



CMPE 132 Project Trendify

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Introduction

What is Trendify?

- A web-based application that uses **Google Trends** and **BigQuery** to explore and analyze trending topics.
- Core features include custom trend analysis, alerts, trend comparison, and visualizations.

Our Projects Purpose / Problems we are trying to solve

- Dynamic Insights: Gain real-time **understanding** of societal collective behaviors and **emerging trends**.
- Wide Applicability: **Helps** marketers, businesses, researchers, and journalists **make data-driven decisions**.
- Actionable Decisions: Helps users make **informed decisions** based on **real-time trend data**

Target Users:

- Marketers: Tailor strategies based on public interests.
- Researchers: Study behavioral patterns and trends.
- Businesses: Drive product development from consumer interest.
- Journalists: Identify relevant, trending stories.
- Educators/Students: Gain insights for academic projects.

Introduction Cont...

How Trendify Works:

1. Explore Trends: Search by inputting location, category, and/or keyword to see trends over a custom time frame.
2. Compare Trends: Identify regional or categorical variations.
3. Custom Analysis: Upload keywords for a focused trend analysis.

Challenges:

- Big Data: Managing vast datasets from Google Trends and ensuring quick response times.
- Scalability: Supporting concurrent users and handling large-scale data without compromising performance.
- Data Visualization: Effectively representing complex data in user-friendly formats.

Database Benefits:

- BigQuery as Backbone: Efficiently stores and processes large datasets.
- User Data Management: Stores preferences, search history, and alerts.
- Real-Time Analysis: Provides up-to-date trend insights with minimal latency.

User-Centered Approach:

- Customizable features like trend filtering and real-time alerts provide personalized insights for each user.

Related Work

Existing Solutions

- **Google Trends:**
 - Pros: Real-time data, powerful visualizations, easy for non-technical users.
 - Cons: Limited customization, lacks predictive features, no integration with external tools.
 - **Trendify Enhancement:** Adds user-specific customization and deeper analysis of niche topics.
- **Trend Analysis Using BigQuery (2022):**
 - Pros: Efficient large dataset processing, predictive marketing insights.
 - Cons: Focused only on marketing, requires advanced skills.
 - **Trendify Enhancement:** Generalizes trend analysis for broader use cases with a user-friendly interface.
- **Forecasting Social Trends Using Google Data (2021):**
 - Pros: Demonstrates the predictive power of trend data.
 - Cons: Focuses on macro-level trends rather than user-centric applications.
 - **Trendify Enhancement:** Trendify adopts a user-centered approach, targeting individual users and small businesses.

Related Work Key Improvements

Key Improvements

- **Feature Integration:**
 - Personalization and saved queries provide user-specific insights not offered by Google Trends.
 - Trendify combines features from multiple tools for a comprehensive experience.
- **User-Friendly Interface:**
 - Unlike BigQuery, Trendify is moving towards a no-code solution, making complex data interactions accessible to all users.
- **Advanced Analytics:**
 - Predictive modeling and advanced comparisons extend beyond static visualizations, aiding better decision-making.
- **Scalability:**
 - BigQuery integration ensures efficient handling of large datasets, suitable for individuals and organizations alike.

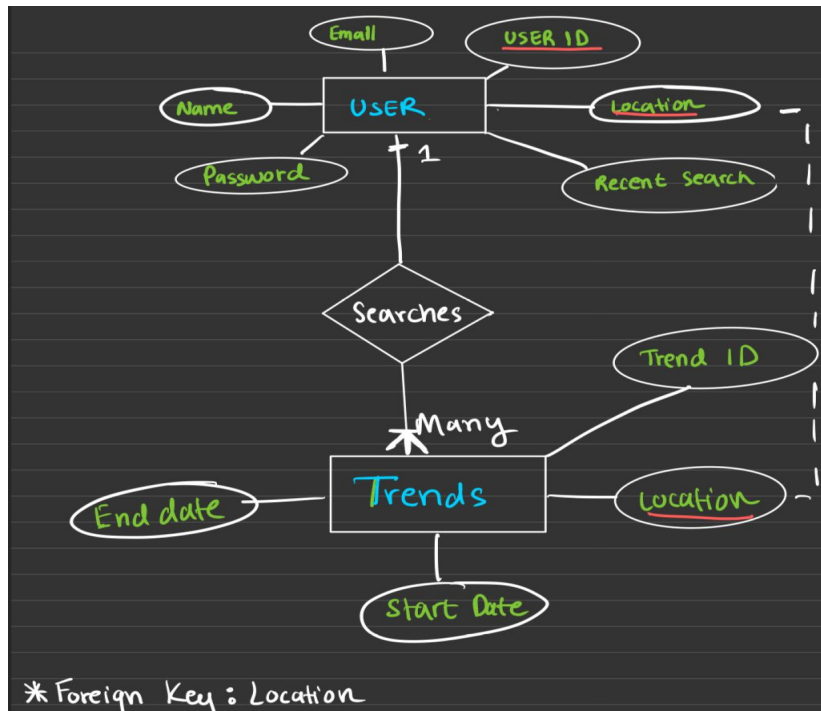
Methods / Database Design

Database Overview:

- The database integrates **Google Trends data** (via BigQuery) with **user data** for personalized trend analysis.
- Key tables:
 1. **User Table:** Stores user information (User ID, email, location, preferences).
 2. **Trends Table:** Tracks trending terms, popularity scores, locations, and timeframes.

ER Diagram:

- **Key Relationships:**
 - **1-to-Many:** Each user can search multiple trends.
 - **Foreign Key:** Location ID connects users with trends



Key Queries

Purpose: Extract trending Google search terms for a given location. EX) "Nashville," within a specific timeframe

Key Optimizations

1. Specific Filtering:

- Replaced LIKE "%Nashville%" with dma_name = "Nashville TN", reducing matches to only exact results, improving query accuracy and performance.

2. Streamlined Ordering:

- Simplified sorting criteria to score DESC and term ASC, prioritizing higher scores and logical alphabetical ordering.

```
1 SELECT DISTINCT term, score, week, dma_name
2 FROM (
3     SELECT term, score, week, dma_name
4     FROM `bigquery-public-data.google_trends.top_terms`
5     WHERE dma_name LIKE "%Nashville%"
6 ) AS filtered_data
7 WHERE week BETWEEN DATE_SUB(CURRENT_DATE(), INTERVAL 7 DAY) AND CURRENT_DATE()
8 ORDER BY LENGTH(term) DESC, score DESC, term ASC
9 LIMIT 100;
```

Query Optimization

Results

- **Run Time:** Reduced significantly due to precise filtering and efficient sorting.
- **Execution Graph:** Demonstrates faster processing with optimized query logic.
- **Impact:**
 - Enhanced speed and accuracy.
 - Logical and user-relevant output ordering

```
1 SELECT term, score, week, dma_name
2 FROM `bigquery-public-data.google_trends.top_terms`
3 WHERE dma_name = "Nashville TN"
4 | AND week BETWEEN DATE_SUB(CURRENT_DATE(), INTERVAL 7 DAY) AND
  CURRENT_DATE()
5 ORDER BY score DESC, term ASC
6 LIMIT 100;
7
```


Key Queries #2

Purpose: Keyword Specific Trend Analysis

```
1  SELECT week AS date, dma_name, term,
2      (SELECT SUM(score)
3      FROM `bigquery-public-data.google-trends.top-terms` AS subquery
4      WHERE LOWER(subquery.term) LIKE '%football%'
5      AND subquery.week = main.week
6      AND subquery.dma_name = main.dma_name
7      AND subquery.term = main.term) AS total_popularity,
8      MIN(rank) AS best_rank
9  FROM `bigquery-public-data.google-trends.top-terms` AS main
10 WHERE LOWER(term) LIKE '%football%'
11 GROUP BY week, dma_name, term
12 ORDER BY week ASC, best_rank ASC;
```

Query Optimization #2

Key Improvements

1. Reduced Redundancy:

- Consolidated calculations for `SUM(score)` and `MIN(rank)` into a single grouping operation, eliminating repeated dataset scans.
- Removed nested subqueries, streamlining data processing.

2. Enhanced Readability:

- Simplified query structure improves maintainability and makes it easier for future users or collaborators to understand and modify.

3. Improved Performance:

- Fewer operations and filters applied, resulting in faster processing times.

```
1 SELECT week AS date, dma_name, term, SUM(score) AS total_popularity, MIN(rank)
   AS best_rank
2 FROM `bigquery-public-data.google_trends.top_terms`
3 WHERE LOWER(term) LIKE '%football%'
4 GROUP BY week, dma_name, term
5 ORDER BY week ASC, best_rank ASC;
6
```

Results and Key Findings

Location and Time-Based Query:

Pre Optimization Run Time: Post Optimization Run Time:

Query results

JOB INFORMATION

Elapsed time
516 ms

Elapsed time
409 ms

Keyword Specific Trend Query:

Pre Optimization Run Time: Post Run Time:

Elapsed time
7 sec

Elapsed time
6 sec

Query results

SAVE RESULTS

JOB INFORMATION		RESULTS	CHART	JSON	EXECUTION DETAILS
Row	term	score	week	dma_name	
1	Arizona State Football	100	2024-12-01	Nashville TN	
2	BRICS nations	100	2024-12-01	Nashville TN	
3	BYU	100	2024-12-01	Nashville TN	
4	Big Ten Championship Game	100	2024-12-01	Nashville TN	
5	Cardinals vs Vikings	100	2024-12-01	Nashville TN	
6	Chargers vs Falcons	100	2024-12-01	Nashville TN	
7	Christian McCaffrey	100	2024-12-01	Nashville TN	

Query results

SAVE RESULTS

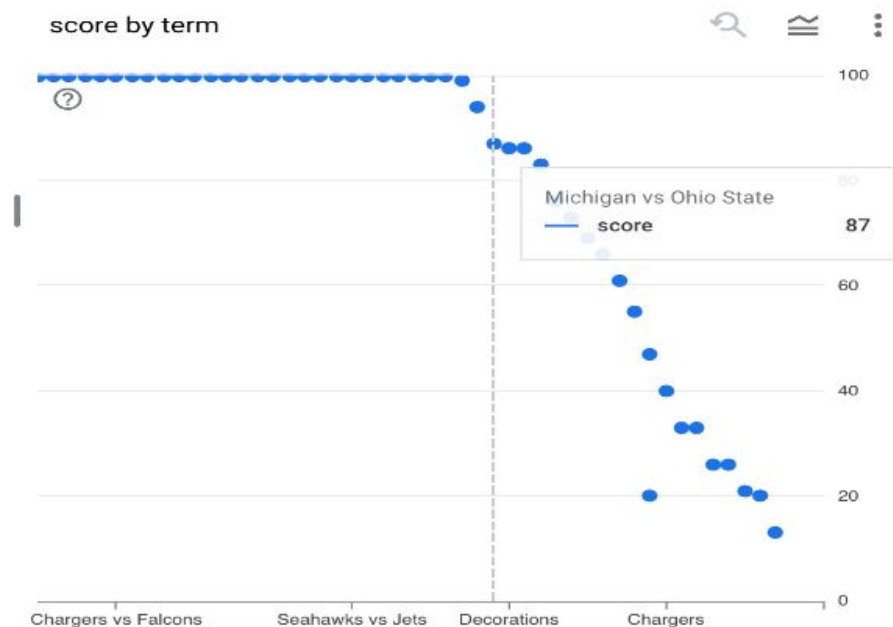
EXPLORE DATA

JOB INFORMATION		RESULTS	CHART	JSON	EXECUTION DETAILS	EXECUTION GRAPH
Row	date	dma_name	term	total_popularity	best_rank	
1	2019-11-03	Charlotte NC	Georgia football	16	1	
2	2019-11-03	Dothan AL	Georgia football	26	1	
3	2019-11-03	Columbus-Tupelo-West Point ...	Georgia football	30	1	
4	2019-11-03	Cleveland-Akron (Canton) OH	Georgia football	6	1	
5	2019-11-03	Ft. Wayne IN	Georgia football	null	1	
6	2019-11-03	Helena MT	Georgia football	null	1	
7	2019-11-03	Yakima-Pasco-Richland-Kenne...	Georgia football	null	1	
8	2019-11-03	Albany GA	Georgia football	31	1	

Results and Key Findings Cont...

Location and Time-Based Query:

Result Graph:



Keyword Specific Trend Query:

Results Graph:



Conclusions

Key Insights:

- Optimized queries significantly improved performance, reducing runtime and resource usage.
- Detailed trend insights enabled by keyword and location-based queries.

Metrics:

- Faster execution times.
- Reduced data scans (fewer rows processed).

Example Outputs:

- Weekly popularity trends for "NBA" or "Football."
- Top trending topics for specific locations like "San Jose."

Lessons Learned

Technical Skills

- Query optimization techniques (indexing, partitioning).
- Database design and schema normalization.

Collaborative Insights

- Effective task division and time management.
- Regular communication enhanced team productivity.

Applications

- Real-world application of database systems to solve complex problems.
- Understanding the power of data in driving informed decisions

References

1. Google Trends. (n.d.). *Google Trends*. Retrieved from <https://trends.google.com/>
2. Author(s). (2022). Leveraging Google Trends with BigQuery for predictive marketing. *Publisher/Conference Name*. (If applicable, include DOI or URL.)
3. Author(s). (2021). Harnessing search trends for sociological predictions. *Journal of Data Science*. (Include volume, issue, pages, and DOI if available.)

Thank You