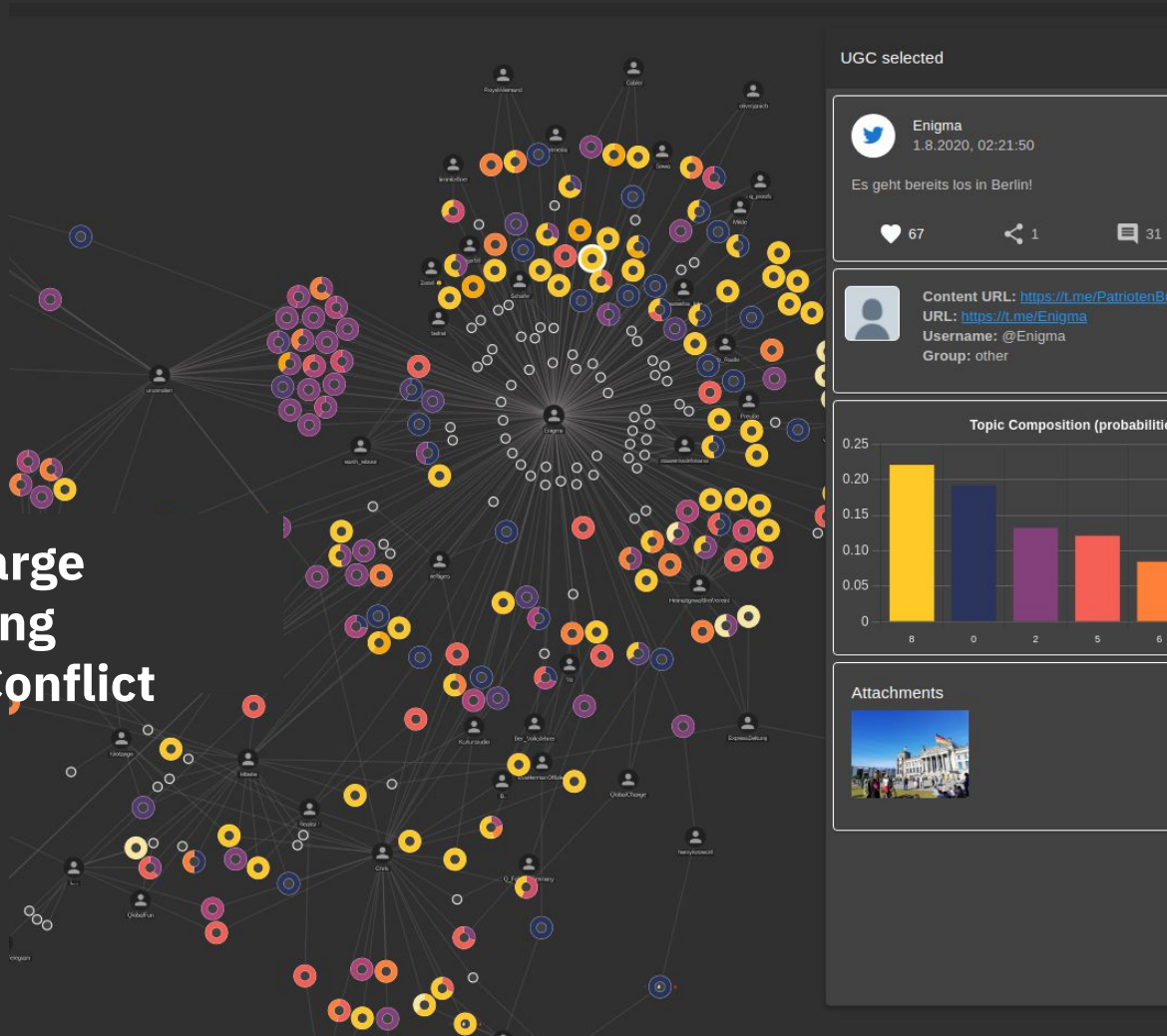
MunichInnovationLabs

Augmenting OSINT with Large Language Models: Enhancing Situational Awareness in Conflict Analysis

Munich, 28. February 2025



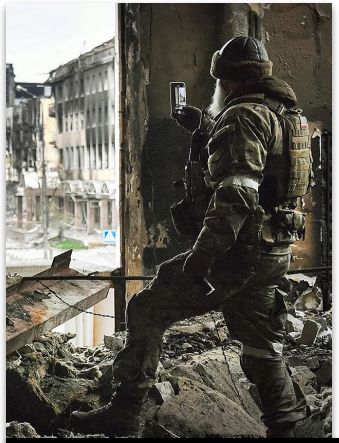
About Munich Innovation Labs

INspectre

P20 POLIZEI 20/20

OPEN SOURCE INTELLIGENCE
INTERNET MONITORING
Team Apollo - Polizei 20/20-Projektgruppe

From data streams to strategic insights

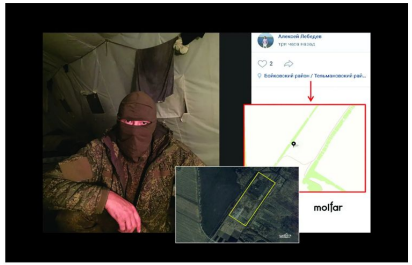


A Private Company Is Using Social Media to Track Down Russian Soldiers

Open-source investigations were once potent journalistic tools, but in Ukraine, they're being used on the battlefield.

On Oct. 12, 2022, Russian soldier Aleksey Lebedev logged onto

VKontakte, Russia's most popular social network, and uploaded a photo of himself in military fatigues crouching in a large white tent. He had been smart enough to obscure his face with a balaclava, but unfortunately for Lebedev and his comrades, he did not obscure the exact location from which he had posted: Svobodne village in southern Donetsk.



Russian soldier Aleksey Lebedev posted on the social media site VKontakte on Oct. 12. The Ukrainian military investigations company Molfar noted the location on Google Maps (inset); a satellite version from Google Maps is pictured in the bottom inset. VKONTAKTE; GOOGLE MAPS VIA MOLFAR

Lebedev's post was picked up by a Ukrainian military investigations company called Molfar. This lead was transferred to an analyst in its open-source intelligence (OSINT) branch, and investigators spent the next few hours constructing a target location profile for Lebedev and his military unit. The unit's location was believed to be a training base for Russian and pro-Russian separatist troops. After discovering two other photos posted from the same location by pro-Russian servicemen—as well as other corroborating evidence, which was sh
Ukrainian intelligence.

Frontverläufe in Echtzeit: Das ist die geheime Kampfsoftware Delta, die im Ukraine-Krieg entscheidend sein könnte

Berlin-Attentäter

Amri-Ermittler übersahen Handyfotos mit Waffen

Neue Panne im Fall des Berliner Attentäters Anis Amri: Ermittler haben ein Handy des späteren Terroristen nur oberflächlich ausgewertet.

Handelsblatt

Münchner Sicherheitskonferenz

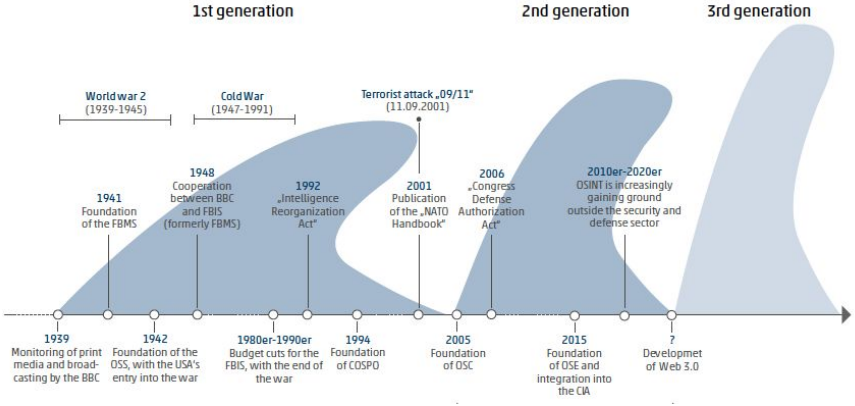
Wie Daten die Bundeswehr zur überlegenen Armee machen sollen

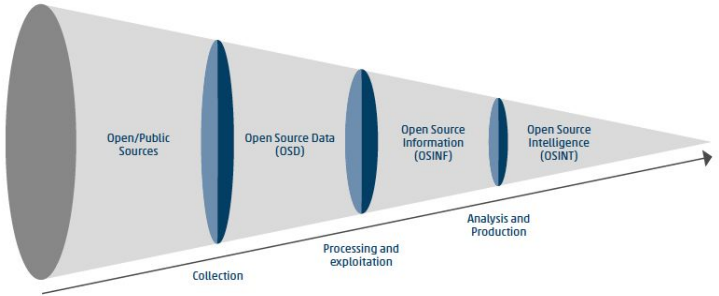
Moderne Kriege entscheiden sich auch in der digitalen Welt. Die Bundeswehr sucht deshalb neue Wege der Kooperation mit innovativen Start-ups und KI-Entwicklern.

Diese Wissenslücke will das Start-up Munich Innovation Labs schließen, das KI Tools für die innere und äußere Sicherheit entwickelt. Mit seiner „Crowd Sourced Information Plattform" (CIP) durchforstet es öffentlich zugängliche Informationen wie beispielsweise aus Webcams oder Datenbanken und kann auch Crowd-User aktivieren, Informationen hochzuladen. So ergibt sich im Idealfall ein detaillierteres und aktuelleres Lagebild, als es selbst mit Satellitenaufnahmen möglich wäre.

Vorgestellt wurde das Projekt am Donnerstagabend im Vorfeld der Münchner Sicherheitskonferenz (MSC). Der Charakter des Kriegs habe sich grundlegend

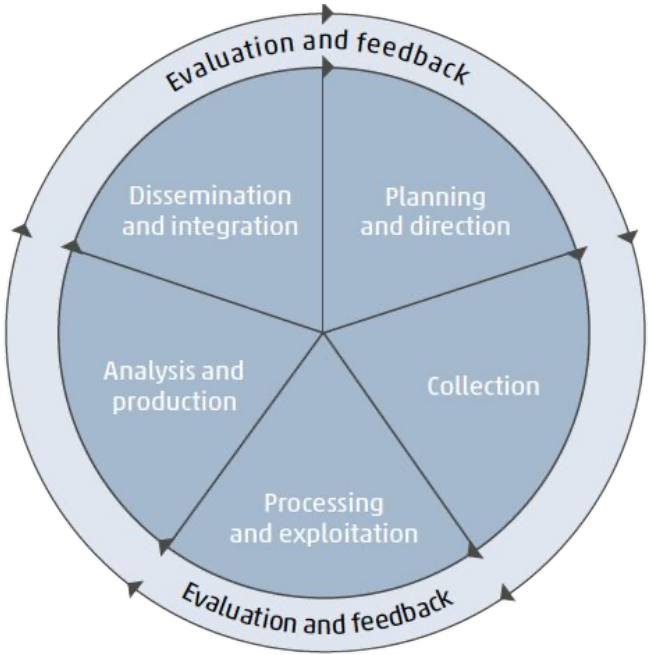
The Evolution of OSINT (Open-Source Intelligence)





Source: On the Trail of OSINT The Evolution and Foundations of Open Source Intelligence, https://www.hensoldt.net/products/190/osint-chronicle-quarterly-paper-introducing-the-world-of-osint

The Intelligence Cycle in OSINT



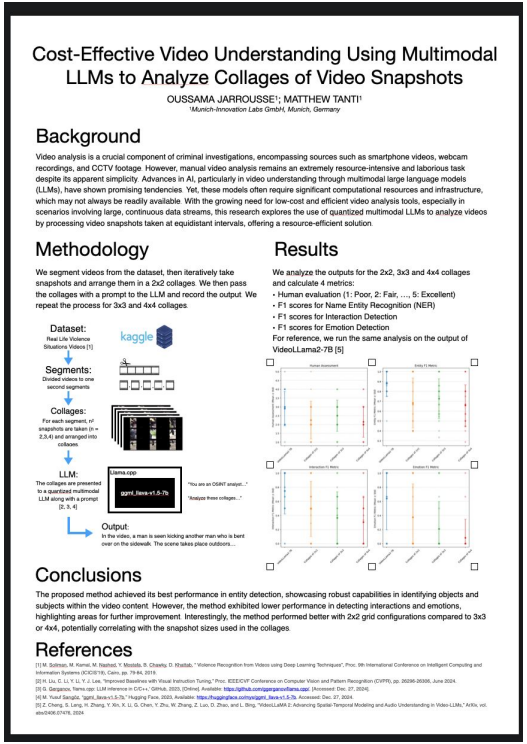
Six-Phase Intelligence Cycle:
Planning → Collection → Processing → Analysis → Dissemination → Feedback

Key Challenges:
Legal boundaries, unstructured data processing, verification requirements

Information Environment:
Managing overload and deliberate misinformation in diverse source landscapes

Source: On the Trail of OSINT The Evolution and Foundations of Open Source Intelligence, https://www.hensoldt.net/products/190/osint-chronicle-quarterly-paper-introducing-the-world-of-osint

Can LLMs provide enhanced Situational Awareness?



Cost-Effective Video Understanding Using Multimodal LLMs to Analyze Collages of Video Snapshots

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Background

Video analysis is a crucial component of criminal investigations, encompassing sources such as smartphone videos, webcam recordings, and CCTV footage. However, manual video analysis remains an extremely resource-intensive and laborious task despite its apparent simplicity. Advances in AI, particularly in video understanding through multimodal large language models (LLMs), have shown promising tendencies. Yet, these models often require significant computational resources and infrastructure, which may not always be readily available. With the growing need for low-cost and efficient video analysis tools, especially in scenarios involving large, continuous data streams, this research explores the use of quantized multimodal LLMs to analyze videos by processing video snapshots taken at equidistant intervals, offering a resource-efficient solution.

Methodology

We segment videos from the dataset, then iteratively take snapshots and arrange them in a 2x2 collages. We then pass the collages with a prompt to the LLM and record the output. We repeat the process for 3x3 and 4x4 collages.

Dataset: Real Life Violence Situations Videos [1] — kaggle

Segments: Divided videos to one second segments

Collages: For each segment, n² snapshots are taken (n = 2,3,4) and arranged into collages.

LLM: The collages are presented to a quantized multimodal LLM along with a prompt [2, 3, 4] — llama.cpp — ggml_llava-v1.5-7b — "You are an OSINT analyst..." "Analyze these collages..."

Output: In the video, a man is seen kicking another man who is bent over on the sidewalk. The scene takes place outdoors...

Results

We analyze the outputs for the 2x2, 3x3 and 4x4 collages and calculate 4 metrics:

- Human evaluation (1: Poor, 2: Fair, ..., 5: Excellent)
- F1 scores for Name Entity Recognition (NER)
- F1 scores for Interaction Detection
- F1 scores for Emotion Detection

For reference, we run the same analysis on the output of VideoLLama2-7B [5]

Conclusions

The proposed method achieved its best performance in entity detection, showcasing robust capabilities in identifying objects and subjects within the video content. However, the method exhibited lower performance in detecting interactions and emotions, highlighting areas for further improvement. Interestingly, the method performed better with 2x2 grid configurations compared to 3x3 or 4x4, potentially correlating with the snapshot sizes used in the collages.

References

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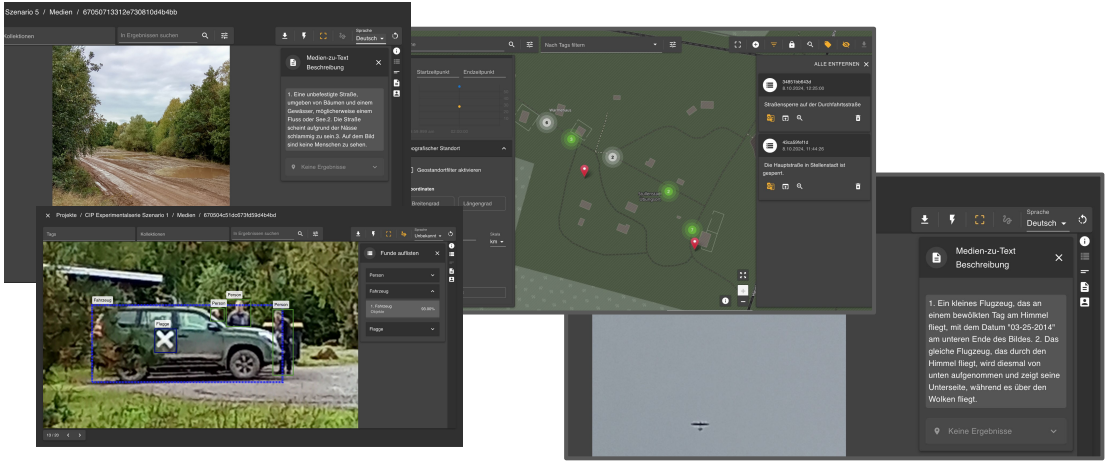
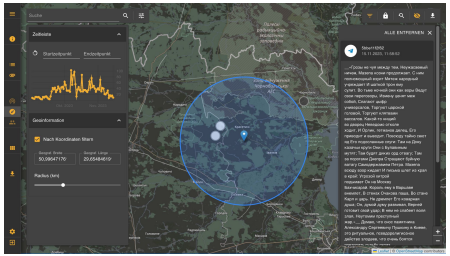
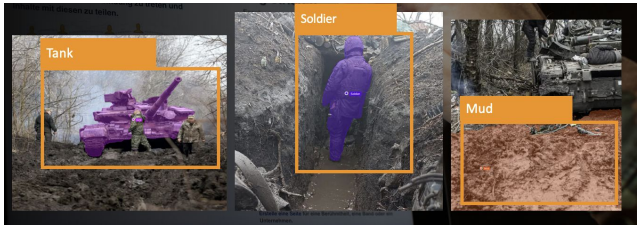
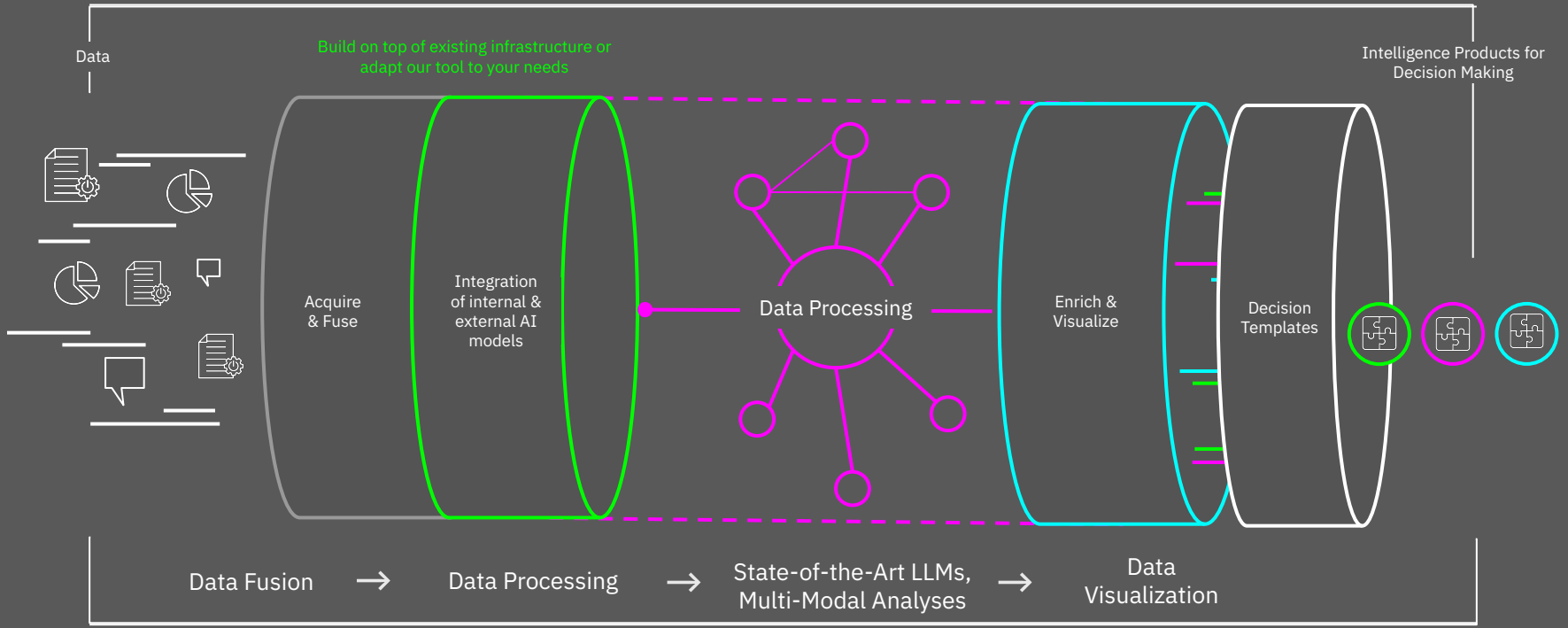
[2] H. Liu, C. Li, Y. Li, Y. J. Lee, "Improved Baselines with Visual Instruction Tuning," Proc. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), pp. 26296-26306, June 2024.
[3] G. Gerganov, llama.cpp: LLM inference in C/C++, GitHub, 2023, [Online]. Available: https://github.com/ggerganov/llama.cpp. [Accessed: Dec. 27, 2024].
[4] M. Yusuf Sarıgöz, "ggml_llava-v1.5-7b," Hugging Face, 2023, Available: https://huggingface.co/mys/ggml_llava-v1.5-7b. Accessed: Dec. 27, 2024.
[5] Z. Cheng, S. Leng, H. Zhang, Y. Xin, X. Li, G. Chen, Y. Zhu, W. Zhang, Z. Luo, D. Zhao, and L. Bing, "VideoLLaMA 2: Advancing Spatial-Temporal Modeling and Audio Understanding in Video-LLMs," ArXiv, vol. abs/2406.07476, 2024.







INspectre AI Platform - a truly modular platform



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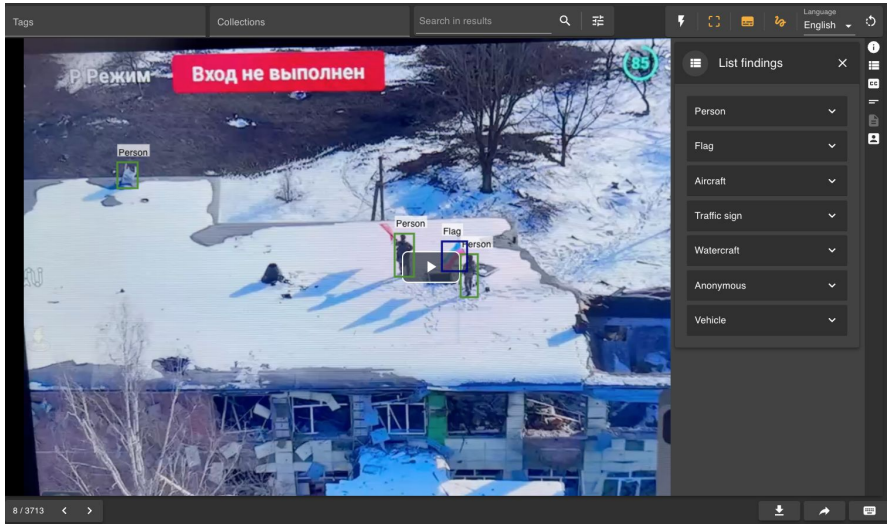
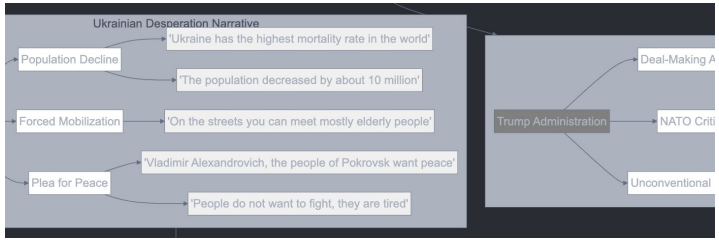
Initial field studies and experiences are promising





- Enhanced Information Extraction: Unmatched performance on unstructured data, multilingual understanding, and advanced pattern recognition across diverse sources
- Knowledge Graph Integration: Automatic generation of visual relationship networks revealing connections and entities missed by human analysis

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INspectre accelerates digital investigations for law enforcement, intelligence, and defense agencies, boosting evidence discovery and threat analysis by 10x[(1)].

(1) As measured in one of our customer projects.

Major Shortcomings and Limitations

- Hallucination Risk: False information confidently presented as factual, causing cascade effects and potentially corrupting downstream intelligence analysis

- Benchmarking Gap: Current evaluation metrics and testing methodologies fail to address real-world intelligence requirements versus academic benchmarks

- Organizational Hurdles: Non-technical barriers, institutional resistance, and training requirements often present greater challenges than technical limitations

Outlook: Deepfake Detection Frontline

Munich Innovation Labs and resaro are putting the best deepfake detection capabilities in the hands of those who protect us every day..

Thank you!

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