Modeling Information Narrative Evolution on Telegram During the Russia-Ukraine War

A Dynamic Clustering Approach to Real-Time Narrative Detection and Analysis

Authors: Patrick Gerard[1,2], Svitlana Volkova[2], Louis Penafiel[2], Kristina Lerman[1], Tim Weninger[3]

[1]University of Southern California, [2]Aptima Inc., [3]University of Notre Dame

USC
INFORMATION
SCIENCES
INSTITUTE

USC Viterbi
School of Engineering

Russian articles about Ukraine that mention Nazism

2,500 articles

Articles referencing
Nazism spiked on the day
Russia invaded Ukraine.

2,000

1,500

Fewer articles about Ukraine were
published after Russia's withdrawal
from Kyiv, but coverage picked up
again as the war shifted to the
Donbas in Ukraine's east.

1,000

500

7-day
average

Jan. 1, 2020

2021

2022

Feb. 24

Source: Semantic Visions

USC
INFORMATION
SCIENCES
INSTITUTE

USC Viterbi
School of Engineering

Feb 24, 2022: "Denazification" narrative explodes in Russian Media

March 2022: Stories evolve from abstract claims to "Nazis using human shields"

April 2022: Mariupol siege becomes "destroying Nazi stronghold" justification

May 9, 2022: Putin's Victory Day speech - "fighting so there's no place for Nazis"

"**Crimes against civilians, ethnic cleansing, and punitive actions organized by neo-Nazis in Ukraine.** It is against that evil that our soldiers are bravely fighting."
—*Vladimir Putin*

Peter Schrank
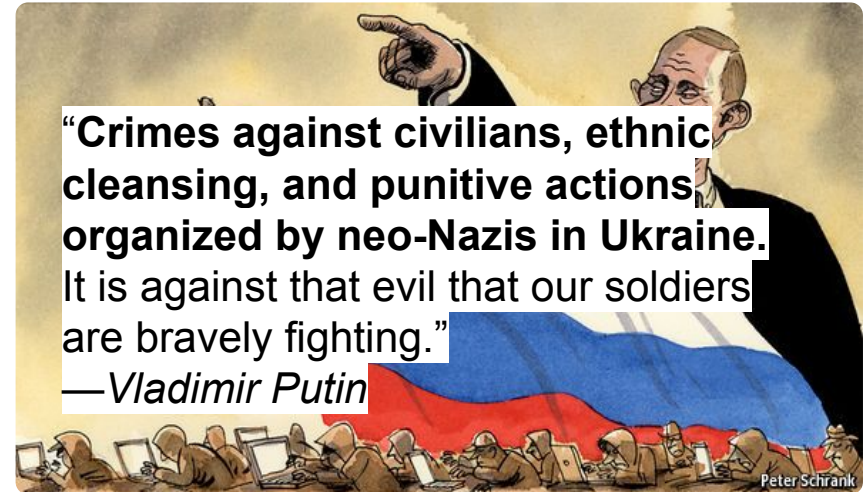
Feb 24, 2022: "Denazification" narrative explodes in Russian Media

March 2022: Stories evolve from abstract claims to "Nazis using human shields"

April 2022: Mariupol siege becomes "destroying Nazi stronghold" justification

May 9, 2022: Putin's Victory Day speech - "fighting so there's no place for Nazis"

*The narrative shifts are **rapid**, **coordinated**, and **measurable**…*

Information Warfare is the New Battlefield

*Narratives **shape public opinion** and policy decisions.*

*Real-time **propaganda influences** global perceptions of conflict.*

Data Source and Scope: Telegram Warbloggers

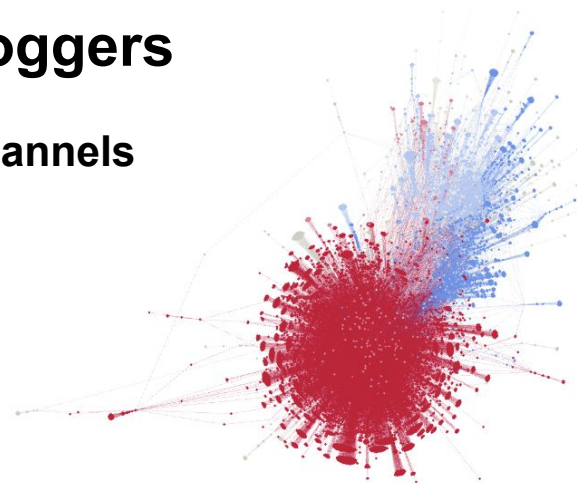Posts from **Russian- and Ukrainian-leaning Telegram channels**

Collected from **Oct 2015–Aug 2023**

Final analysis focused on **~8.6M posts** from **568 channels**

→ **243 pro-Ukrainian** (4.2M posts)

→ **325 pro-Russian** (4.4M posts)

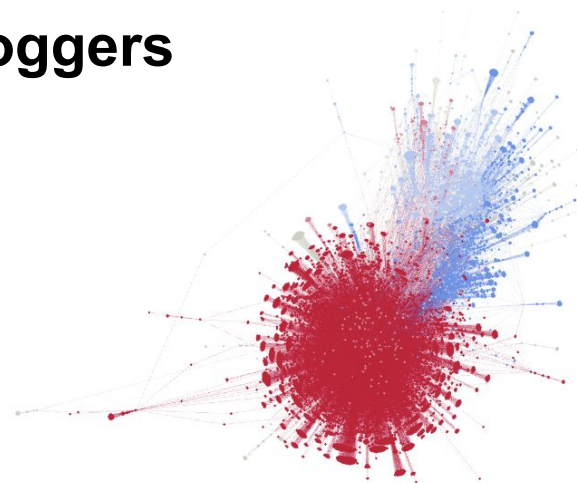Data primarily in **Russian and Ukrainian**

Co-reference network of Telegram warbloggers. Nodes represent channels, colored by inferred stance:
🔴 **Pro-Russian** (red),
🔵 **Pro-Ukrainian** (blue),
⚪ **Unaffiliated/Neutral** (grey)

Data Source and Scope: Telegram Warbloggers

What stories do these communities tell themselves about the war?

How do these stories change?

Co-reference network of Telegram warbloggers. Nodes represent channels, colored by inferred stance:
- 🔴 **Pro-Russian** (red),
- 🔵 **Pro-Ukrainian** (blue),
- ⚪ **Unaffiliated/Neutral** (grey)

Our Approach - Step 1

OnlineAgglo:

*Real-time hierarchical clustering that tracks how narratives **split, merge, and evolve** as new posts arrive. Captures the **dynamic lifecycle** of narratives at scale.*

"Why does Ukraine have so many US-funded biological research facilities?"

"Documents confirm: Pentagon developing biological weapons in Ukrainian labs targeting Russian DNA"

Our Approach - Step 1

OnlineAgglo:

*Real-time hierarchical clustering that tracks how narratives **split, merge, and evolve** as new posts arrive. Captures the **dynamic lifecycle** of narratives at scale.*

"Hunter Biden's Metabiota company funded gain-of-function research in Mariupol biolab - evidence recovered by our forces"

"Ukrainian biolabs were preparing ethnic bioweapons for genocide of Russians in Donbas - this is why we had to act"

Our Approach - Step 1

OnlineAgglo:

*Real-time hierarchical clustering that tracks how narratives **split, merge, and evolve** as new posts arrive. Captures the **dynamic lifecycle** of narratives at scale.*
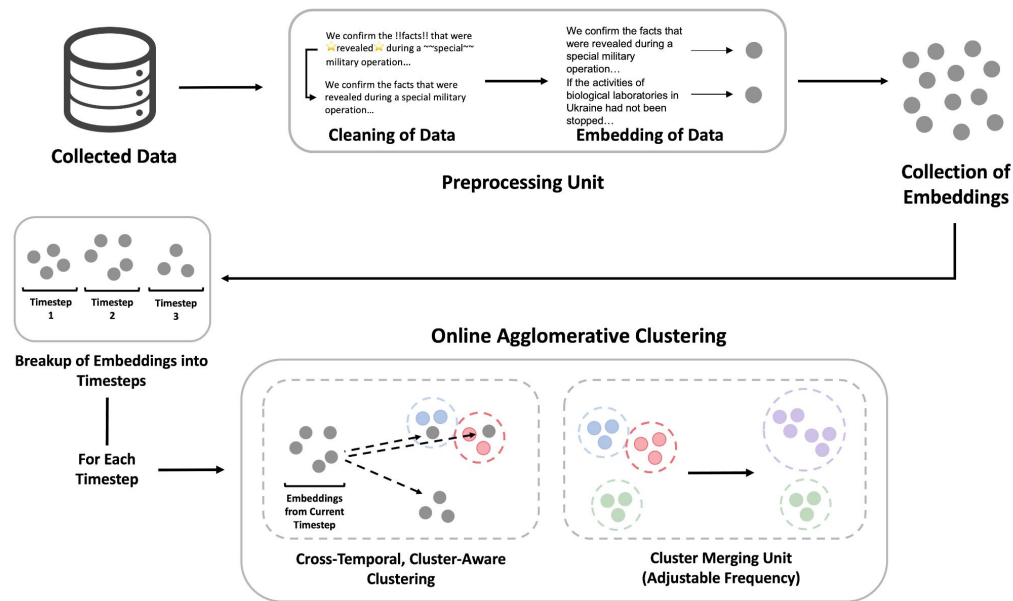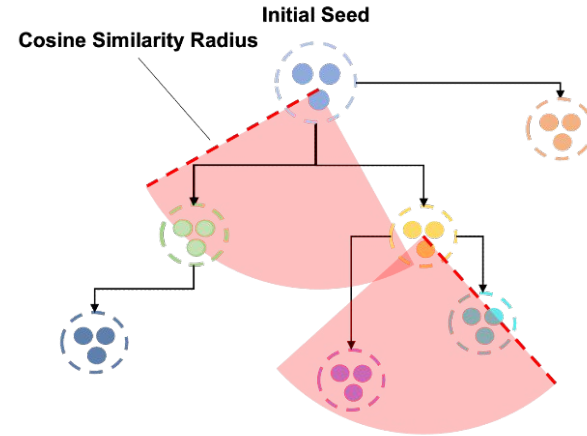
Our Approach - Step 2 (Optional)

MacroNarrative:

*Human-in-the-loop framework that combines related narrative clusters into coherent **macro-narratives**, tracking how overarching **themes drift and mutate** across time.*

Creation of candidate seed cluster set via BFS-inspired discovery process seeking clusters like other candidate clusters.

Our Approach - Step 2 (Optional)

MacroNarrative:

*Human-in-the-loop framework that combines related narrative clusters into coherent **macro-narratives**, tracking how overarching **themes drift and mutate** across time.*

Human inspection of each seed candidate across every timestep.

Timestep 0: Cluster 2 - 125 Texts

Text 1: "Let them now tell the world community that the American military was developing it in the Pentagon's biological laboratories in the territories of Ukraine and other former Soviet republics."

Text 2: "Statements by a State Department representative indicate Washington's fears that a violation of the Biological Weapons Convention by Ukraine and the United States will be confirmed, said Russian Ambassador to Washington Anatoly Antonov."

Timestep n: Cluster 2 - 207 Texts

Text 1: "They reported that everything necessary to continue the implementation of the US military-biological program has already been taken out of Ukraine."

Text 2: "New evidence of the presence of American biological laboratories in Ukraine."

Our Approach - Step 2 (Optional)

MacroNarrative:

Human-in-the-loop framework that combines related narrative clusters into coherent **macro-narratives***, tracking how overarching* **themes drift and mutate** *across time.*

Formation of dynamic Macro-Cluster using refined seed clusters.

Narrative Centroid

Seed Cluster
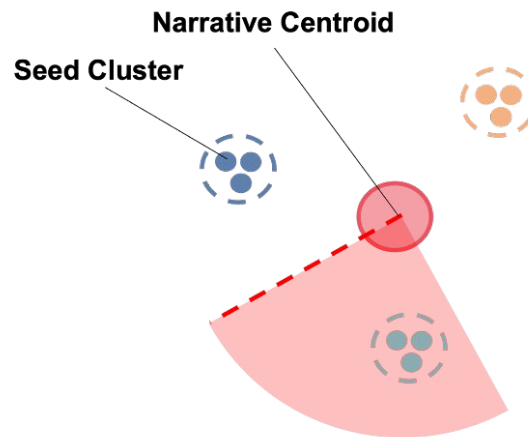
Key Findings

Divergent Focus Patterns

Ukrainian narratives emphasize **military/war** *and international politics, while Russian narratives focus heavily on* **international politics** *and internal politics.*

Community	Military/War	Politics	
		Internal	International
Ukrainian	**46.5%**	9.3%	44.2%
Russian	16.7%	31%	**52.4%**

Theme breakdown of trending clusters each week.

Key Findings

Disagreement over Reality

*When both communities do discuss the same topic, their respective perceptions are **dramatically different***.

Bucha Massacre:

Russian troops committed a massacre in Bucha.

Top Micro-Narratives:
Russian Atrocities
Ukrainian Resistance
International Diplomacy
Humanitarian Crisis
Information Warfare
War Crimes Accountability
Economic Impact
Bucha Refugees

Key Findings

Disagreement over Reality

*When both communities do discuss the same topic, their respective perceptions are **dramatically different**.*

Bucha Massacre:

There was not any "Bucha Massacre" committed by Russian troops.

Top Micro-Narratives:
Bucha Event Doubts
Media Manipulation
International Report Challenges
Alternative Narratives
Critique of Ukraine's Role
Evidence Credibility

Key Findings

Narrative Structural Diversity

*Narratives are **internally complex**.
The relative use of each theme changes
dramatically **across time**.*

Example Ukrainian Macro-Narrative

**Russian troops committed a massacre in
Bucha.**

Top Micro-Narratives:
Russian Atrocities
Ukrainian Resistance
International Diplomacy
Humanitarian Crisis
Information Warfare
War Crimes Accountability
Economic Impact
Bucha Refugees

Key Findings

Narrative Structural Diversity

*Narratives are **internally complex**.*
*The relative use of each theme changes dramatically **across time**.*

Ukraine must be denazified.

Top Micro-Narratives:
Ukrainian Neo-Nazism
WWII History Revision
Russian Anti-Nazi Stance
Western Support
Neo-Nazi Impact
Ukrainian War Crimes
Civilian Effects

Key Findings

Ukraine must be denazified.

Narrative Structural Diversity
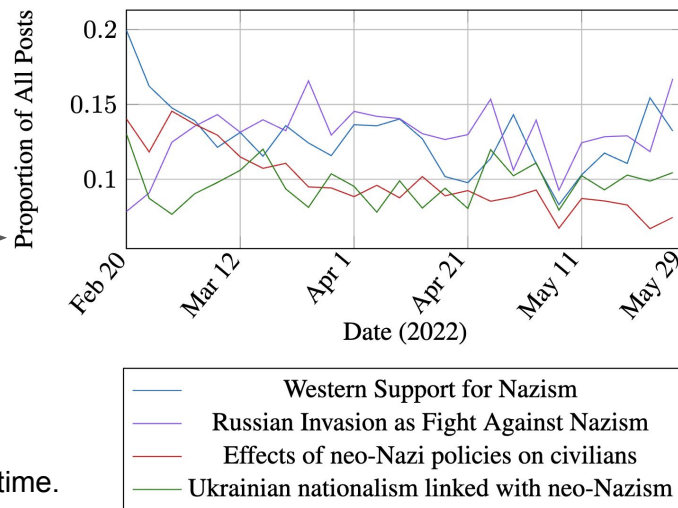
*Narratives are **internally complex**.
The relative use of each theme changes
dramatically **across time**.*

Top 4 Themes in Russian Denazification Narrative

Micro-narrative proportion over time.

19

USC
INFORMATION
SCIENCES
INSTITUTE

USC Viterbi
School of Engineering

Key Takeaways: Modeling Information Narrative Detection and Evolution

Dynamic Narrative Tracking at Scale

We introduce adaptive clustering framework for real-time narrative evolution, **capturing 93.2% accuracy** in identifying trending stories that match external events.

Complex Internal Narrative Mechanics

Narratives exhibit intricate structural diversity and adaptive temporal patterns—**surging and dormant phases** driven by external triggers, revealing sophisticated internal evolution mechanisms.

Fundamentally Different Realities

Russian and Ukrainian communities construct entirely separate information worlds: divergent event priorities, contrasting temporal responses, and **opposing interpretations of identical events** like Bucha point towards irreconcilable narrative universes.

✉ pgerard@isi.edu

🌐 patrickgerard.co

🦋 patrikgerard.bsky.social

USC Information Sciences Institute

USC Viterbi
School of Engineering