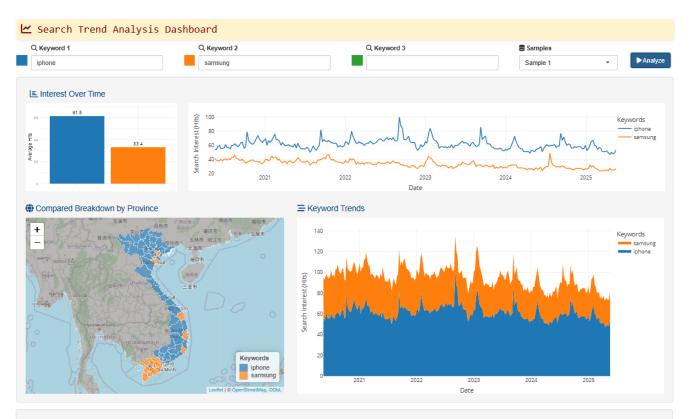
Keyword Search Intelligence

Al-driven dashboard for comprehensive search trend analysis.

https://triphan-viz.shinyapps.io/trend-analysis/

Doan Quang Hung & Phan Minh Tri



LLM-generated Analysis

"Okay, let's analyze the Google Trends data for "iphone" and "samsung" from May 2020 to May 2025

"iphone" Trend Analysis:

The search interest for "iphone" shows a clear cyclical pattern. We observe peaks every year around September. This is strongly correlated with the typical timefr ame for Apple's annual iPhone releases, indicating a surge of interest driven by new product announcements and subsequent launches. Looking at the long-term tren d, while there are fluctuations, the overall search interest appears to be slightly declining in recent years, especially when comparing peak values from 2020-202 2 to 2023-2025. A minor peak can be found at the start of the year, around January/February.

**"samsung" Trend Analysis:*

The search interest for "samsung" is generally lower and more stable compared to "iphone". There are no sharp peaks as evident as those for "iphone" around Septem ber, the general level of search volume is lower. However, we notice slight bumps in search volume around January/February, which could possibly correlated with the release of Samsung's S-series phones. Unlike iPhone, the long-term trend for "samsung" searches shows a clearer decline over the years, with interest significantly lower in 2023-2025 than in 2020-2022.

*Correlation and Relationship:**

The keywords "iphone" and "samsung" are in the same product category (smartphones), there's likely a competitive relationship reflected in the search data. While there's no strong positive correlation where one *directly* triggers the other, the data suggests an *inverse* relationship, or at least an *opportunity cost* dyn amic. As "iphone" searches spike around release dates, "samsung" searches don't necessarily increase. This suggests that people actively interested in the iPhone release are less likely to be searching for Samsung at the same time. The small peaks in search volume at the start of each year suggests a similar effect. They are competing brands in a similar product category, therefore it is reasonable to assume that the search volumes will reflect this competition, although the Google Trend data does not offer enough information to infer direct relationship."

¹⁾ This dashboard utilizes an unofficial Google Trends API: the presented results may differ from those displayed on the official Google Trends website.

²⁾ The LLM-generated analyses are for informational purposes only and may contain inaccuracies. Users are advised to independently verify all insights and conclusions

³⁾ Dashboard designed and developed by Doan Quang Hung and Phan Minh Tri.

Problem & Motivation

CHALLENGES

- Understanding search trends requires technical expertise
- No localized insights for Vietnam market
- Manual analysis is time-consuming



OUR SOLUTION

- User-friendly interactive dashboard
- Vietnam-focused geographical analysis
- Al-powered automatic insights

Real-time trend comparison



System Architecture









Google Trends Query Interface

Utilizes the gtrendsR

package for real-time

keyword trend data,

ensuring the dashboard

stays current with the

latest search trends.

Robust Data Processing Layer

Cleans, structures, and enriches data by mapping search trends to Vietnam's provinces, providing localized and actionable insights.

Interactive Visualizations

Employs **Plotly** for dynamic charts and **Leaflet** for interactive maps, allowing users to filter and explore provincial trends through intuitive visuals.

LLM-Powered
Analysis & Insights

Leverages large language models (**Gemini**) to analyze trends and generate meaningful, automated insights for deeper understanding.

Live Demo Introduction



Compare Keywords

Analyze up to 3 keywords simultaneously for trend comparison.



Province-Level Analysis

Gain localized insights with detailed data for Vietnam's provinces.



Real-time Data

Access current trends or utilize pre-loaded sample datasets.



AI-Generated Insights

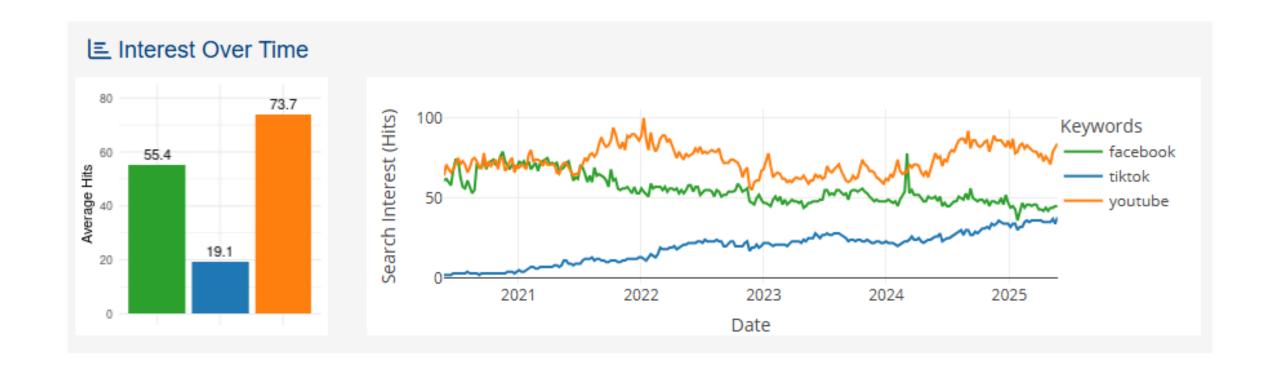
Receive automated, intelligent interpretations of the data.

Google Trends Data Retrieval

Performing a gtrendsR Search

```
res <- qtrends(c("tiktok", "youtube", "facebook"), qeo = c("VN"), qprop = "web", time = "today 5-y")
List of 7
$ interest_over_time : 'data.frame': 786 obs. of 7 variables:
 ..$ date : POSIXct[1:786], format: "2020-05-24" "2020-05-31" "2020-06-07" "2020-06-14" ...
  ...$ hits : int [1:786] 2 2 2 2 3 3 3 3 3 3 ...
 ...$ keyword : chr [1:786] "tiktok" "tiktok" "tiktok" "tiktok" ...
 ..$ geo : chr [1:786] "VN" "VN" "VN" "VN" ...
 ..$ time : chr [1:786] "today+5-y" "today+5-y" "today+5-y" "today+5-y" ...
  ..$ gprop : chr [1:786] "web" "web" "web" "web" ...
 ..$ category: int [1:786] 0 0 0 0 0 0 0 0 0 ...
 $ interest_by_country: NULL
 $ interest_by_region :'data.frame': 189 obs. of 5 variables:
 ..$ location: chr [1:189] "Phu Tho Province" "Yen Bai Province" "Vinh Phuc Province" "Ninh Bình Province" ...
 ..$ hits : int [1:189] 100 95 94 90 90 88 86 85 84 84 ...
  ... keyword : chr [1:189] "tiktok" "tiktok" "tiktok" "tiktok" ...
  ..$ geo : chr [1:189] "VN" "VN" "VN" "VN" ...
 ..$ gprop : chr [1:189] "web" "web" "web" "web" ...
 $ interest_by_dma
                   : NULL
 $ interest_by_city :'data.frame': 260 obs. of 5 variables:
  ..$ location: chr [1:260] "Nghi Văn" "tx. Hồng Lĩnh" "tx. Phú Thọ" "tx. Thái Hòa" ...
 ...$ hits : int [1:260] NA ...
  ... keyword : chr [1:260] "tiktok" "tiktok" "tiktok" "tiktok" ...
  ..$ geo : chr [1:260] "VN" "VN" "VN" "VN" ...
 ..$ gprop : chr [1:260] "web" "web" "web" "web" ...
 $ related_topics
                  : NULL
 $ related_queries : NULL
 - attr(*, "class")= chr [1:2] "gtrends" "list"
```

Trend



BAR CHART

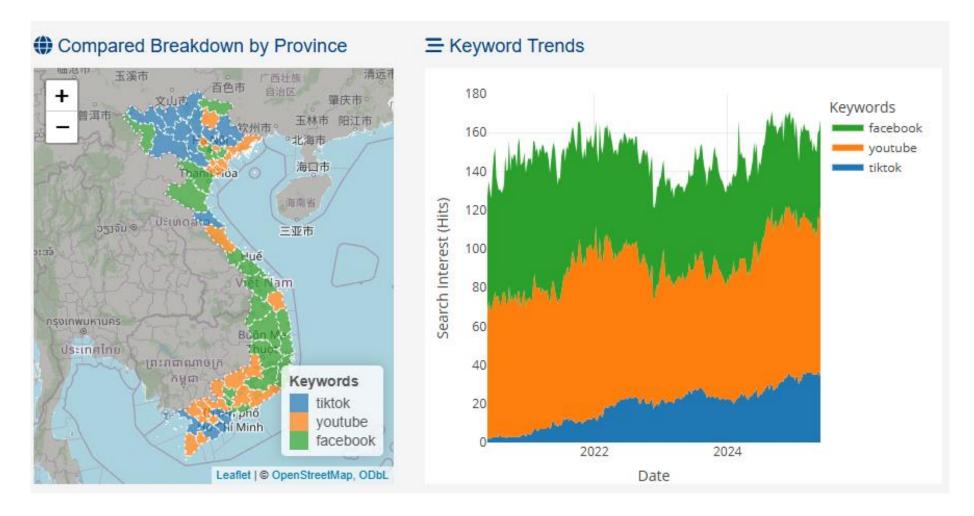
Summarizes the average search interest for each keyword, providing a quick comparison of overall popularity.

Packages: ggplot (bar chart), plot_ly (line chart)

LINE CHART

Tracks the search interest trends over time for each keyword, highlighting shifts in user behavior and seasonal patterns.

Trend



MAP

Maps keyword search popularity geographically by province in Vietnam, helping identify regional differences and target areas.

STREAMGRAPH

Combines all keyword trends to show their relative search interest over time, emphasizing how each keyword contributes to the total search volume.

Packages: gadm (Vietnam geo), leaflet (map), plot_ly (streamgraph)

LLM Integration



Google Trend DATA EXTRACTION

Extract trend summary from Google Trends results
library(gtrendsR)

```
if (input$data_source == "Online") {
  gtrends(kw, gprop = "web", time = "today 3-m", geo = "VN")
} else {
  selected_data()
```



GEMINI API CALL

gemini (prompt) sends data to Gemini API

Load Gemini API key, https://ai.google.dev/gemini-api/docs/api-key
library(gemini.R)



SYSTEM PROMPT

Structure data into analytical prompts with our system prompt:

```
prompt <- paste0(</pre>
```

"You are a **senior Data Analyst** with strong experience in interpreting complex datasets. For each dataset, table, or chart I provide, analyze the key patterns, trends, or anomalies.",

```
trend summary,
```

"Your task: Write 3 to 5 clear, concise sentences. Describe the **trend** of each keyword (e.g. rising, falling, seasonal). Conclude **any correlation or relationship** between the keywords. Use plain English that a **non-technical reader** (like a marketer or product manager) can easily understand"

Key Achievements



KEYWORD ANALYSIS

Multi-dimensional trend comparison across time, geography, and competitors

LLM INTEGRATION

First-of-its-kind automated insights generation for Vietnam market data



CREATIVITY & INNOVATION

- Vietnam-specific localization
- User-friendly interface design
- Real-time Al analysis integration
- Interactive geographical mapping

Limitations

GOOGLE SUPPORT

No officially supported API for users.

Third-party APIs work but are unstable.

Future Upgrade & Thank you

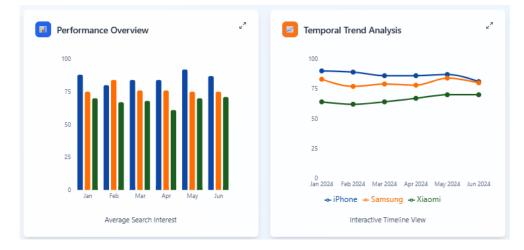
We appreciate your time and interest in our project.

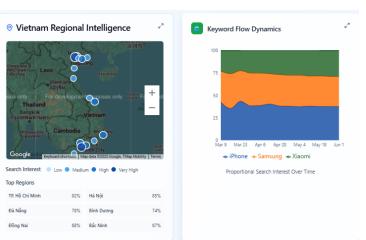
Our journey of innovation continues, with exciting new features on the horizon:

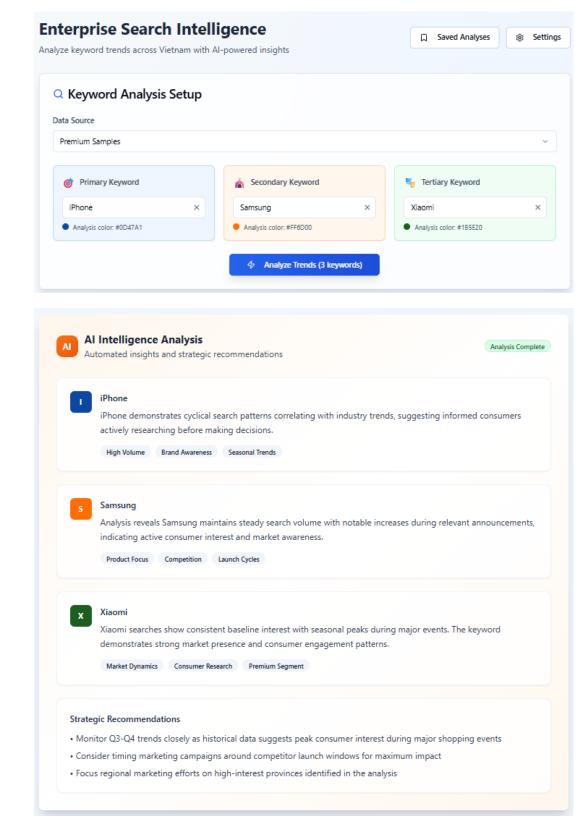
Secure Access: Implement Login/Signup for personalized experiences.

Research Management: Save and organize your keyword research efficiently.

Collaborative Sharing: Easily share insights with team members and partners.







https://preview--trend-insight-vietnam-pulse.lovable.app/dashboard