INTRODUCTION TO SOCIAL MEDIA AND BIG DATA FOR MIGRATION STUDIES

Google Trends data in migration studies

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MIGRATION CONCEPTS – QUICK RECAP

International migrant

"*Person who moves to a country other than that of his/her usual* ***residence*** *for a period of* ***at least a year****, so that the country of destination effectively becomes his/ her country of new residence*"

UN definition

Labor migration

International movement of persons for the purpose of employment.

- High & low skilled labor migration
- Needs based calls by countries

MIGRATION CONCEPTS – QUICK RECAP

Irregular migration

Movement of persons that takes place outside the laws, regulations, or international agreements governing the entry into or exit from the State of origin, transit or destination. May also include refugees, victims of trafficking, or unaccompanied minors.

(IOM, 2019)

Refugee

"owing to **well- founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion**, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence, is **unable or, owing to such fear, is unwilling to return** to it."

(1951 Convention and 1967 Protocol relating to the status of refugees)

MIGRATION CONCEPTS – QUICK RECAP

Asylum seeker

An asylum-seeker is an individual seeking international protection, but whose claim has not yet been finally decided on by the country in which he or she has submitted it. Not every asylum seeker will ultimately be recognized as a refugee, but every recognized refugee is initially an asylum seeker.

(UNHCR, 2006)

Internally displaced person (IDP)

Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border.

(IOM, 2019)

GOOGLE TRENDS DATA IN MIGRATION STUDIES

WHAT IS GOOGLE TRENDS?

Google Trends is a tool by Google, that shows the **relative** interest over time and/or by subregion for any selected query, time period and location.

(Trends Help, 2021)

(see: https://support.google.com/trends/answer/4365533?hl=en&ref_topic=6248052)

WHAT DO GOOGLE TRENDS DATA TELL US?

- Interest for a selected query over time

Search interest for a topic as a proportion of all searches on all topics on Google at the specified time and location

- Interest for a selected query by subregions

Search interest for a topic by subregions as a proportion of all searches on all topics on Google in that same place and time.

WHAT DO GOOGLE TRENDS DATA TELL US?

- Google Trends **does not** report the overall search volume for a selected query.

Google Ads – Keyword Planner is meant for insights into monthly and average search volumes, specifically for advertisers to assess the size of the audience (https://support.google.com/google-ads/answer/6325025)

- It gives us a measure of interest for a query normalized for the selected time and location.

(Trends Help, 2021)

NORMALIZATION

- Google Trends normalizes search data to make comparisons between terms easier. Search results are normalized to the selected time and location of a query as follows;

- "Each data point is divided by the total searches of the geography and time range it represents to compare relative popularity"
- This process is necessary to avoid the places with the most search volume to always rank the highest.
- "The resulting numbers are then scaled on a range of 0 to 100 based on a topic's proportion to all searches on all topics"

(Trends Help, 2021)

NORMALIZATION

- Different regions that show the same search interest for a term don't always have the same total search volumes.

- The parameters we enter matter. 100 indicates the maximum search interest for a query, only for the time and location selected. Shortening and extending the selected time period may change the minimum and maximum interest points.

- Time adjustment for non-real time data

GOOGLE TRENDS DATA IN LITERATURE

- Epidemiology:
  - Online search data to *nowcast* outbreaks (**Flu Trends!**)

(Ginsberg, et al., 2009) (Pelat, Turbelin, Bar-Hen, Flahault, & Valleron, 2009) (Brownstein, Freifeld, & Madoff, 2009)

- Economics:
  - Online search data to forecast unemployment rate, economic activity, inflation rate

(Ettredge, Gerdes, & Karuga, 2005) (Askitas & Zimmermann, 2009) (Choi & Varian, 2009) (Guzman, 2011)

GOOGLE TRENDS DATA IN DEMOGRAPHY LITERATURE

- Demography
  - Online search data to *forecast* abortions, fertility behaviour, suicides and causes of mortality

(Reis & Brownstein, 2010)

(Billari, D'Amuri & Marcucci, 2016)

(Wilde, Chen & Lohmann, 2020)

(McCarthy, 2010)

(Song, et al., 2014)

(Chang, Kwok, Cheng, Yip, & Chen, 2015)

(Solano, et al., 2016)

(Ricketts & Silva, 2017)

GOOGLE TRENDS DATA IN MIGRATION STUDIES

- Use in migration research

- Estimating migration flows

- Estimating migration stocks

- Now-casting and forecasting

GOOGLE TRENDS DATA IN MIGRATION STUDIES LITERATURE

- Migration from Latin America to Spain & Google search (Wladyka, 2013)
- UN Global Pulse 2014 – Estimating migration flows using online search data
- Internal migration & Bing search (Lin, Cranshaw & Counts, 2019)
- Syrian refugees & Google search (Connor, 2017)
- Predicting international migration with online search keywords (Böhme, Gröger & Stöhr, 2020)

UNDERSTANDING GOOGLE TRENDS DATA

GOOGLE TRENDS – UNDERSTANDING THE DATA

- Google Trends, while a big data source in itself, limits our access to aggregated and normalized data

- Google Trends gives us a proxy for the intent behavior, i.e. in the case of migration studies intention to move

- Google Trends allows us to form variable for intention to move measured at any given location and any given time
  - as known as Search Volume Index or Google Trends Index

OVERLOOK AT GOOGLE TRENDS DATA

- Data does not show the volume of Google searches but its popularity.
- Calculated and normalized by Google
- Data are anonymized, categorized, and aggregated.
- Sample data

OVERLOOK AT GOOGLE TRENDS DATA

- There are two types of Google Trends data that can be accessed:

- Real-time data covering the last seven days.
  - Time unit: hour
- Non-real time data (a separate sample from real-time data)
  - Between 2004 and up to 36 hours prior

GOOGLE TRENDS – DATA PROCESSING

- Google processes data prior to reporting Google Trends output.

- The data pre-processing includes;
  - filtering irregular activities (some may still remain),
  - sampling,
  - placing thresholds

GOOGLE TRENDS – DATA PROCESSING

- Google Trends data excludes;

- Search terms with low volume that cannot pass the threshold (appear as "0”)
- Repeated searches from the same person over a short period of time as irregular activity.
- Queries with apostrophes and other special characters.

(Trends Help, 2021)

REPRESENTATIVENESS

- Google Trends output is calculated based on a representative sample instead of the entire volume of Google searches. This is due to the too big volume of Google searches, exceeding billions of searcher per day.
- We don’t know the exact sampling methodology used by Google.

- Even if you search for trends using the same parameters, you may get very slightly different results, due to the sample. These are statistically not significant – but can do a robustness check.

NON-REAL TIME DATA – REPORTING

➢ Time unit of non-real time data reporting depends on the selected time period

- Up to 7 days — hourly data
- Up to 3 months — daily data
- Up to 5 years — weekly data
- + 5 years — monthly data

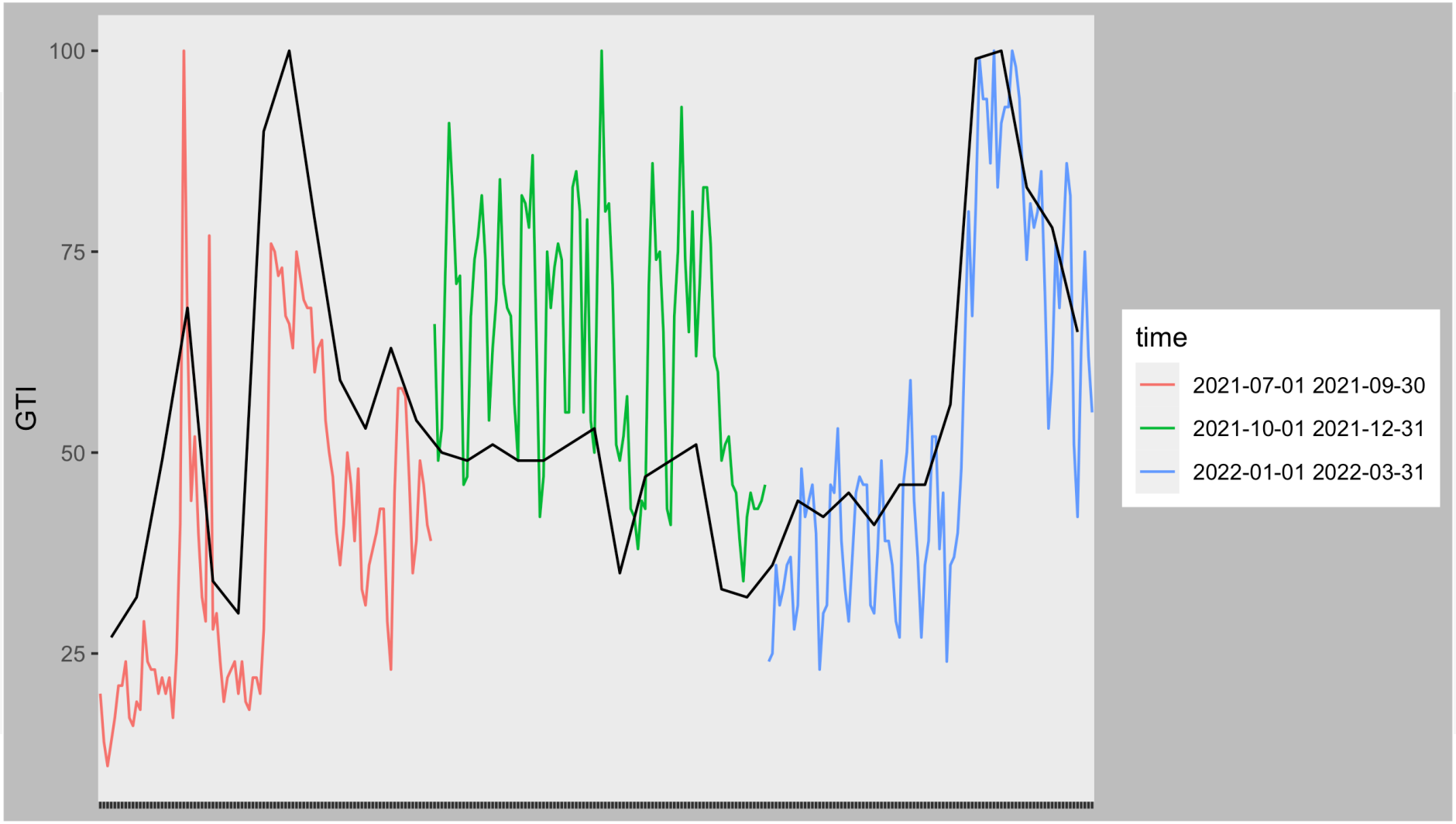
GOOGLE TRENDS – UNDERSTANDING THE DATA

- Beware of the representation bias while using digital trace data
- Google usage is mostly more widespread than use of a certain social media outlet, but is still bound by the same limitations
- In statistical analyses using an adjustment factor is encouraged
  - such as the Google search engine market share or internet penetration rate

EXTENDING THE TIME PERIOD

- If we need daily data for longer than 3 months or weekly data for longer than 5 years, we need to download them separately.
- Normalization problem
- Google Trends normalizes the data for the given time period. Merging different time periods requires additional adjustments or normalization.

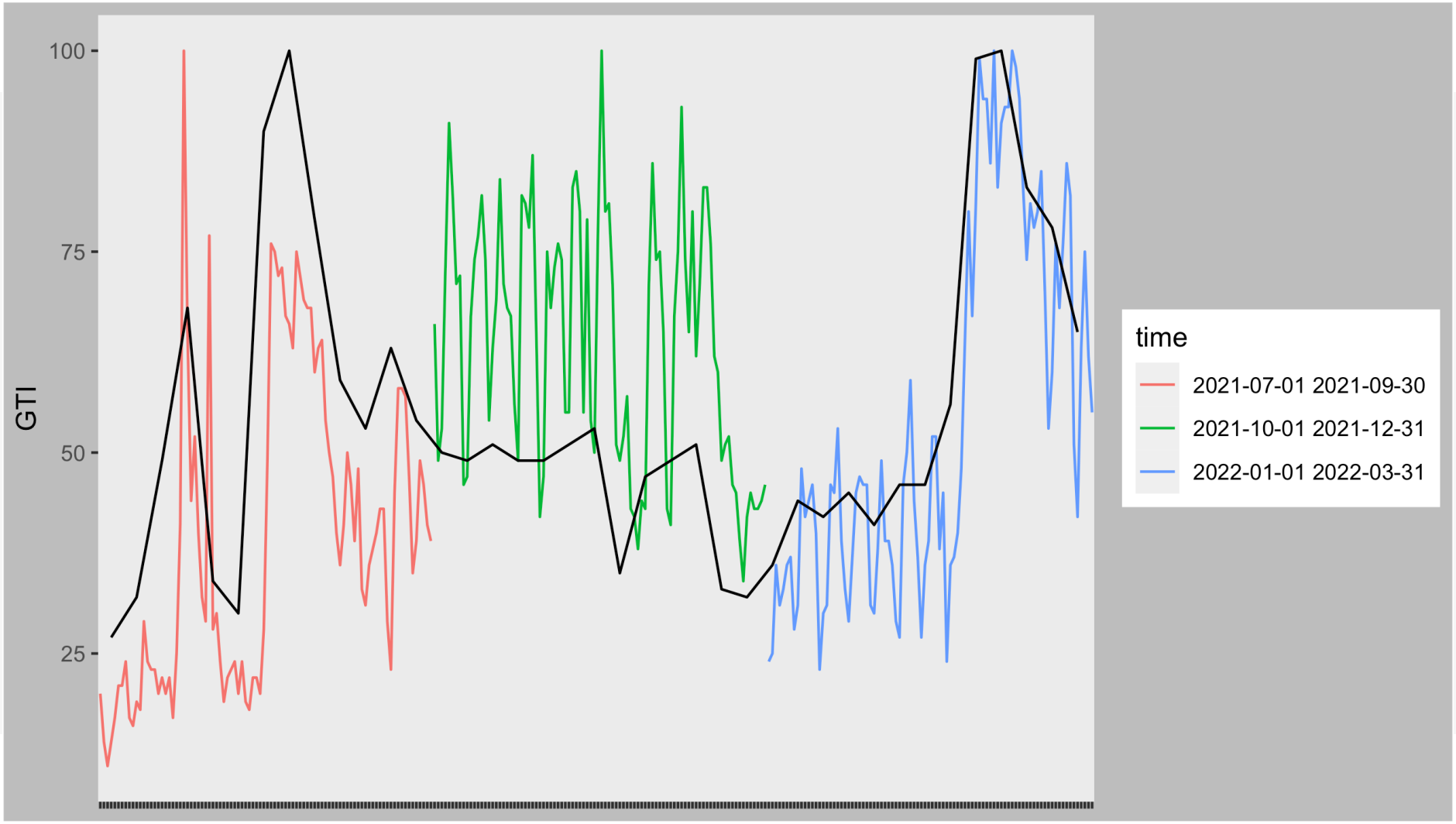
MERGED DAILY DATA



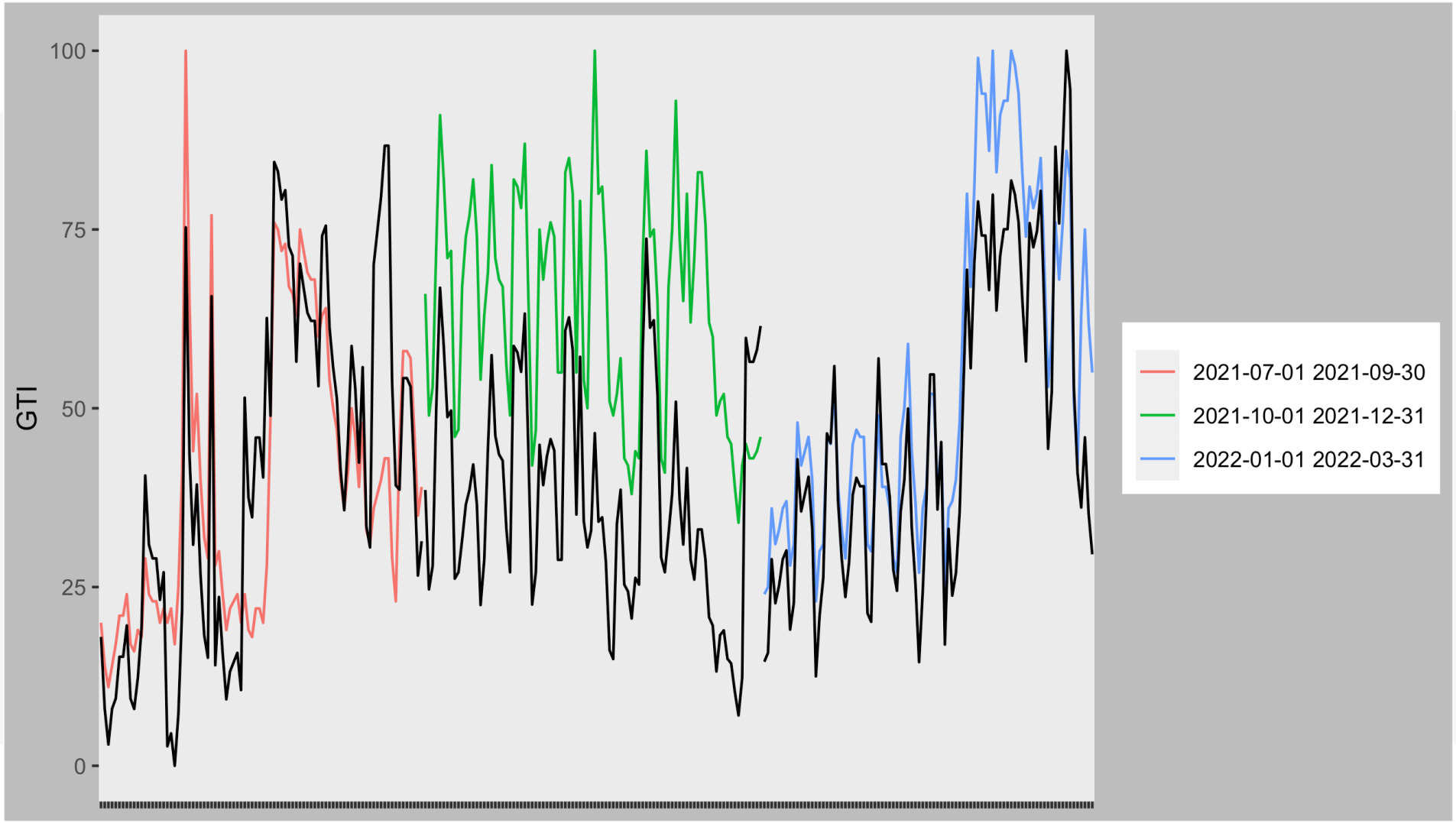
EXTENDING THE TIME PERIOD

- Create an adjustment factor
- Combine daily (or weekly) data sets
- Download weekly (or monthly) data set for the same time period
- Calculate the adjustment factor by the overlapping dates and apply the adjustment to the daily data of the same week (weekly data of the same month)
  - (Johansson, 2014; Risteski & Davcev, 2014)
- Rescale to 0-100 range

EXTENDING THE TIME PERIOD



EXTENDING THE TIME PERIOD



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USING GTRENDSR TO RETRIEVE DATA

HOW TO MAKE A QUERY

- Determine the keyword(s)
- https://trends.google.com/ can be helpful in the brainstorming phase
- See which keywords produce a meaningful result

HOW TO MAKE A QUERY

- Being more specific with selected keywords helps narrow down the focus to the matter of interest

- When you determine the parameters, download the data using *gtrendsR* package by Massicotte & Eddelbuettel

  - For further information, see https://github.com/PMassicotte/gtrendsR

HOW TO MAKE A QUERY

Search term	Results
tennis shoes	Results can include searches containing both tennis and shoes in any order. Results can also include searches like "red tennis shoes," "funny shoes for tennis," or "tennis without shoes." No misspellings, spelling variations, synonyms, plural, or singular versions of your terms are included.
"tennis shoes"	Results include the exact phrase inside double quotation marks, possibly with words before or after, like "red tennis shoes."
tennis + squash	Results can include searches containing the words "tennis" OR "squash."
tennis -shoes	Results include searches containing the word "tennis," but exclude searches with the word "shoes."
center + centre + centere	Results include alternative spellings like “centre” or “centere,” and common misspellings like "centere." Trends considers each version of a word a different search, including misspellings.

Google. (2022), Trends Help: Search Tips for Trends, https://support.google.com/trends/answer/4359582?hl=en&ref_topic=4365530

HINTS

- Consider alternatve spellings for search queries
- Consider the use of accented characters
- Google may aggregate results for a query with and without accented characters for local language
  - Same filter / aggregation may not apply in other locations, make a few trials
- Consider regional dialects that may apply
- Be careful when using phrases as search queries
- Consider the justification of query selection

GTRENDSR

- gtrends(keyword = “”, geo = “”, time = “”, gprop = “”, hl = “”, low_search_volume = **TRUE** , compared_breakdown = FALSE)

- time – default is last 5 years
  - “now 7-d” (last seven days), “today 1-m” (past 30 days), “today 3-m” (past 90 days), “today 12-m” (past 12 months), “Y-m-d Y-m-d”
- compared_breakdown can only be used to compare multiple keywords in a single location.

GTRENDSR OUTPUT

- **Interest over time**
  - use “onlyInterest = TRUE”

- Interest by country (or region)
- Interest by dma (designated market area)
- Interest by city
- **Related topics**
- **Related queries**

GTRENDSR – COMMON ERRORS

- Error in get_widget(… : widget$status_code == 200 is not TRUE

- Make sure you use geo identifiers as given in the *countries* data
- Try downloading the developer version
  - devtools::install_github("PMassicotte/gtrendsR")
- It's possible that you have exceeded a limit with Google Trends, try dividing the sets included in your code (keywords, locations etc.)
- It's possible that you have exceeded a limit with Google Trends for the day

GTRENDSR – COMMON ERRORS

- gtrends(keyword = "asylum", time = "2022-01-01 2022-03-29",
  gprop = "web", hl = "en", low_search_volume = TRUE,
  onlyInterest = TRUE)

- Unless specified, geo is considered worldwide
- hl – language, important for related queries, related topics and location names

- See R markdown

PRACTICAL EXERCISE

GTRENDSR – PRACTICAL EXERCISE

- Think of a migration case that can be explored using Google Trends
  - You may also work on the example case used in codes

- Create a set of keywords to monitor the migration flow (or stock)
  - Use the related_queries feature to help

- Visualize your output **OR** Try extending the time period and using time-adjustment technique

THANK YOU!