Keyword Search Intelligence

AI-driven dashboard for comprehensive search trend analysis.

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

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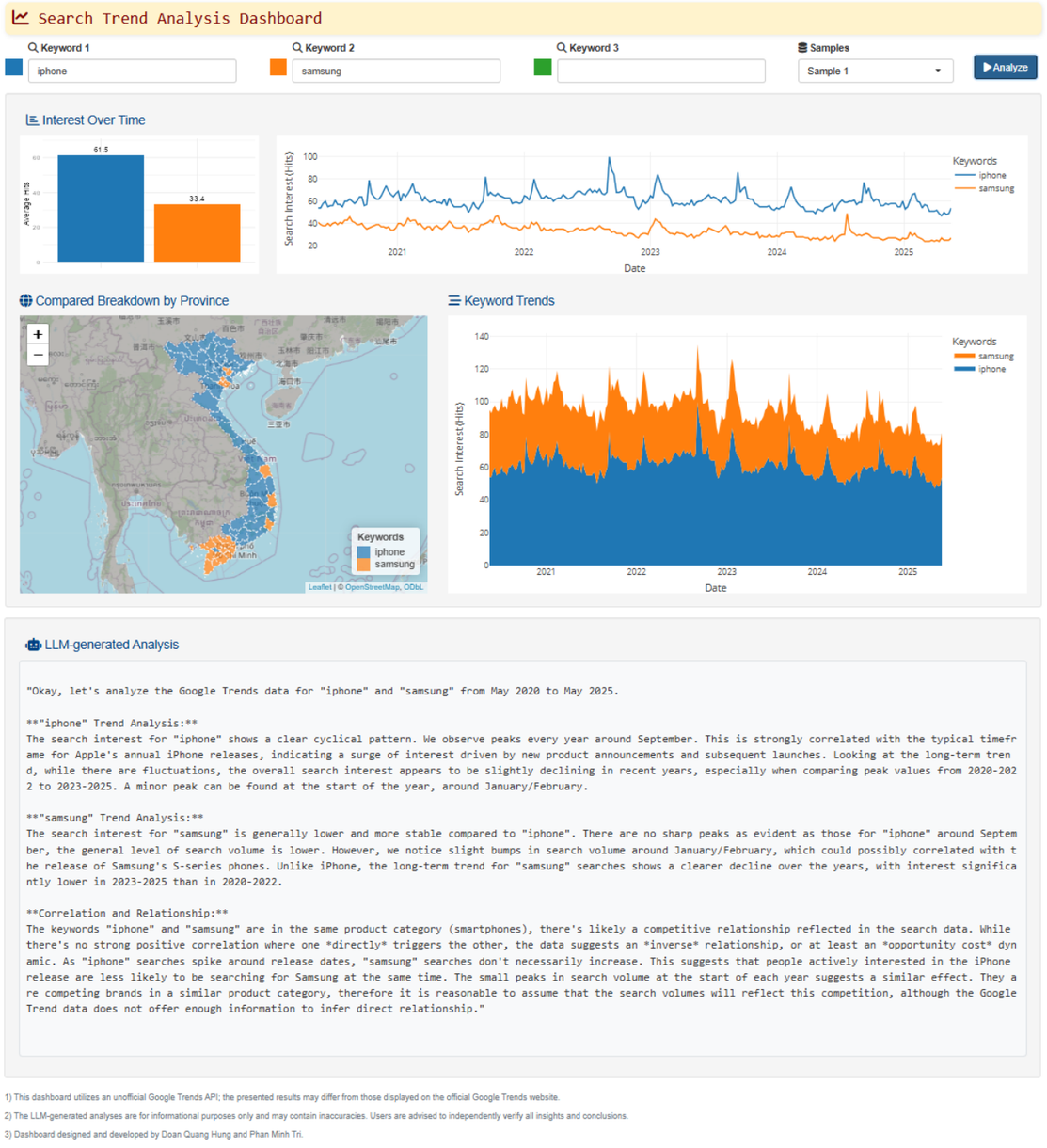


Problem & Motivation

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
- AI-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.

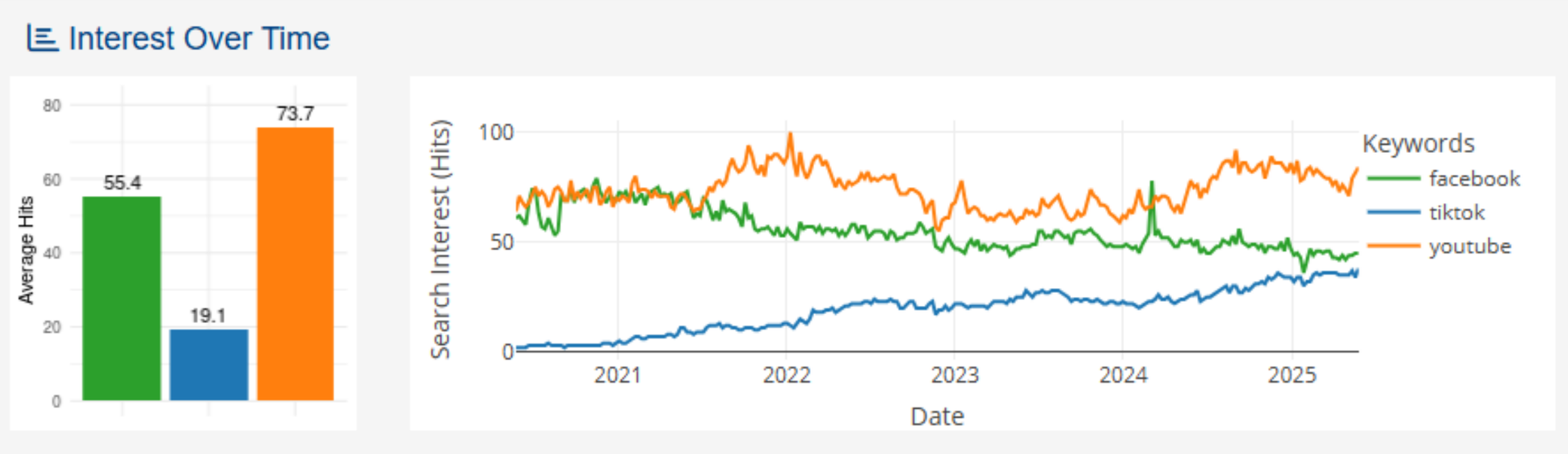
Google Trends Data Retrieval

Performing a gtrendsR Search

```
res <- gtrends(c("tiktok", "youtube", "facebook"), geo = c("VN"), gprop = "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 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 NA NA NA NA NA NA NA NA 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

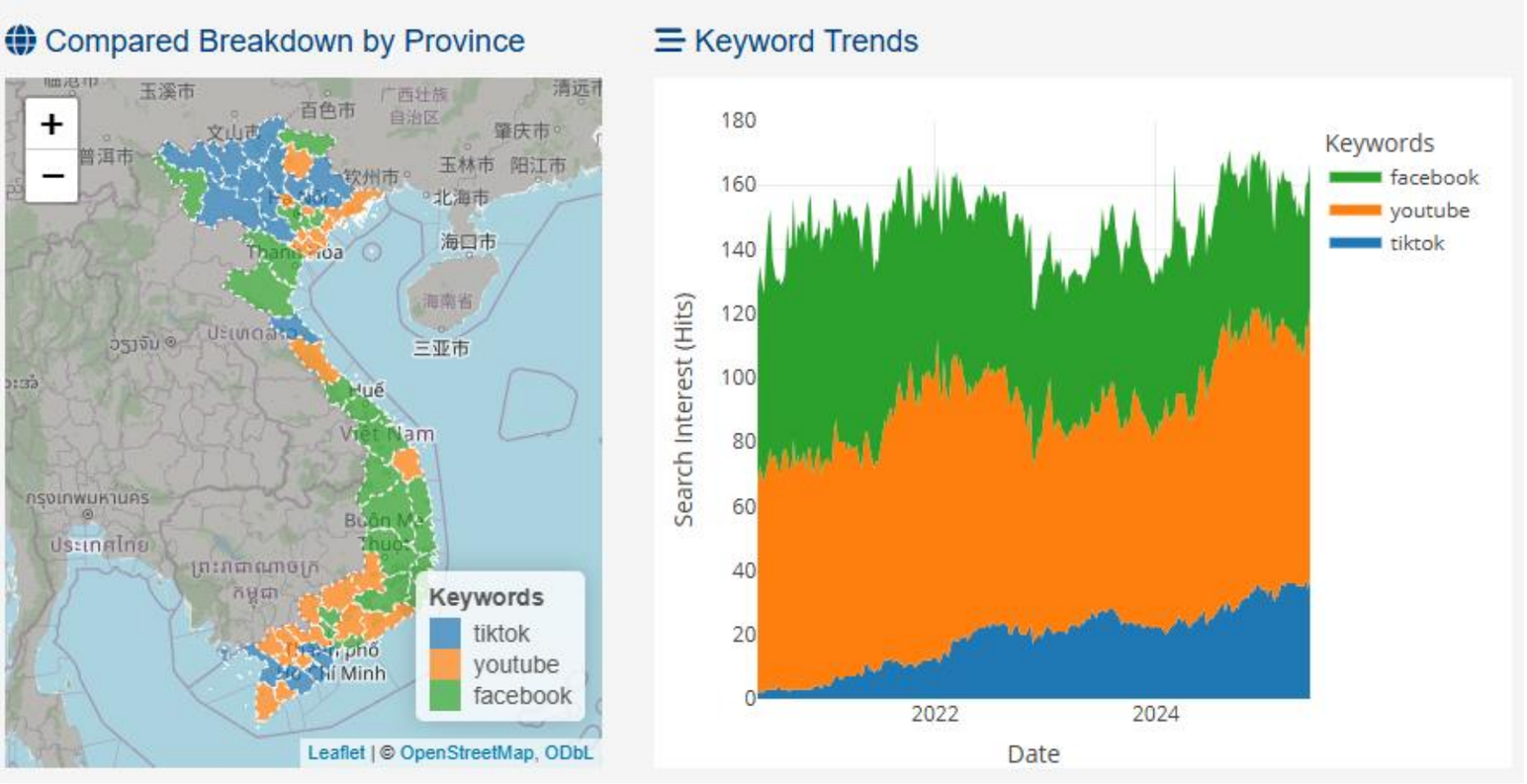
Summarizes the average search interest for each keyword, providing a quick comparison of overall popularity.

LINE CHART

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

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

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(
 "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 AI 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

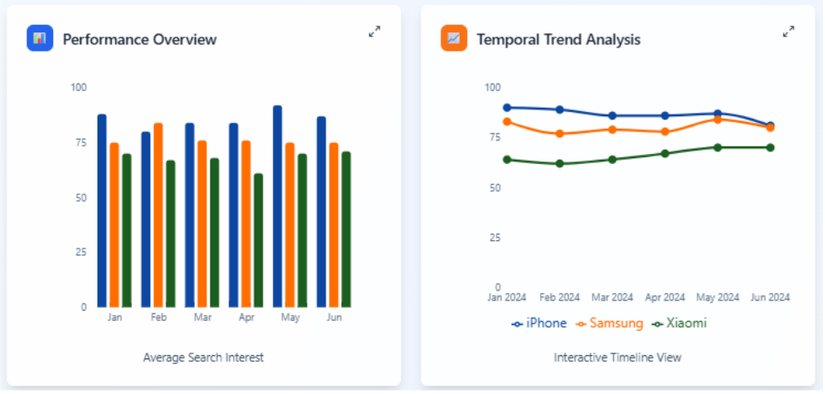
We appreciate your time and interest in our project.

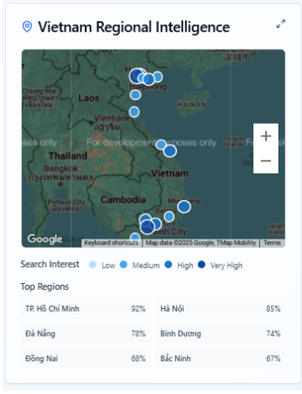
Our journey of innovation continues, with exciting new features on the horizon:

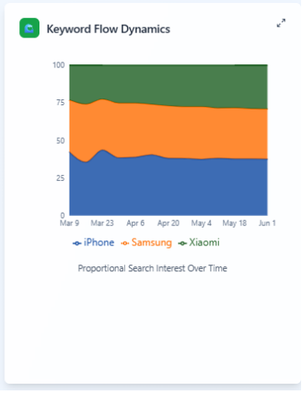
Secure Access: Implement Login/Signup for personalized experiences.

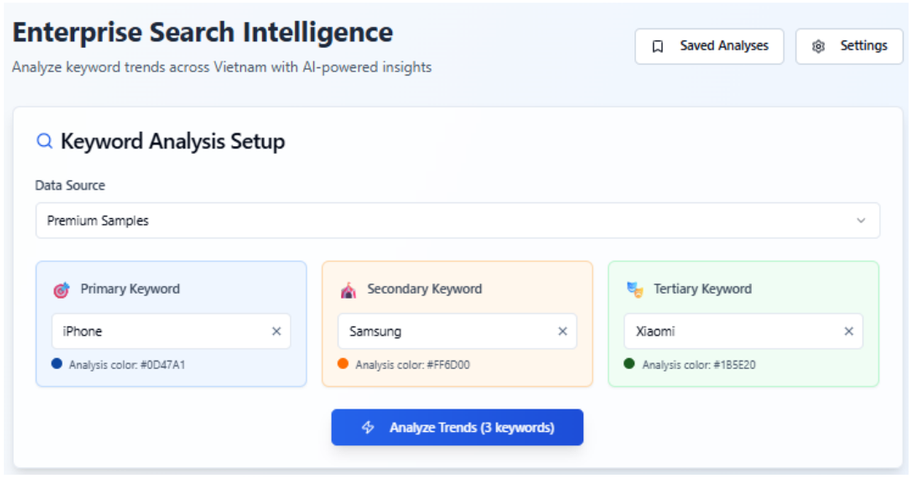
Research Management: Save and organize your keyword research efficiently.

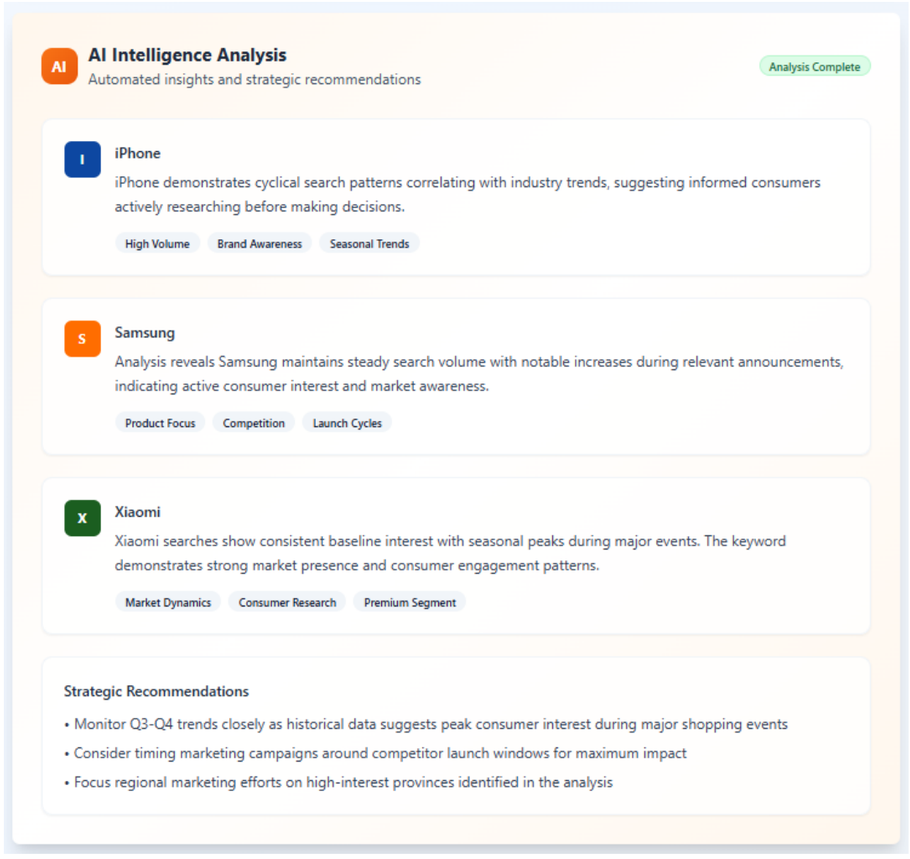
Collaborative Sharing: Easily share insights with team members and partners.











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