS
(SELECT *,
    RANK() OVER(PARTITION BY city ORDER BY total_amount DESC) rn_desc,
    RANK() OVER(PARTITION BY city ORDER BY total_amount) rn_asc
FROM total_transactions)

SELECT
    city , MAX(CASE WHEN rn_asc=1 THEN exp_type END) AS lowest_exp_type,
    MIN(CASE WHEN rn_desc=1 THEN exp_type END) AS highest_exp_type
FROM city_rank
GROUP BY  city;
```

Insight:

Output:

RESULTS

	city	lowest_exp_type	highest_exp_ty...
1	Achalpur, India	Entertainment	Grocery
2	Adilabad, India	Food	Bills
3	Adityapur, India	Grocery	Food
4	Adoni, India	Entertainment	Bills
5	Adoor, India	Bills	Fuel
6	Afzalpur, India	Food	Fuel
7	Agartala, India	Food	Grocery
8	Agra, India	Grocery	Bills
9	Ahmedabad, In...	Grocery	Bills
10	Ahmednagar, I...	Grocery	Fuel
11	Aizawl, India	Grocery	Food
12	Ajmer, India	Fuel	Entertainment
13	Akola, India	Fuel	Bills
14	Akot, India	Entertainment	Fuel
15	Alappuzha, India	Entertainment	Food
16	Aligarh, India	Entertainment	Bills
17	Alipurduar, India	Entertainment	Food
18	Alirajpur, India	Entertainment	Entertainment
19	Allahabad, India	Bills	Grocery

MESSAGES

Timestamp	Message
11:02:08 PM]	Started executing query at Line 1
	Warning: Null value is eliminated by an aggregate or other
	(986 rows affected)
	Total execution time: 00:00:51.871

Insight:

This query provides insights into the expense habits of each city, revealing:

- The most expensive and least expensive expense types for each city
- Opportunities for targeted marketing and resource allocation based on city-specific expense patterns
- Potential areas for cost optimization and budgeting in each city

11. **Query:** What is the total spend for each city, and how do they rank in terms of total spend?

```sql
SELECT city, SUM(amount) total_spend
FROM credit_card_transactions
GROUP BY city
ORDER BY total_spend DESC
```

Output:

RESULTS

	city	total_spend
1	Greater Mumb...	576751476
2	Bengaluru, India	572326739
3	Ahmedabad, In...	567794310
4	Delhi, India	556929212
5	Kolkata, India	115466943
6	Lucknow, India	115334476
7	Chennai, India	114730600
8	Hyderabad, India	114493477
9	Surat, India	114486151
10	Kanpur, India	114370532
11	Jaipur, India	111136855
12	Pune, India	109313930
13	Bathinda, India	2767609
14	Udaipur, India	2498194
15	Ramnagar, India	2448619
16	Vijayapura, India	2445557
17	Kalyan-Dombiv...	2436920
18	Nokha, India	2410357
19	Fatehpur Sikri, I...	2204376

MESSAGES

imestamp	Message
12:32:41 AM]	Started executing query at Line 5
	(986 rows affected)
	Total execution time: 00:00:00.080

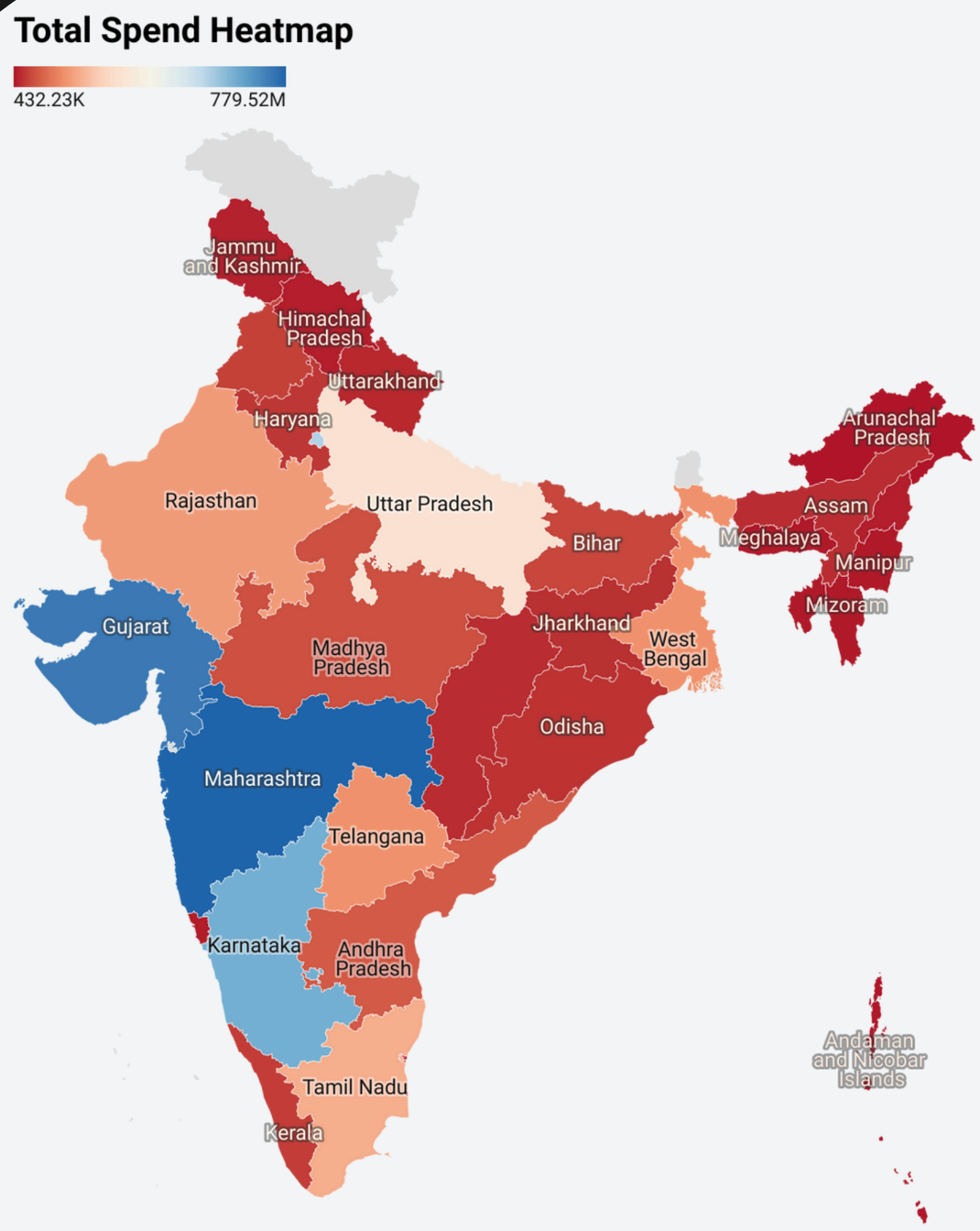
Insight:

This query provides insights into the total spend patterns across different cities, revealing:

- The cities with the highest and lowest total spends
- The distribution of total spend across various cities
- Opportunities for targeted marketing and resource allocation in high-spend cities

HEATMAP

This heatmap illustrates the total spend patterns across different cities, with darker shades indicating higher total spends. The chart reveals a clear concentration of high spends in Maharashtra, Karnataka, Delhi while Chandigarh, Arunachal Pradsh, Andaman exhibit relatively lower spends. The varying shades of color provide a visual representation of the spend distribution, enabling easy identification of areas with high and low spending activity



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