

A Glimpse at the Internet Performance in the 2022 Conflict in Ukraine

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[1] T. Mizrahi, J. Yallouz, "Using Internet Measurements to Map the 2022 Ukrainian Refugee Crisis", Arxiv:2205.08903, 2022.

[2] T. Mizrahi, J. Yallouz, "Internet Performance in the 2022 Conflict in Ukraine: An Asymmetric Analysis", Arxiv:2205.08912, 2022.

Russian Invasion of Ukraine

24 February, 2022



Data Sources

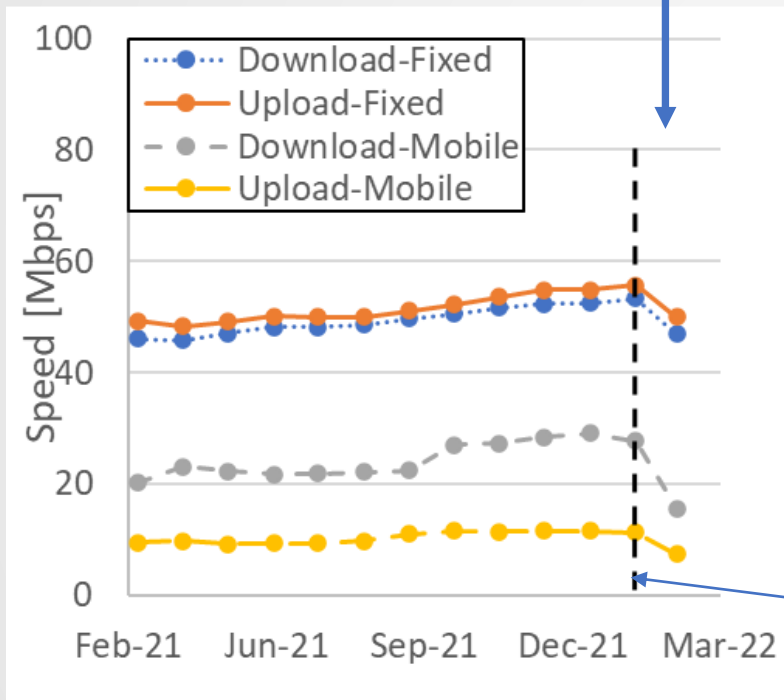
This research is based on publicly available data from various sources:



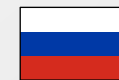
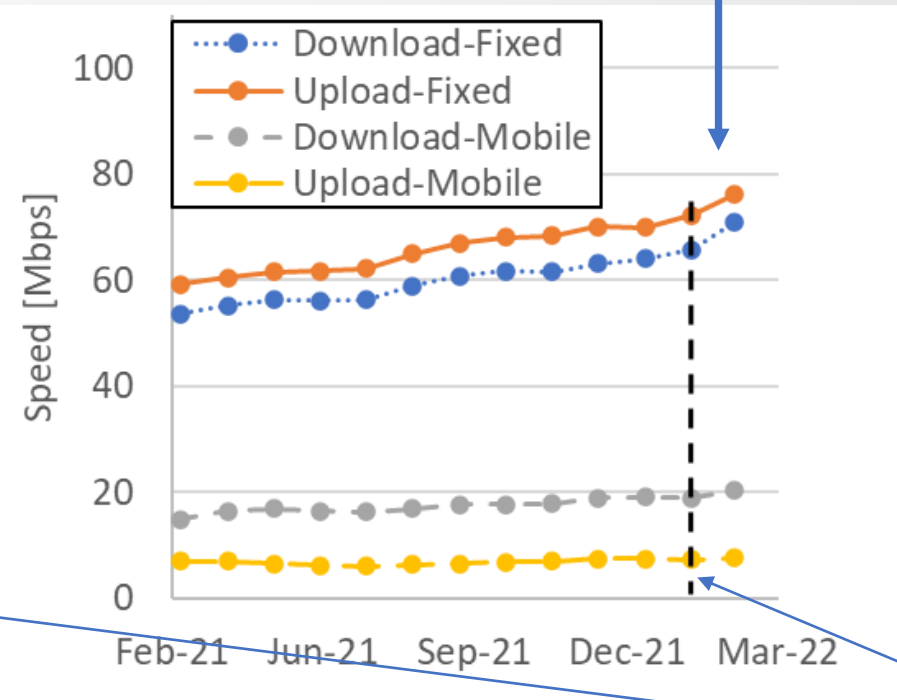
Data was captured on the first half of May, 2022.

Internet Performance: An Asymmetric Trend

Speedtest median results on the first month of the war



Can be explained by damage and disruptions to infrastructure.

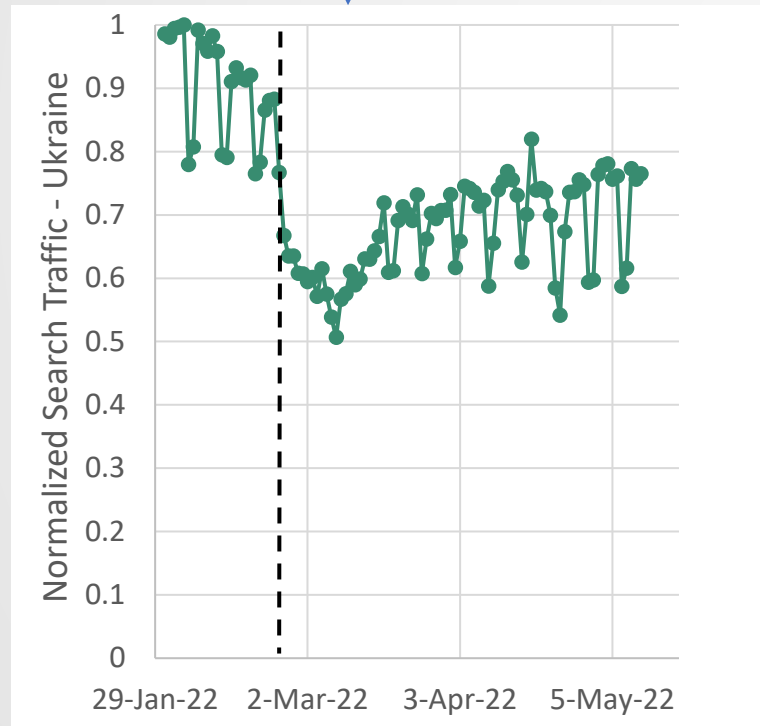


Can be explained by the reduction in streaming consumption.

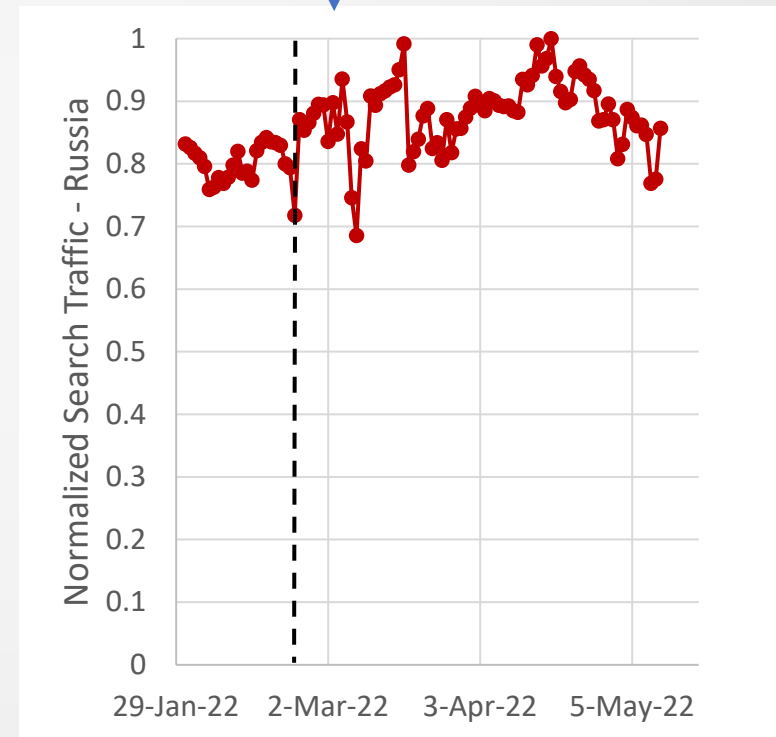
Dotted line marks the beginning of the war

Web Search Rate [Google]

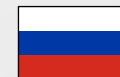
A significant decrease in Ukraine, an increase in Russia.



Web Search Rate [Google]



Web Search Rate [Google]



Russian Increase in News Consumption

“As the conflict has continued, we’ve seen a dramatic increase in requests from Russian networks to worldwide media, reflecting a desire by ordinary Russian citizens to see world news beyond that provided within Russia.”

Cloudflare CEO Matthew Prince

Cloudflare and Akamai to continue operations in Russia

Say that it is better to offer access to information than a blackout

March 08, 2022 By: Sebastian Moss [Comment](#)



Content delivery network (CDN), Edge, and web infrastructure companies Cloudflare and Akamai will continue to operate in Russia.

Both companies argued that it was better to help provide access to accurate information in the country, but said that they condemned Russia’s unprovoked invasion of Ukraine.

Cloudflare CEO Matthew Prince said that he had received “several calls to terminate” all business inside Russia, potentially referencing an appeal by cybersecurity startup SOC Prime that called out AWS, Akamai, and Cloudflare.

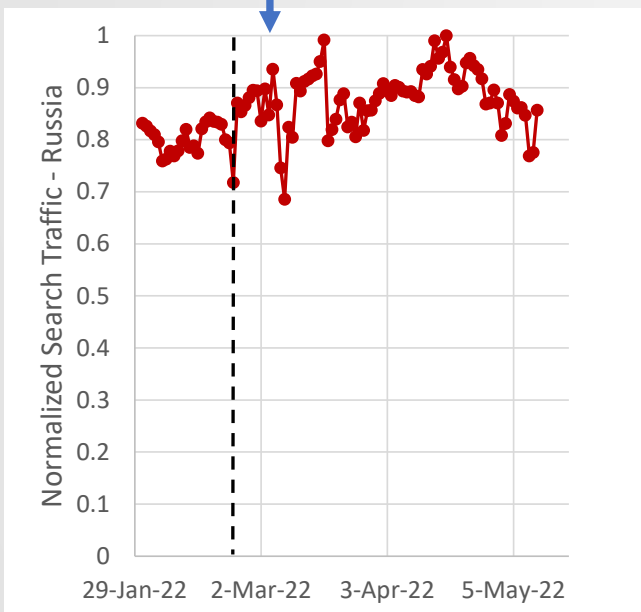
Prince said that, while the company has ceased business with sanctioned entities, Cloudflare’s view “is that Russia needs more Internet access, not less.”

He added: “As the conflict has continued, we’ve seen a dramatic increase in requests from Russian networks to worldwide media, reflecting a desire by ordinary Russian citizens to see world news beyond that provided within Russia.”

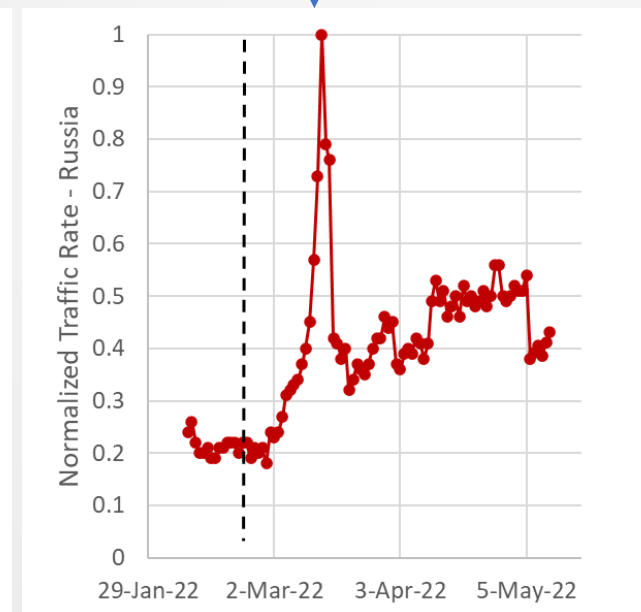


– Techcrunch

[Data Center Dynamics, 8 March 2022]



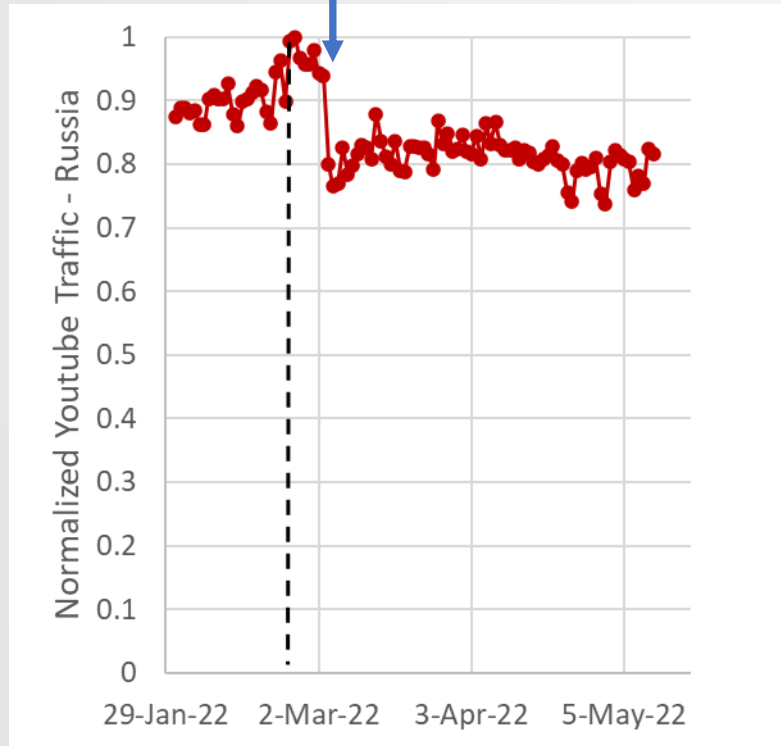
Web Search Rate [Google]



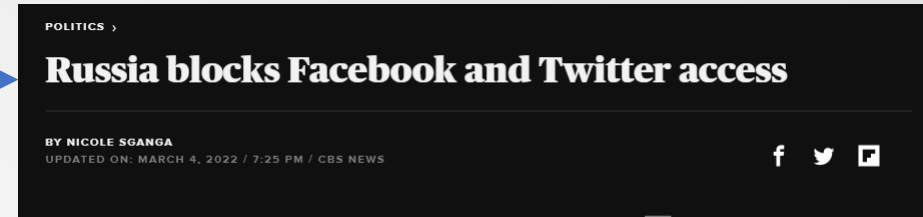
Traffic Rate [Cloudflare]

Streaming in Russia

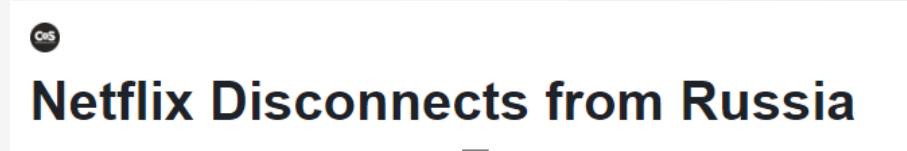
Youtube traffic rate dropped on March 4th.
Correlated to social media blocking.



Youtube Rate [Google]



[CBS News, 4 March 2022]

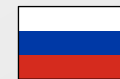
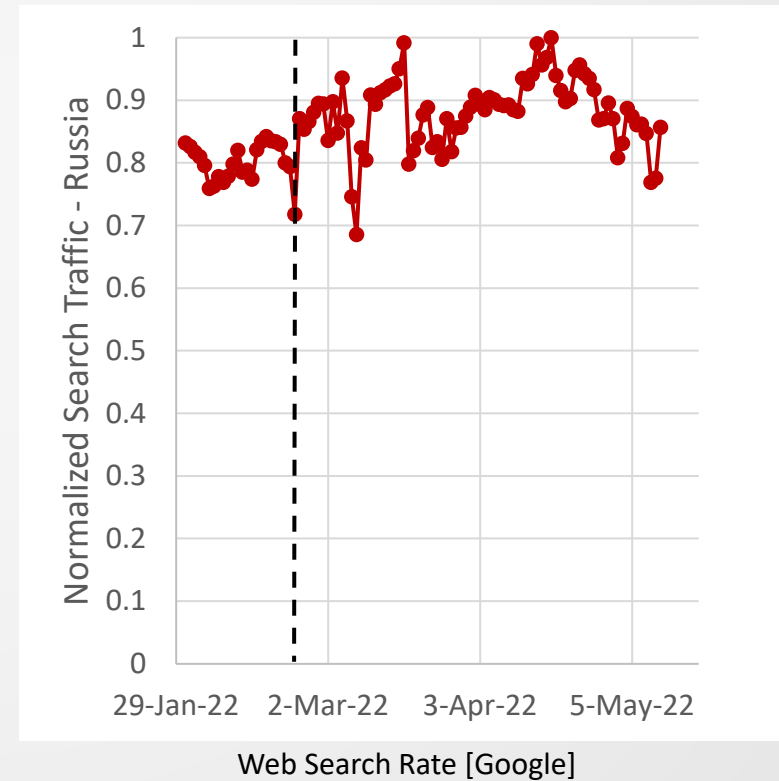
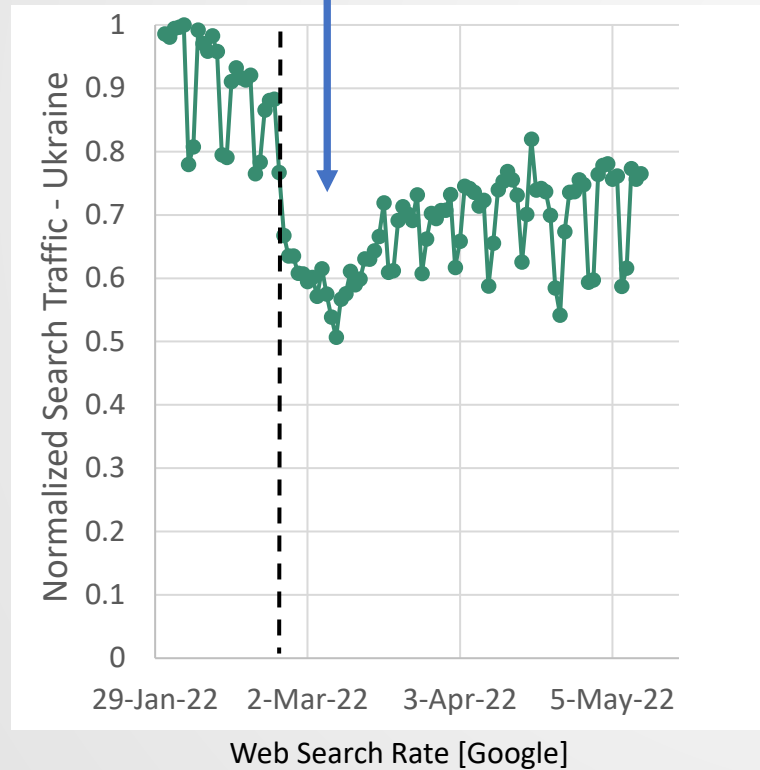


[Yahoo News, 7 March 2022]

The significant drop in streaming traffic can explain the Speedtest performance improvement in Russia.

Web Search Rate [Google]

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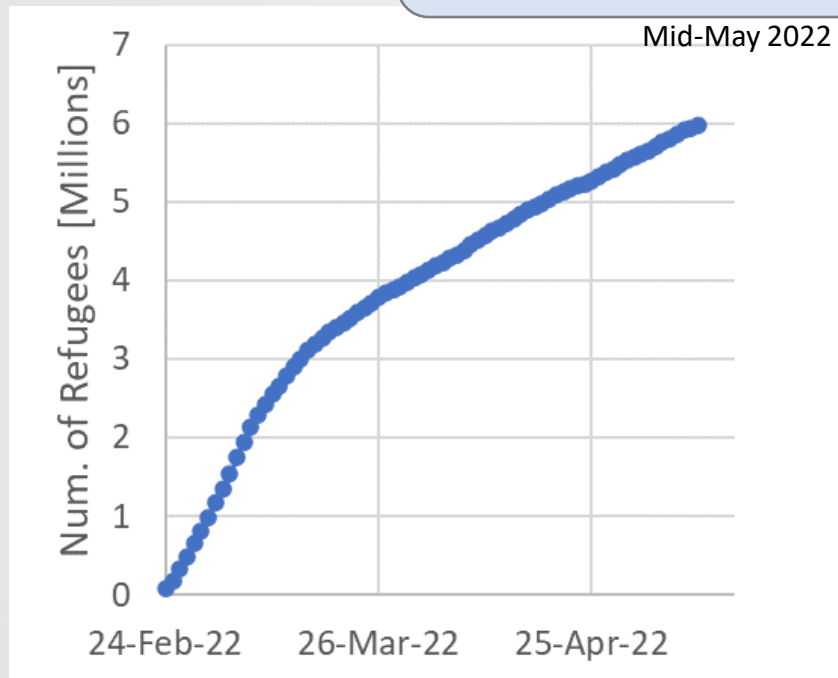
The Ukrainian Refugee Crisis



<https://www.indiatoday.in/world/russia-ukraine-war/story/russia-ukraine-war-ukrainian-boy-crying-poland-refugee-crisis-viral-video-1922475-2022-03-09>

Ukrainian Refugees

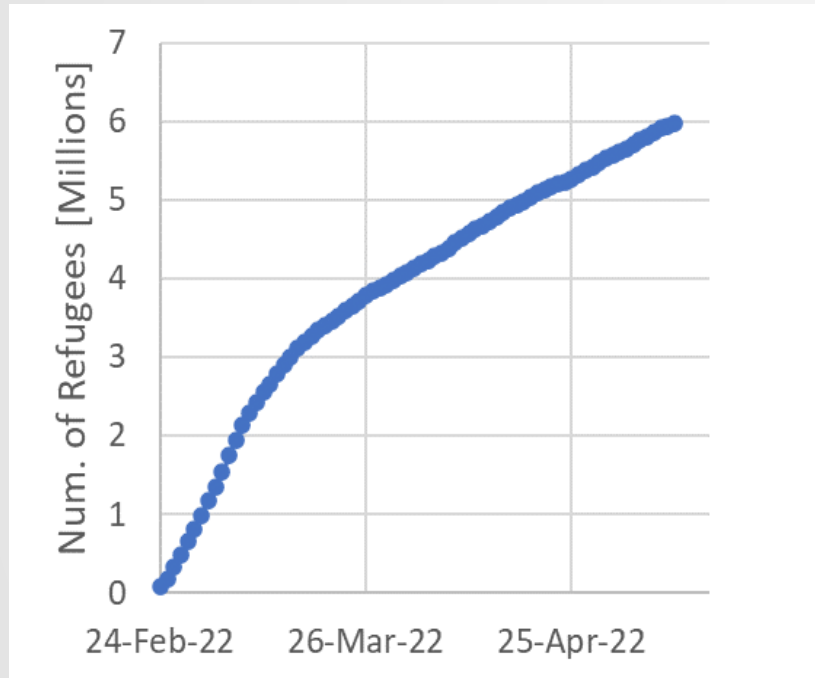
[UNHCR] publishes daily statistics about Ukrainian refugees crossing the border to neighboring countries.



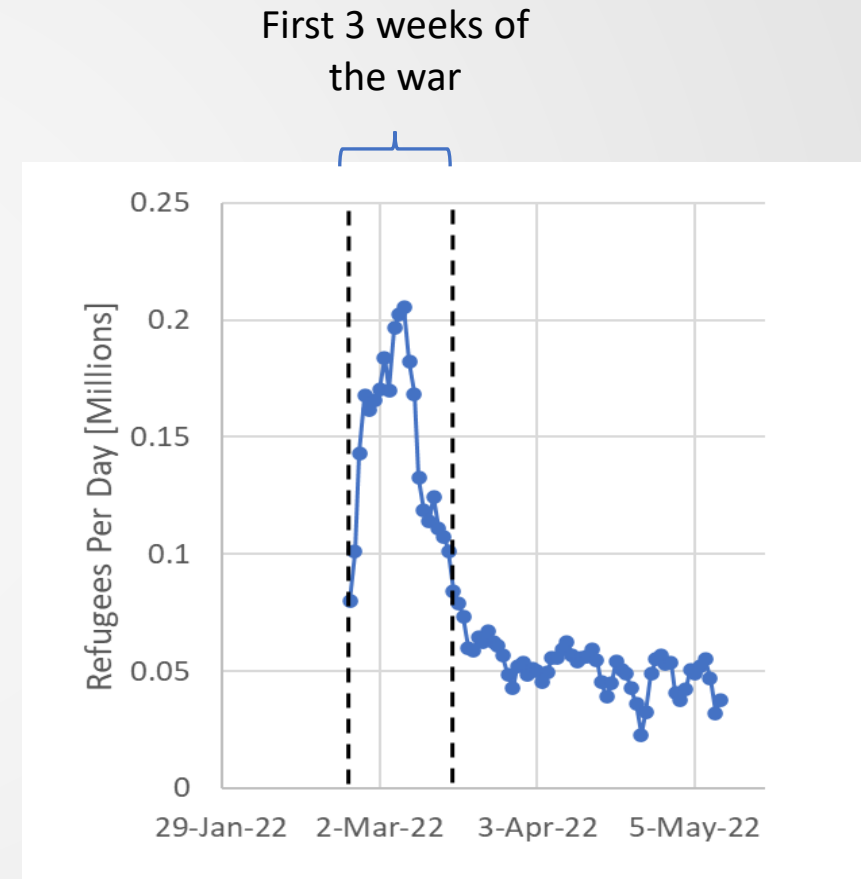
[UNHCR] – The UN Refugee Agency

> 9 million crossed the border [July, UNHCR]
> 25% of the population internally displaced [estimated numbers]

Focusing on the First 3 Weeks

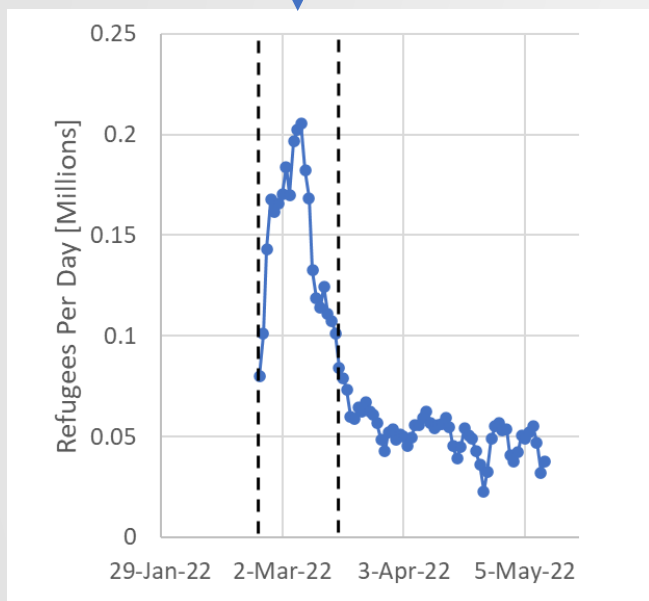


Derivative

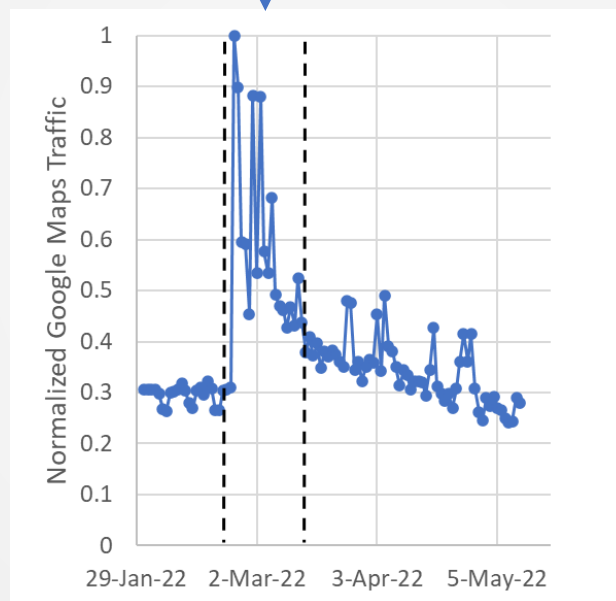


Correlating the Refugee Rate to Internet Measurements

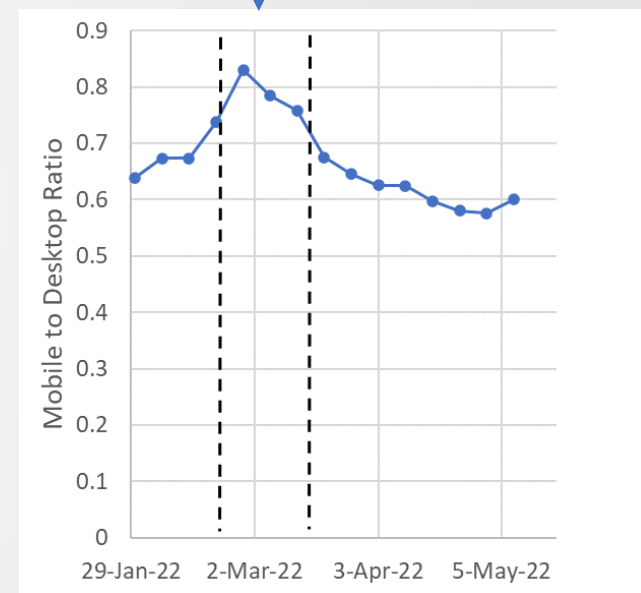
Refugee rate is highly correlated to navigation apps and to mobile device usage



Refugee Rate
[UNHCR]



Google Maps Traffic Rate
[Google]



Mobile-to-desktop ratio
[Statcounter]



The Refugee Flow

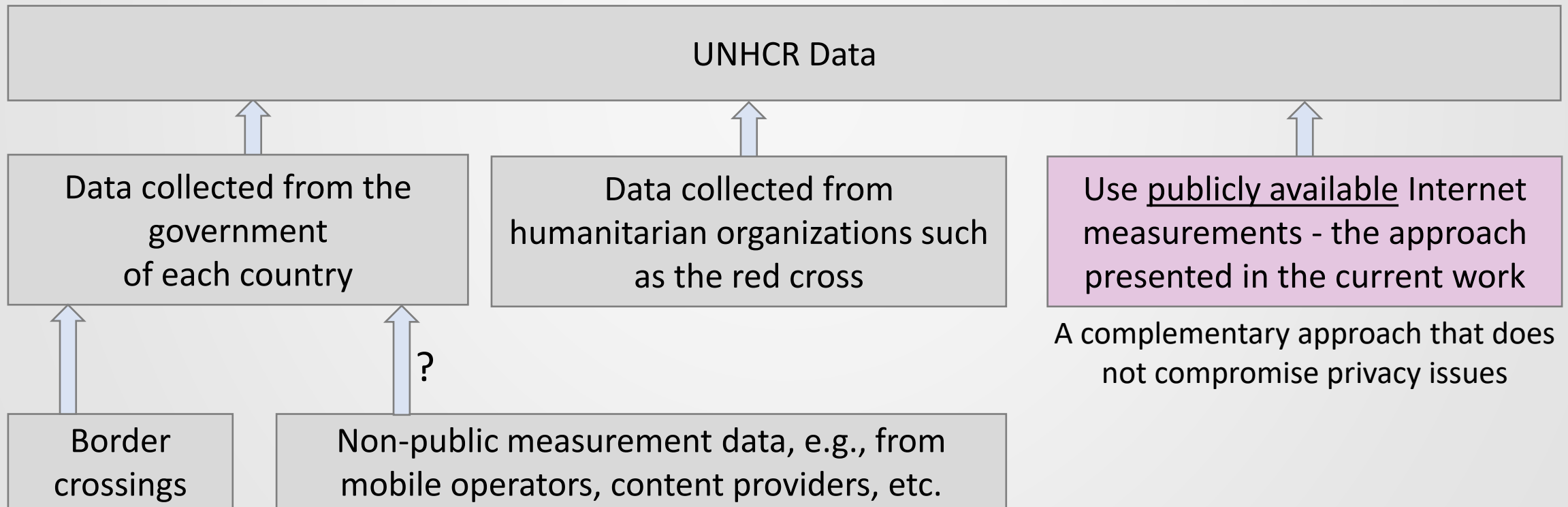
While there is accurate data about refugees that cross the border, there is no accurate data about where refugees end up staying. Traveling within the EU is not monitored.



[UNHCR]

A first step towards helping and supporting refugees is knowing where they are.

Mapping the Refugee Crisis



Use publicly available Internet measurements - the approach presented in the current work

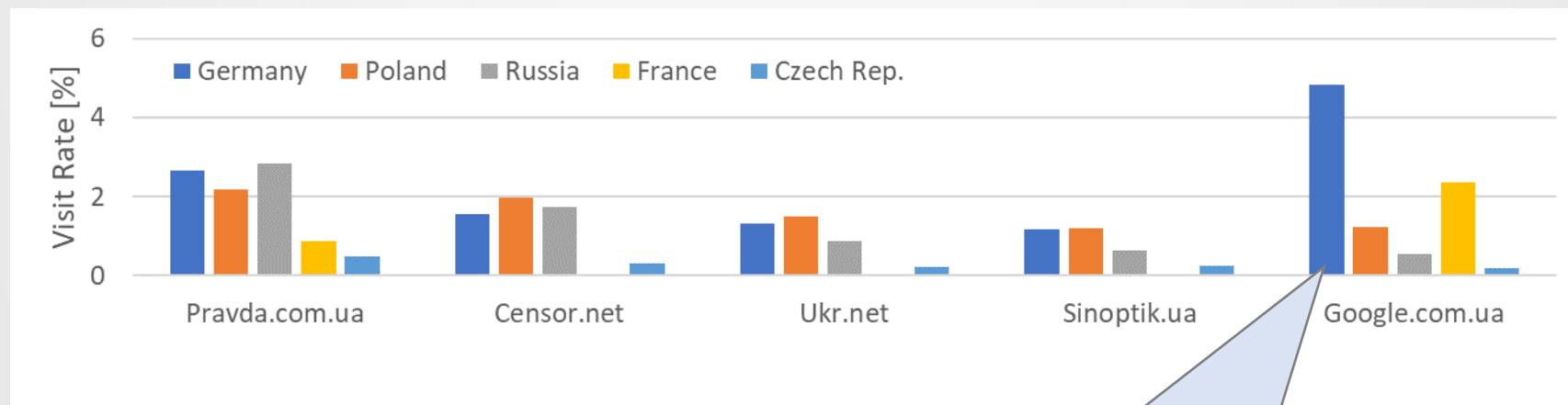
A complementary approach that does not compromise privacy issues

Not clear if this is done today, and may have privacy issues

Using Website Analytics

We combined two sources of data:

- Top accessed Ukrainian sites [Similarweb]
- Website visit location [Cloudflare]



4.84% of the visits to
google.com.ua came from
Germany

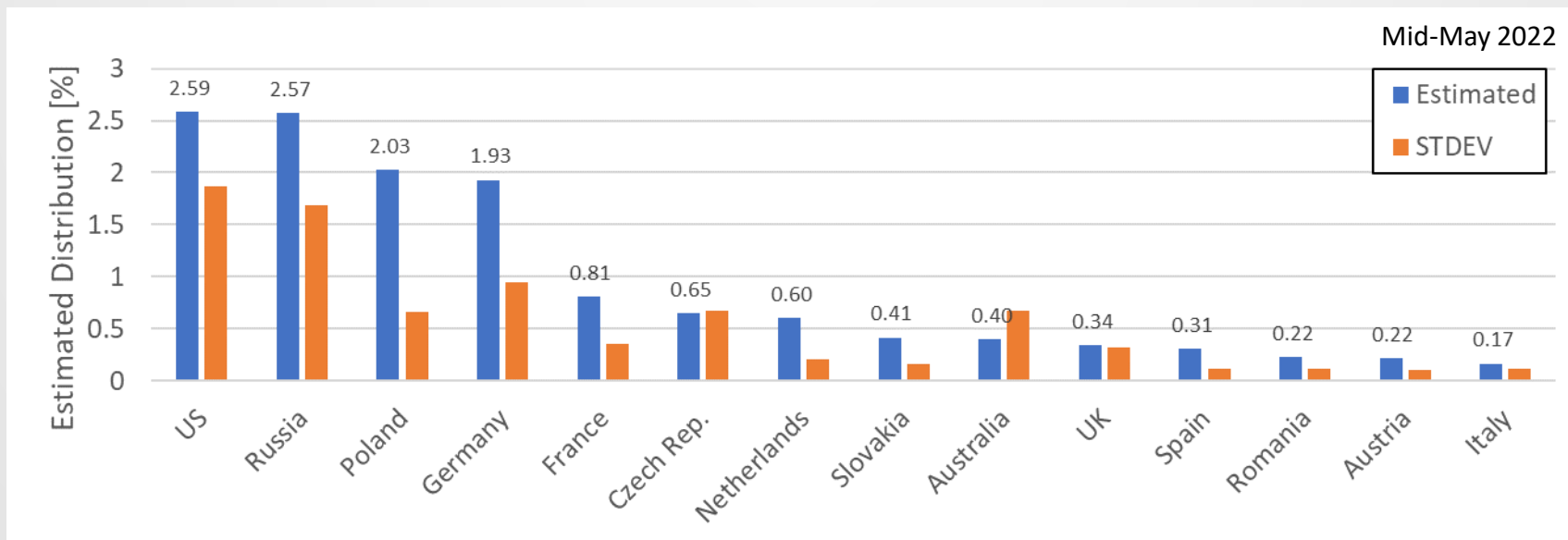
Estimating the Ukrainian Presence

- Top 15 accessed Ukrainian sites [Similarweb]
Eliminated international sites such as facebook.com and yandex.ru
- For each site: extracted the visit percentage from each country [Cloudflare]

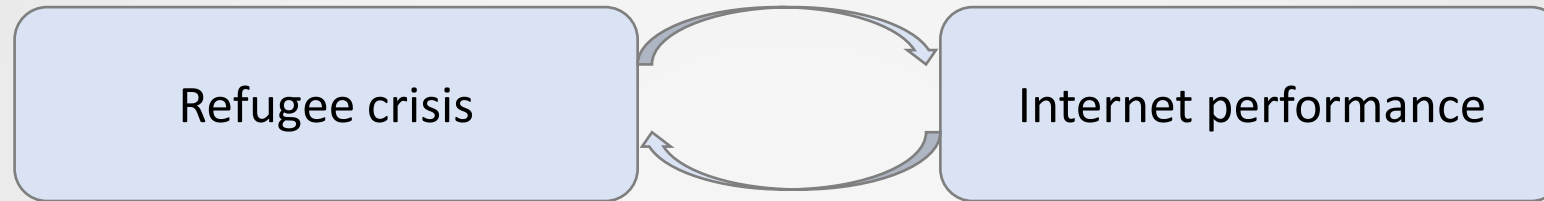
Maximum likelihood estimation of the percentage of Ukrainians in each country.

Each website had a weight that is proportional to the number of visits per month.

Work-in-progress: estimating the number of refugees by comparing to historical data.



Conclusion



- This work-in-progress shows how the refugee crisis affected Internet performance in Ukraine and around it.
- We presented a method of mapping the Ukrainian presence throughout the world using website analytics.
- The methods presented in this work can potentially be use as a complementary means for assessing the distribution and the flow of refugees throughout the world.

Thanks

Our hearts are with the families of the casualties and with the refugees.
We hope that the conflict will be resolved soon.

References

- [1] T. Mizrahi, J. Yallouz, "Using Internet Measurements to Map the 2022 Ukrainian Refugee Crisis", Arxiv:2205.08903, 2022.
- [2] T. Mizrahi, J. Yallouz, "Internet Performance in the 2022 Conflict in Ukraine: An Asymmetric Analysis", Arxiv:2205.08912, 2022.