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A new proposed data-driven index to monitor conflicts



Luca Macis, Marco Tagliapietra, Elena Siletti, Paola Pisano



Monitoring for global instability I



Two approaches – Sundberg and Melander (2013)

- individual diplomatic and political knowledge
- data science and technology

The two approaches are not mutually exclusive!

First approach:

policymakers and stakeholders rely on their diplomatic network and news gathering.



Monitoring for global instability II



Second approach: data collection and analysis

Requirements:

- open source
- accessibility
- reliability (human-supervised)
- constantly updated



GDELT







Monitoring for global instability III



Data-driven approach: ACLED (Armed Conflict Location and Event Data) – Raleigh et al. (2023)

Largely adopted for studies in the wars or conflict context — Hegre et al. (2012); Halkia et al. (2020)

- 6 main classes: Battles, Protests, Riots, Explosions/Remote violence, Violence against civilians, and Strategic developments.
- These are further divided into **25 sub-events.**





ITA DATA 2024

Monitoring for global instability IV

ACLED Data Over Time





Monitoring for global instability V

ITA DATA 2024 ACLED Data Over Time







violence index

Monitoring for global instability V



Goal: an index to monitor different intensities of violence on a temporal and geographic level.



Data I



Dataset of armed conflicts, civil wars, and violent demonstrations

A new ad hoc dataset defined through web scraping techniques.

Each historical event is marked by the following information:

- Precise location: identifies the geographic extent of the event
- Type: armed conflicts, civil wars or violent demonstrations;
- Start date, End date: start and end date (*present* if still in progress);
- **Description:** brief description of the historical event.



Data II

Israel–Hamas War

Precise Location: Gaza Strip and Israel
Type: Armed Conflict
Start Date: 07/10/2023
End Date: Present

Description: A war that began with a surprise attack by Hamas on Israel, followed by a massive Israeli bombing campaign and invasion of Gaza. The conflict has resulted in significant civilian casualties, extensive destruction in Gaza, and global calls for a ceasefire. The war has also led to regional and international tensions, including accusations of genocide against Israel.



Data III



Focus: temporal progression of ACLED variables, grouped:

- on a weekly basis
- by sub-event
- by fatalities per sub-event

country	event_date	Armed clash	Air/drone strike	
Afghanistan	2017-01-06	155	13	
Afghanistan	2017-01-13	140	10	



Methods I

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Data normalization using Min-Max method — *Mazziotta and Pareto (2020), OECD (2008).*

$$y_{i,j,k} = \frac{x_{i,j,k} - \min(x_j)}{\max(x_j) - \min(x_j)},$$

where *i* represents the countries, *j* denotes the variables, and *k* indicates the weeks.





% Contribution

Methods III

Ukraine 2022-02-18, contribution

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Methods III

Violence Index contributions

Contribution		
%	Fatalites_Chemical weapon Fatalites_Change to group/activity Fatalites_Peaceful protest Fatalites_Peaceful protest Fatalites_Protest with intervention Fatalites_Arrests Fatalites_Arrests Fatalites_Grenade Fatalites_Grenade Explosions/Remote violence_Suicide bomb Fatalites_Excessive force against protesters Fatalites_Suicide bomb Fatalites_Suicide bomb Fatalites_Government regains territory Battles_One-state actor overtakes territory Fatalites_Non-state actor overtakes territory Fatalites_Non-state actor overtakes territory Fatalites_Non-state actor overtakes territory Fatalites_Non-state actor overtakes territory Fatalites_Memote violence_Grenade Riots_Violent demonstration Strategic developments_Agreement Strategic developments_Agreement Strategic developments_Agreement Strategic developments_Agreement Strategic developments_Agreemote violence_Shelling/artillery/missile attack Protests_Protest with intervention Riots_Memote violence_Remote explosive/landmine/IED Explosions/Remote violence_Remote explosive/landmine/IED Explosions/Remote violence_Remote explosive/landmine/IED Explosions/Remote violence_Remote explosive/landmine/IED Explosions/Remote violence_Air/drone strike Violence against civilians_Attack Battles_Armed clash	



Methods V

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Summation of weekly contributions to obtain the VI, reflecting the intensity of unrest events.

$$VI_{i,j} = av_{i,j}^{(1)} \times cav^{(1)} + av_{i,j}^{(2)} \times cav^{(2)} + ... + av_{i,j}^{(n)} \times cav^{(n)} \times 1000$$

where: $av^{(n)}$ is the *n*-th re-scaled ACLED variable, $cav^{(n)}$ is the *n*-th weighted contribution w.r.t. $av^{(n)}$, *i* is the *i*-th week, *j* is the *j*-th country, and *n* is the total number of ACLED variables.



Results





Conclusion

- The VI peaks during periods of war or armed conflict, reflecting intensified events.
- The methodology provides a quantitative portrayal of unrest events.
- It identifies the variables with the most significant impact during critical periods.

Index customization and modularization

- choosing a different geographical area (city, province, ...)
- by choosing a different time window (daily, weekly, monthly, yearly, ...)

Next steps

- weighting with TF-IDF score
- more complex aggregation models



UNIVERSITÀ The end.

