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AI model building for data analysis in LEAs: A practical example

A practical example of using AI enabled OSINT solution for data analysis in law enforcement
Vilnius, CEPOL, 2022-06-08

Introduction

- MIL is experienced in developing solutions for highly regulated industries, such as healthcare, security, and defence.

- INspectre developed in collaboration with German law enforcement agencies.

- Brief agenda summary:
  - AI model development introduction
  - Analyst use case demonstration
  - Live demo
  - Takeaways and Q&A

INspectre overview

Face Recognition

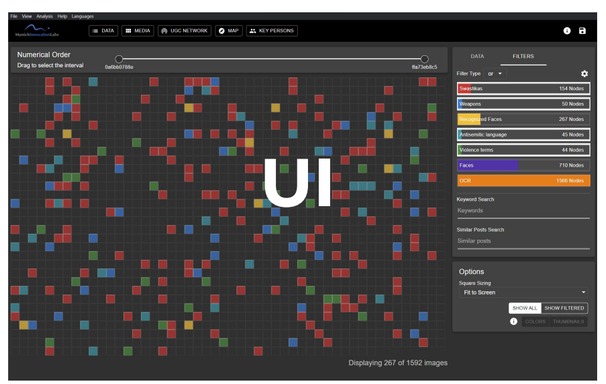
- Detection and Recognition
- Customized Facenet
- List of recognized faces

Object Detection

- Faster RCNN models
- Trained for different purposes
- Detection of Weapons, Swastikas, ...

Text analysis

- OCR analysis (Tesseract OCR)
- Voice to text recognition (VOSK)
- Topic analysis



Faster RCNN: https://proceedings.neurips.cc/paper/2015/file/14bfa6bb14875e45bba028a21ed38046-Paper.pdf
FaceNet: https://www.cv-foundation.org/openaccess/content_cvpr_2015/papers/Schroff_FaceNet_A_Unified_2015_CVPR_paper.pdf
Tesseract OCR: https://tesseract-ocr.github.io/
VOSK: https://github.com/alphacep/vosk-api

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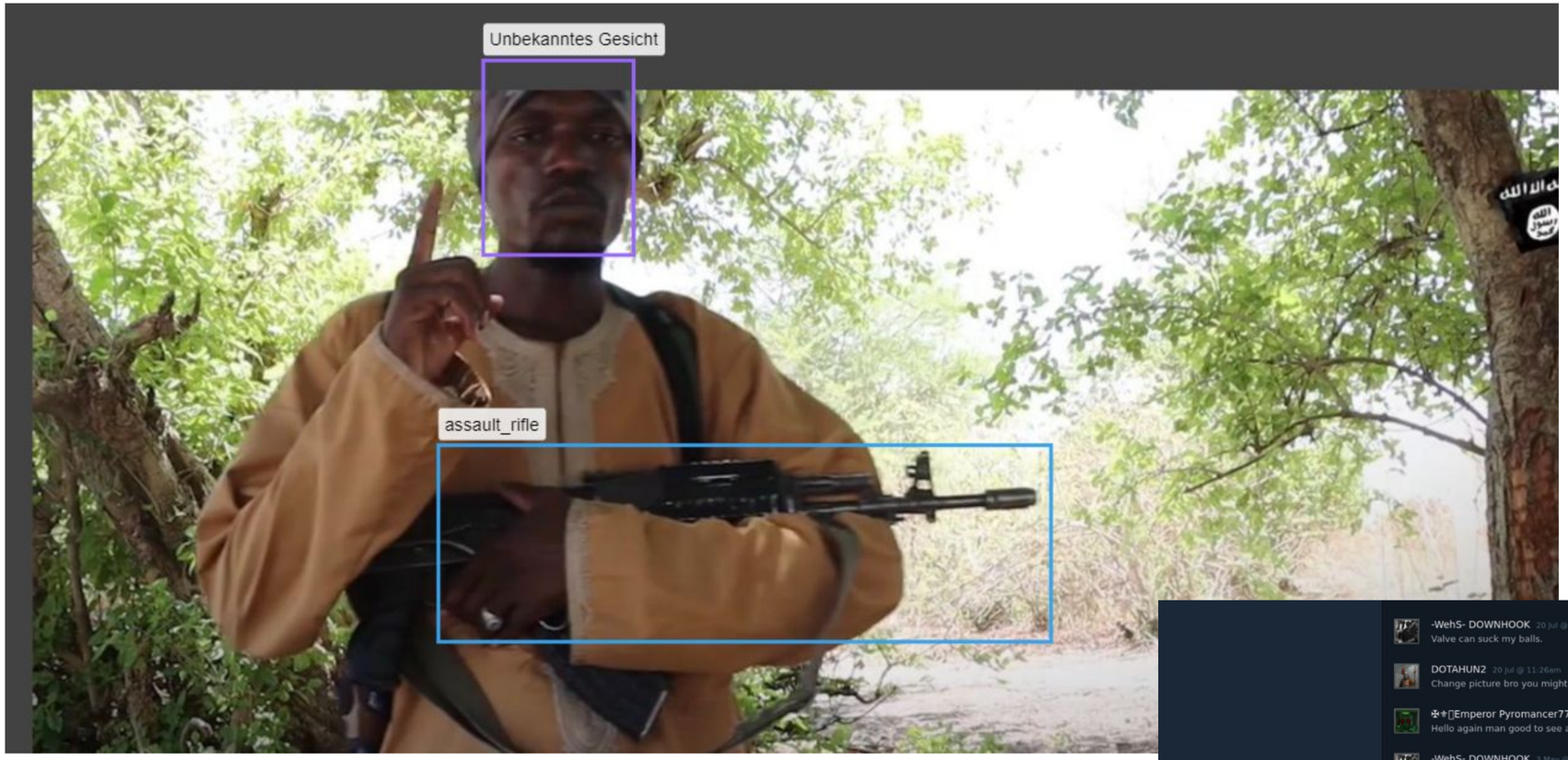
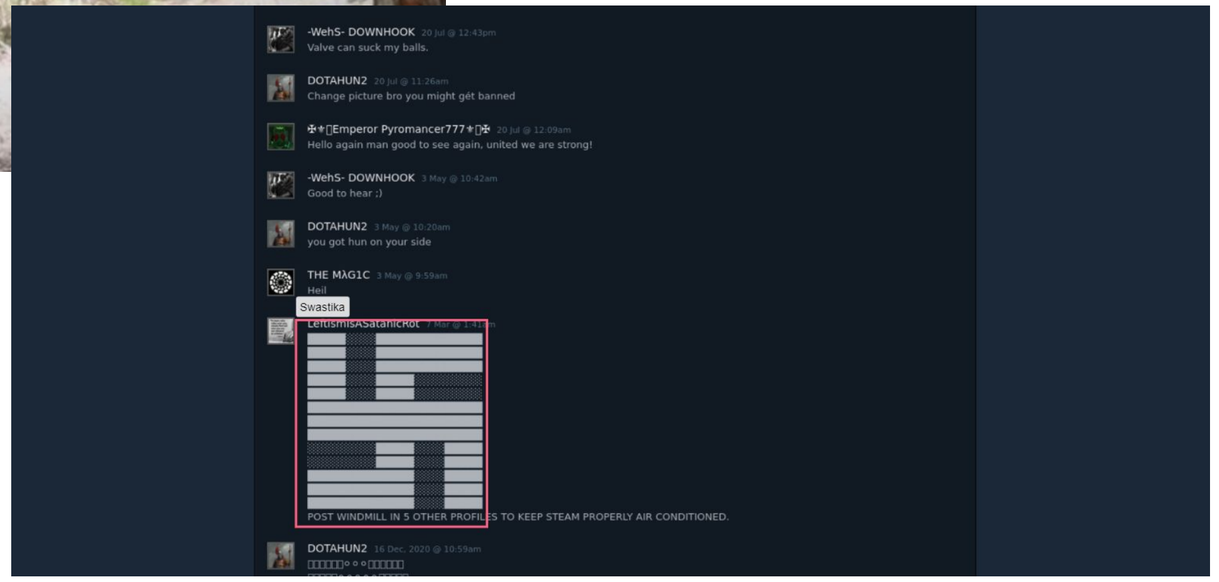
Mike Engholm
21 Aug 2020


Unbekanntes Gesicht
assault_rifle


-WehS- DOWNHOOK 20 Jul @ 12:43pm
Valve can suck my balls.
DOTAHUN2 20 Jul @ 11:26am
Change picture bro you might gét banned
✠✯Emperor Pyromancer777✯✠ 20 Jul @ 12:09am
Hello again man good to see again, united we are strong!
-WehS- DOWNHOOK 3 May @ 10:42am
Good to hear ;)
DOTAHUN2 3 May @ 10:20am
you got hun on your side
THE MÀG1C 3 May @ 9:59am
Heil
Swastika
POST WINDMILL IN 5 OTHER PROFILES TO KEEP STEAM PROPERLY AIR CONDITIONED.
DOTAHUN2 16 Dec, 2020 @ 10:59am

DEUTSCHLAND STAATLICHE HILFE

600-Milliarden-Paket soll Großunternehmen vor dem Untergang bewahren

Wer diesen heuchlerischen Marionetten

jetzt immer noch Glauben schenkt,

Die Aufnahmefähigkeit der großen Masse ist sehr beschränkt, das Verständnis klein, dafür jedoch die Vergeßlichkeit groß. Darum gilt es Propaganda auf nur sehr wenige Punkte zu beschränken und diese schlagwortartig so lange zu verwenden, bis sich auch der Letzte unter einem solchen Wort das Gewollte vorzustellen vermag.

Bemerkung: da hat sich seit damals nicht viel verändert, sie fallen immer noch darauf herein. Heute nennt man die Sprachregelung und Meinungsführerschaft.

IDENTIFIZIERUNG RECHTSRADIKALER ELTERN UND IHRER NAZI-BRUT.

Die Zunahme von Hass und Hetze durch rechtsradikale Nazischweine in Deutschland (verrecke!) liegt in der mangelnden Bespitzelung und Denunziation in Schulen und Kitas. Unsere Stiftung hilft Ihnen/Ihninnen typisches Drecksnaziverhalten zu erkennen und uns sofort zu melden:

- **Eltern nicht arbeitslos** (PRIVILIGIERT)
- **Kein Migrationshintergrund** (FREMDENFEINDLICH)
- **Ein oder beide Elternteile sind weiß** (RASSISTISCH)
- **Spricht zuhause Deutsch** (VÖLKISCH)
- **Gepflegtes Erscheinungsbild** (NATIONALISTISCH)
- **Gute körperliche Verfassung** (HITLERJUGEND)
- **Fällt durch Disziplin und Benehmen auf** (IDENTITÄR)
- **Pausenbrot mit Obst & Gemüse** (FAT SHAMING)
- **Guter Notendurchschnitt** (HERRENRASSISCH)
- **Kennt Vogel- und Baumarten** (WIDERLICHE HEIMATLIEBE)
- **Hilft gerne anderen Kindern** (SUBVERSIVITÄT)
- **Zeigt Lehrern Respekt und Interesse** (NS-GEHORSAM)

Helfen Sie uns, diese abartigen Eigenschaften aus unserer bunten und vielfältigen Gesellschaft auszuradieren und diesen menschenverachtenden Nazi-Eltern das Sorgerecht zu entziehen. Es gibt kein Recht auf Nazi-Kinder.

STASI KAHANE STIFTUNG

INITIATIVEN FÜR LINKE GESINNUNGSPRÜFUNG UND DENUNZIATION

AI model development process

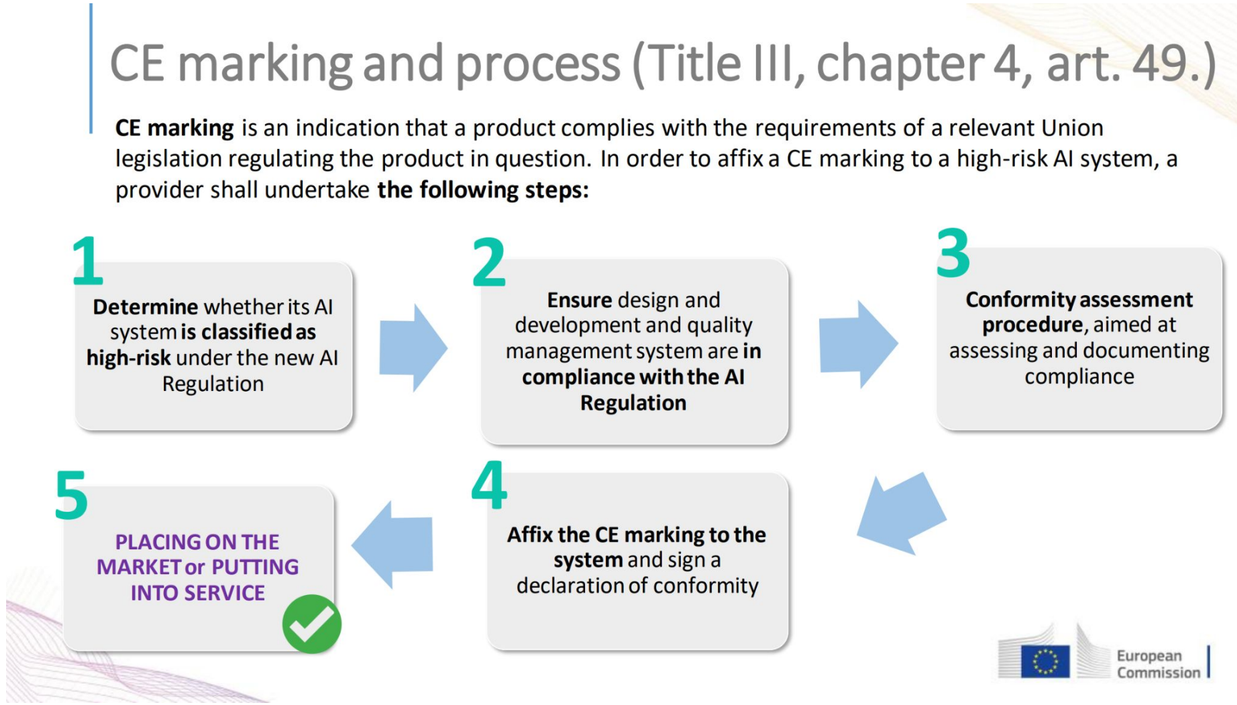
- Iterative and systematic improvement of the model

EU Artificial Intelligence Act proposal

- In April 2021, the European Commission published a draft framework regulation that proposes regulation of all high-risk AI systems according to a CE marking process

- The proposal is currently in the commenting phase, high-risk AI systems will include applications in law enforcement and public safety

- **High-risk AI systems as per proposal include**
  - **AI systems to used by law enforcement** in a variety of applications, e.g. intended to be used for crime analytics regarding natural persons
  - Biometric identification and categorisation of natural persons



AIA proposal: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0206
Source of figures, CEPS summary presentation: https://www.ceps.eu/wp-content/uploads/2021/04/AI-Presentation-CEPS-Webinar-L.-Sioli-23.4.21.pdf

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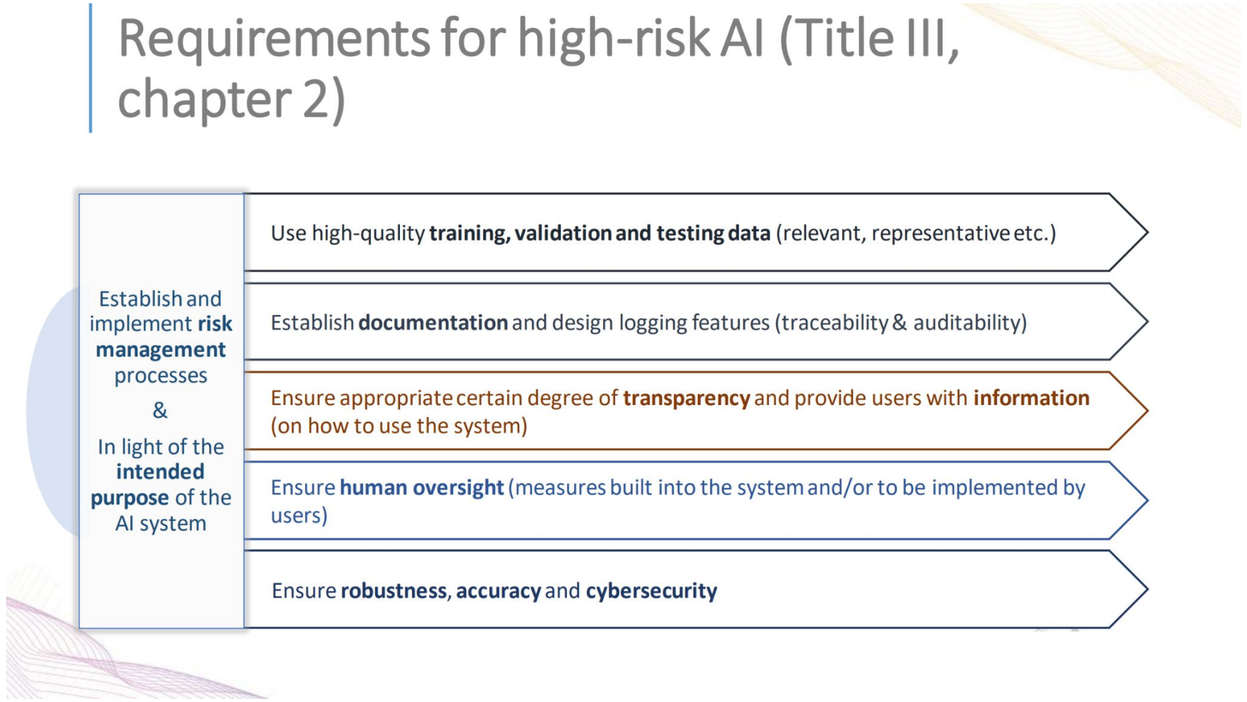
EU Artificial Intelligence Act proposal

- With this suggested legislation, regulatory approval of high-risk AI systems will be on the level of Medical Device Regulation and require a similar level of documentation by the manufacturer

- Documentation of training, validation and testing data
- Design documentation
- Usability testing and technical manuals
- Validation in realistic environments with endusers

- **A close collaboration between law enforcement agencies and solution providers is needed to be able to fulfil these regulatory requirements!**



AIA proposal: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0206
Source of figures, CEPS summary presentation: https://www.ceps.eu/wp-content/uploads/2021/04/AI-Presentation-CEPS-Webinar-L.-Sioli-23.4.21.pdf

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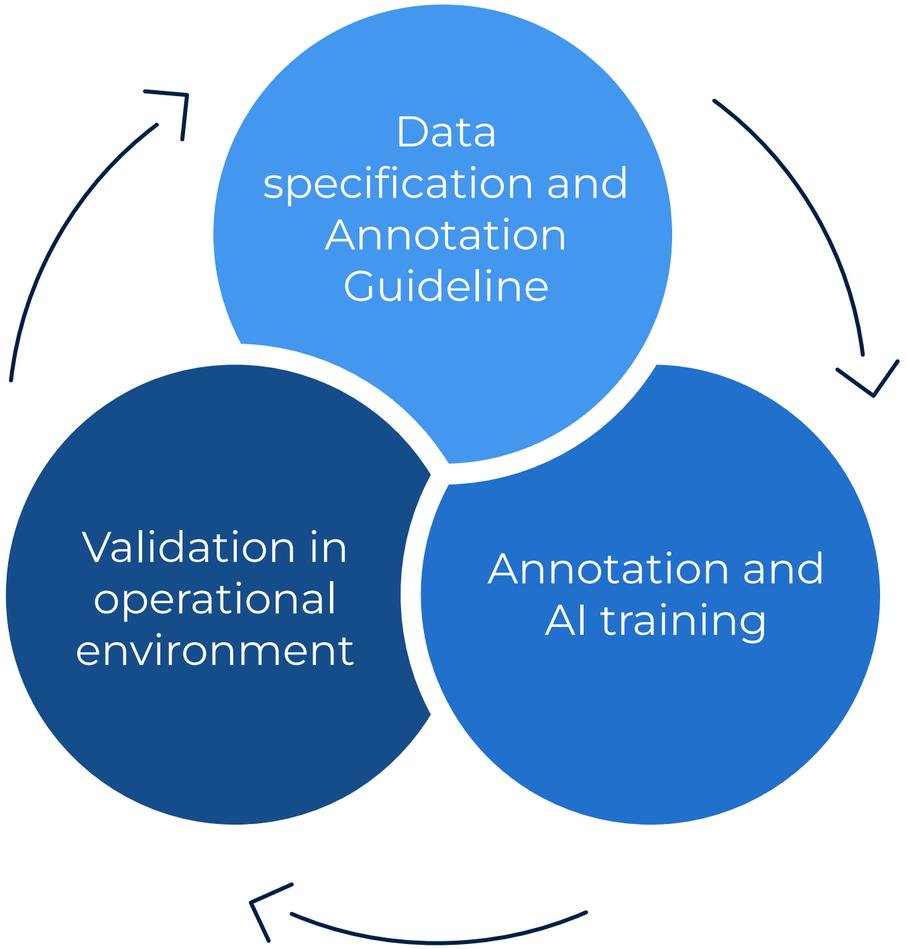
Necessary workflow for LEA AI modules in production



Data specification and Annotation Guideline

- Identify and define operating environment (e.g. Social Media inputs) in a Data Specification
- Creation of an Annotation Guideline for specific task (e.g. “hate speech”, “firearm in hand”)

Annotation process and AI training

- Carry out annotation according to Annotation Guideline, quality assured through documented QA process, e.g. second/third rater review
- Split into Training/Test/Validation datasets
- Technical training of AI module

Validation

- Validation set is evaluated with domain experts (endusers), taking into account usability
- If needed: Adaptation of Annotation Guideline, new iteration
- Due to time dynamics of underlying data: Supervised learning in production environment with on-going validation (AI models do age!)

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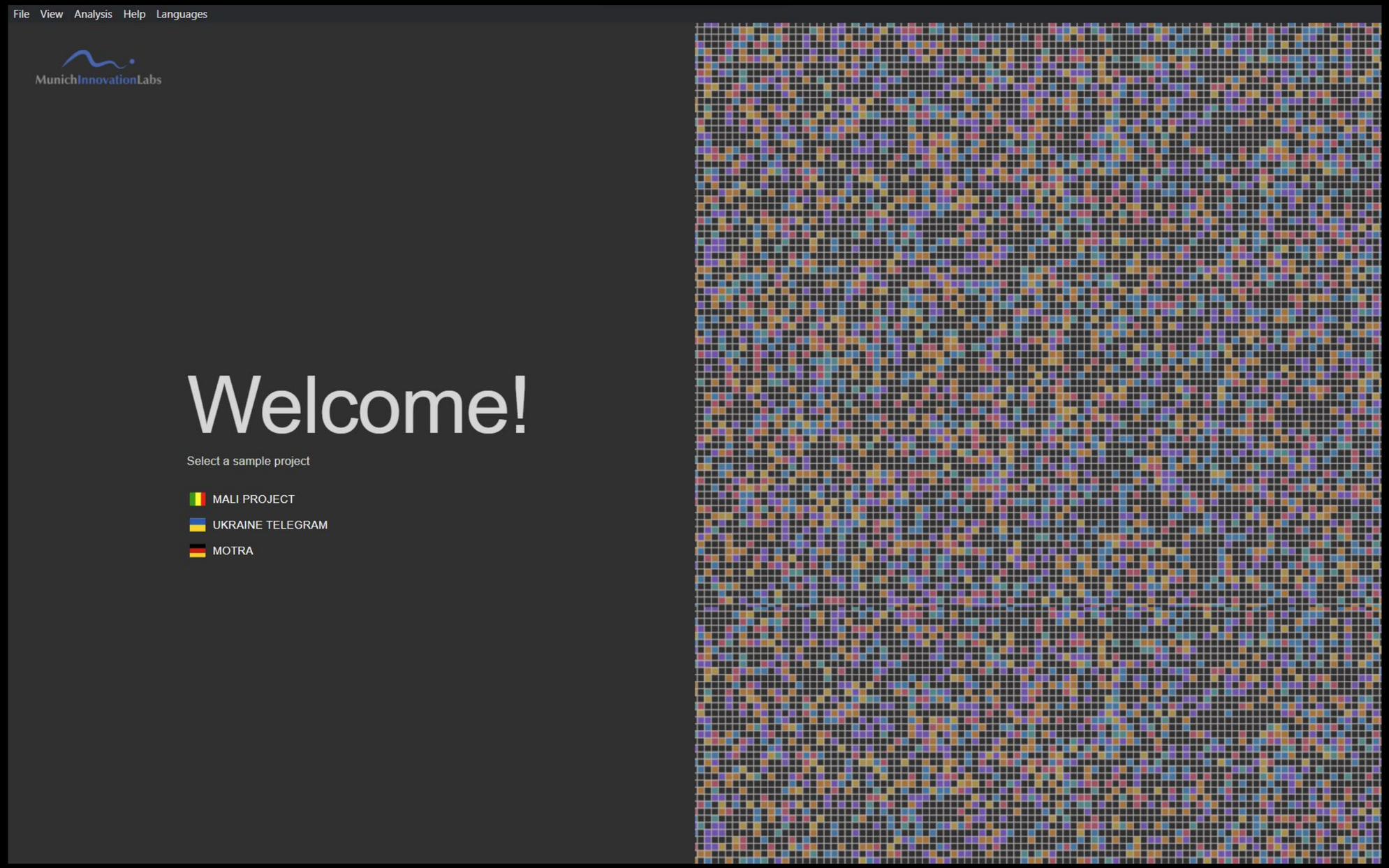
Application Demonstration

- Example scenarios of application usage by an Analyst
- Scenario 1: Finding potentially offensive/extremist behavior in digital environments
- Scenario 2: Finding uncredible/unreliable claims, their spread and identifying the individuals responsible for them

- **Live Demo**

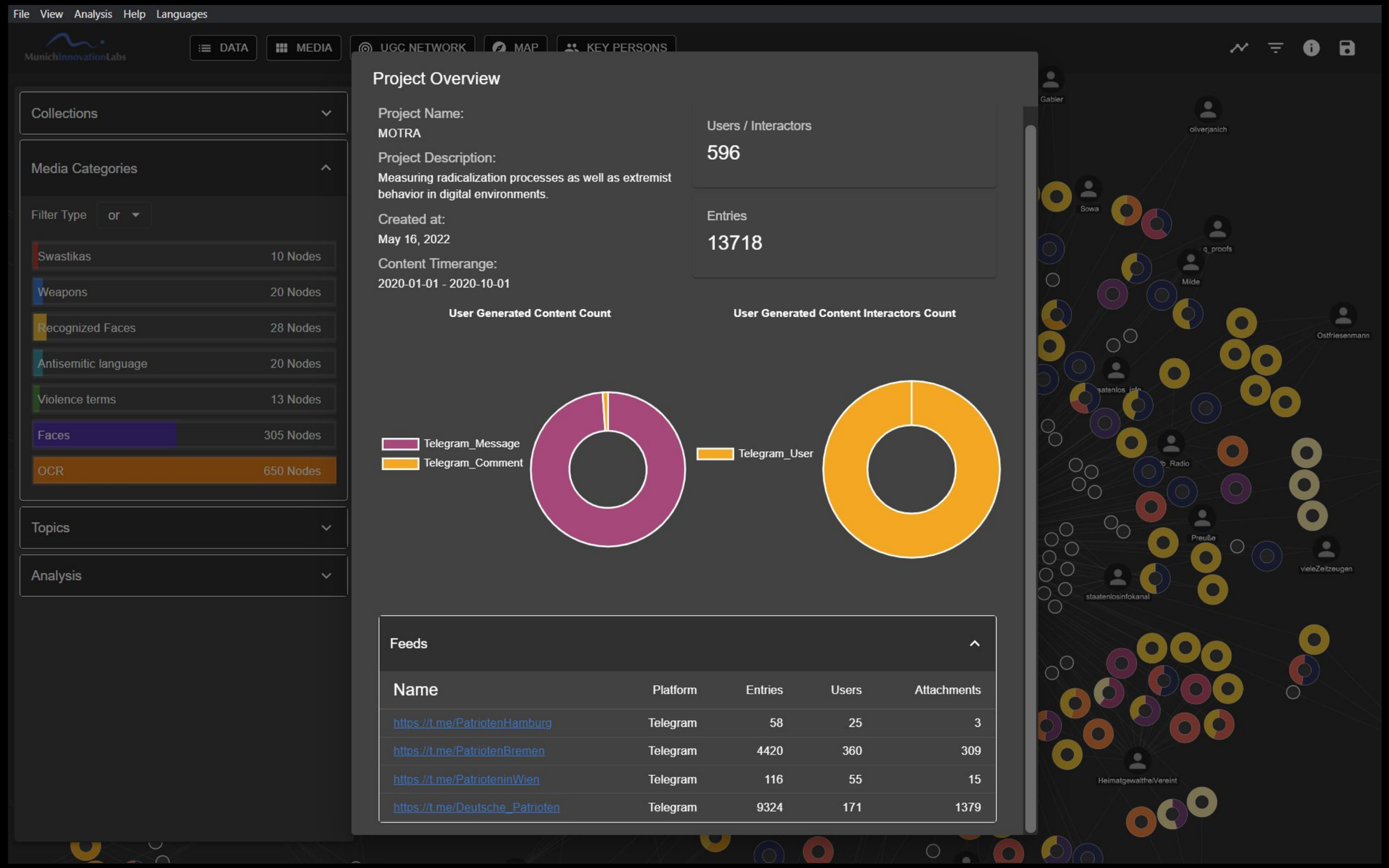
Application Demonstration



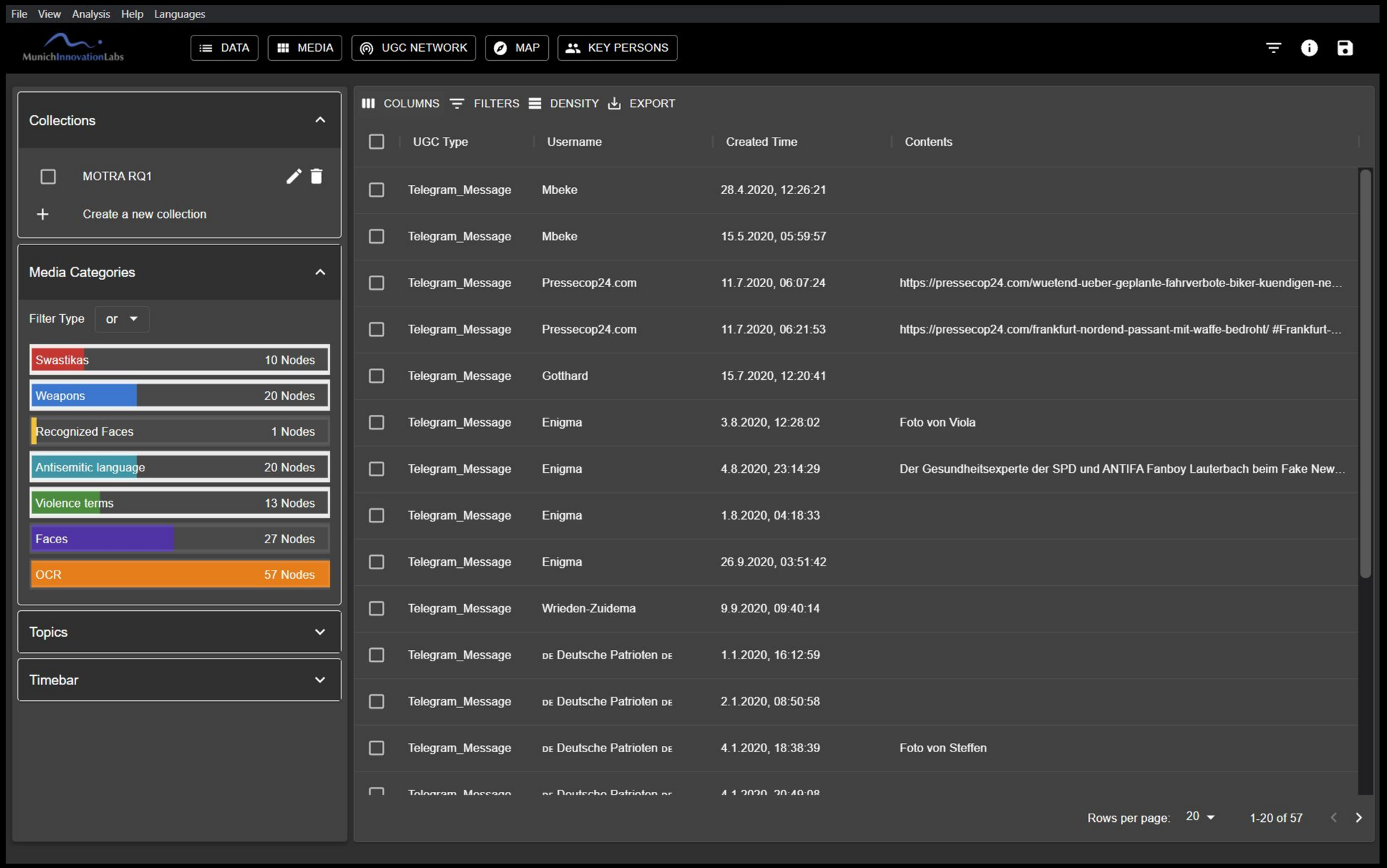
Scenario 1

Finding potentially offensive/extremist behavior in digital environments

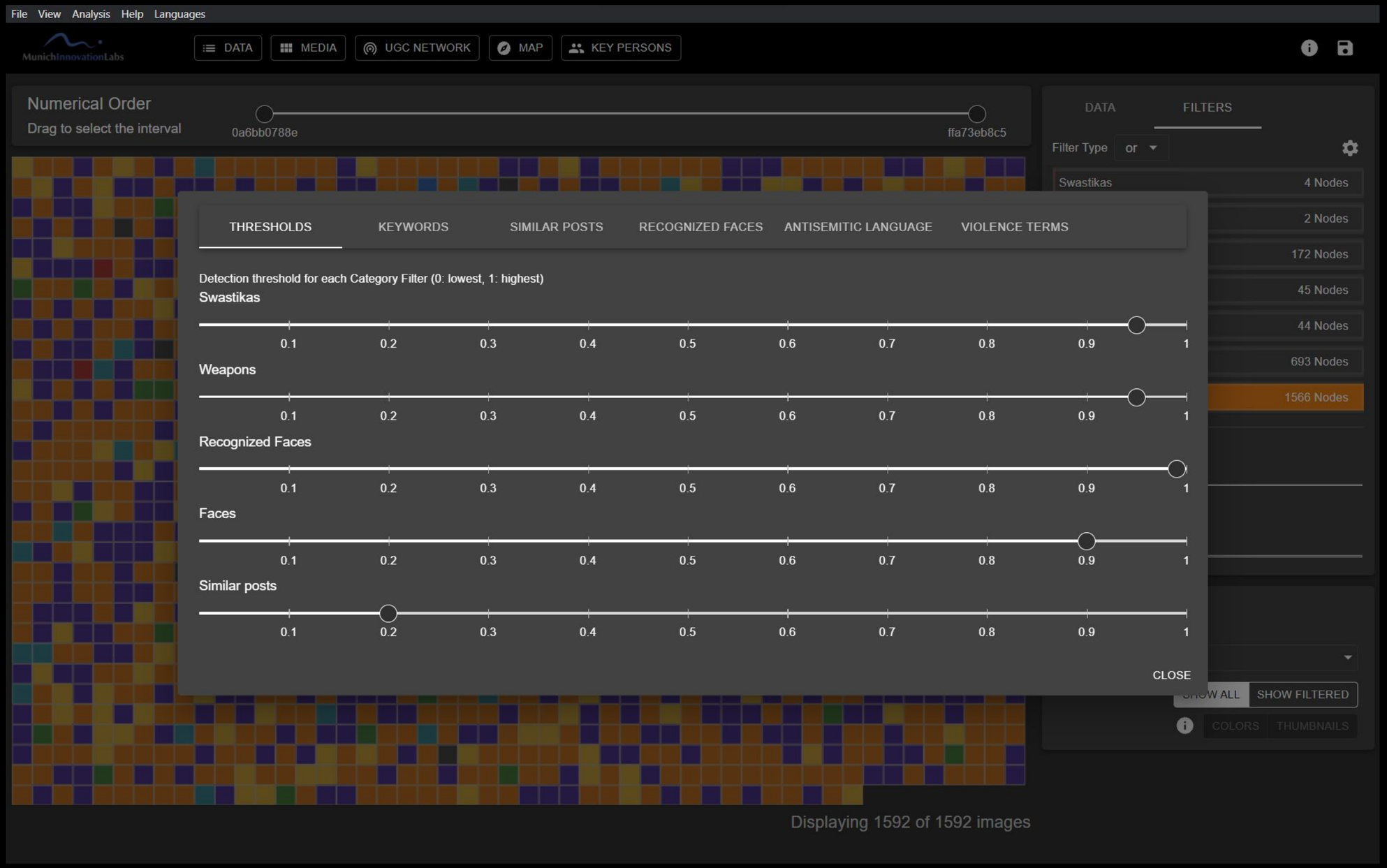
1. Get data overview



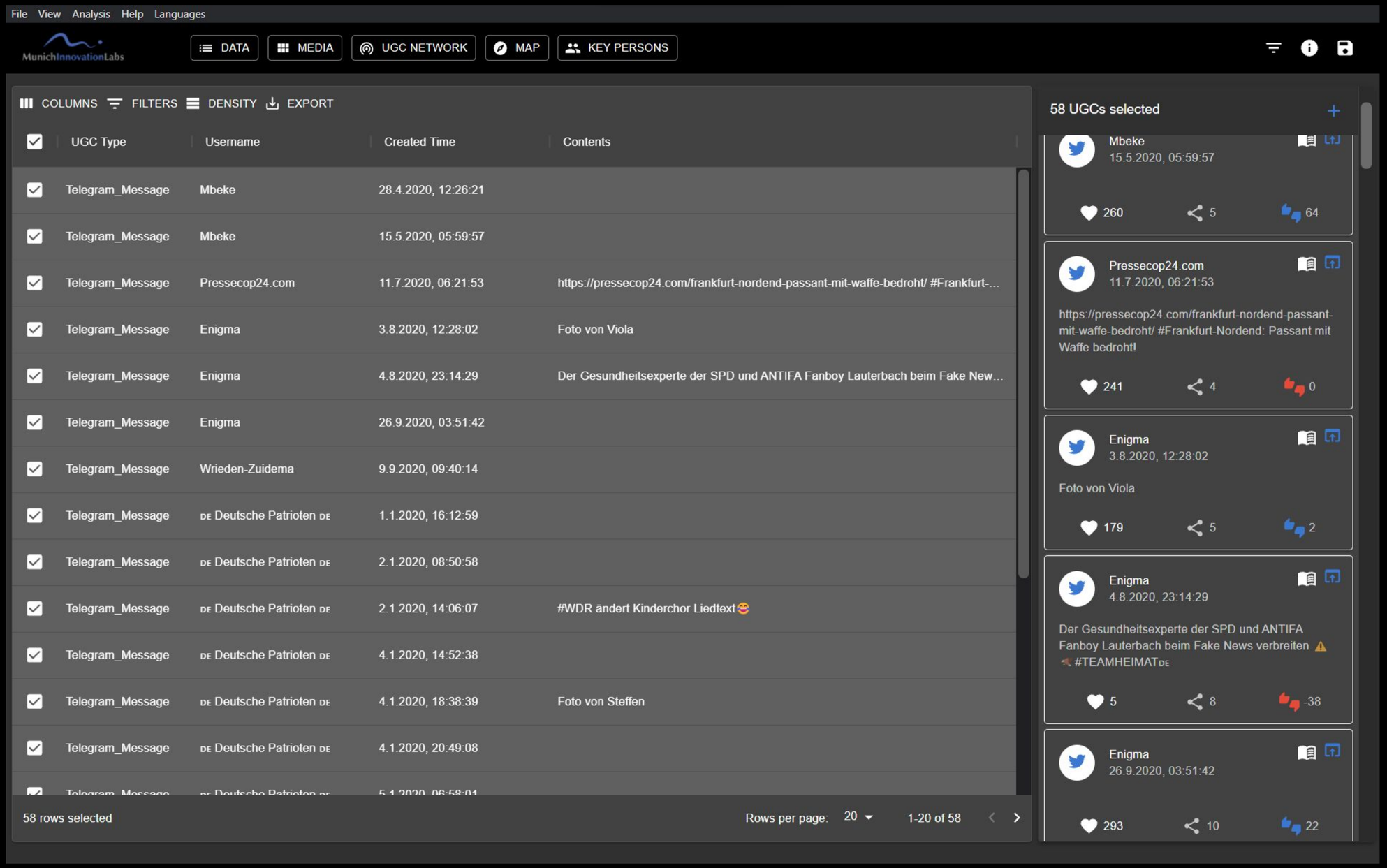
2. Identify relevant AI analyses/filters



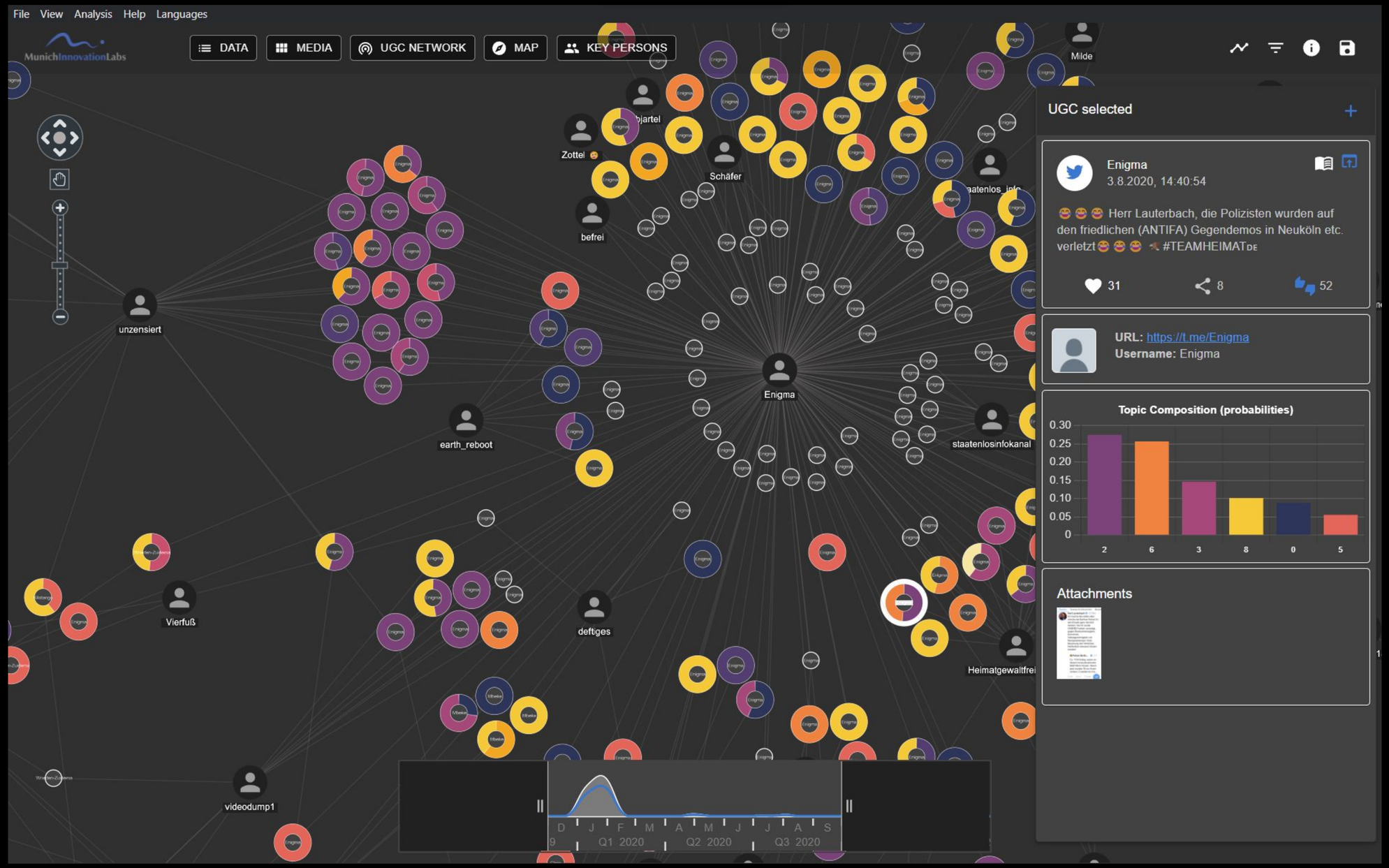
3. Start with high threshold values



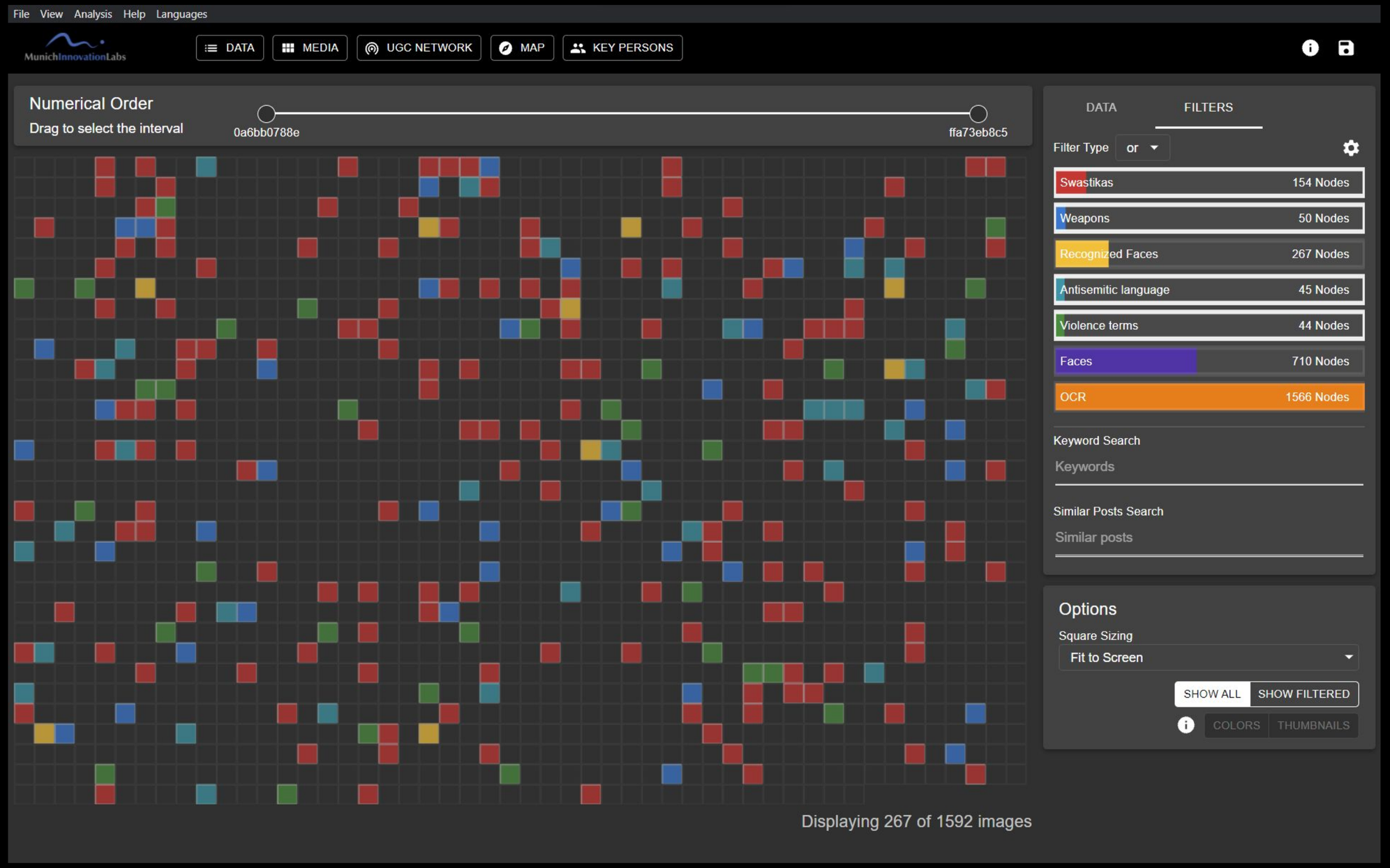
5. Utilise different views: Simple sortable table view



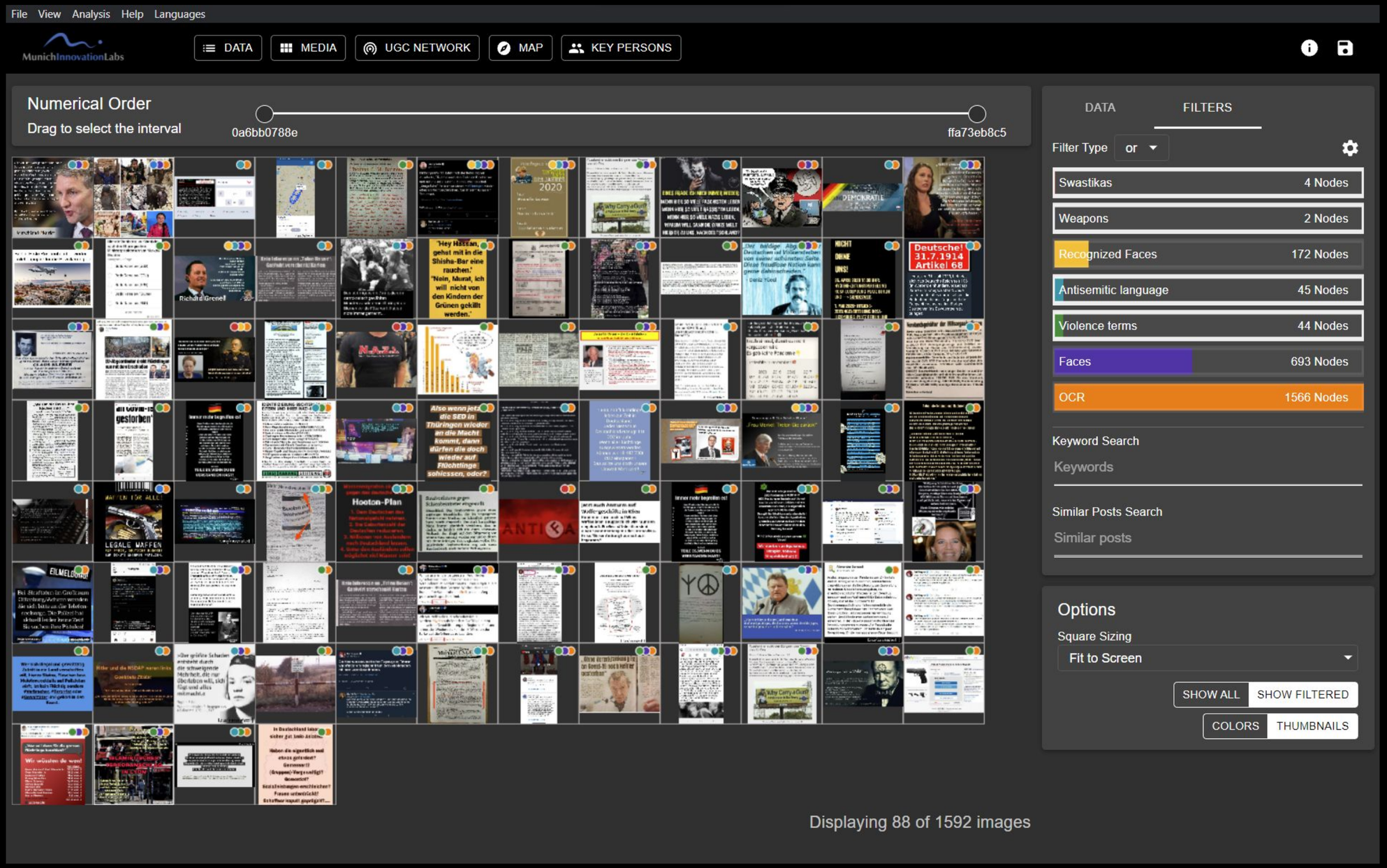
UGC Network view for social network analysis



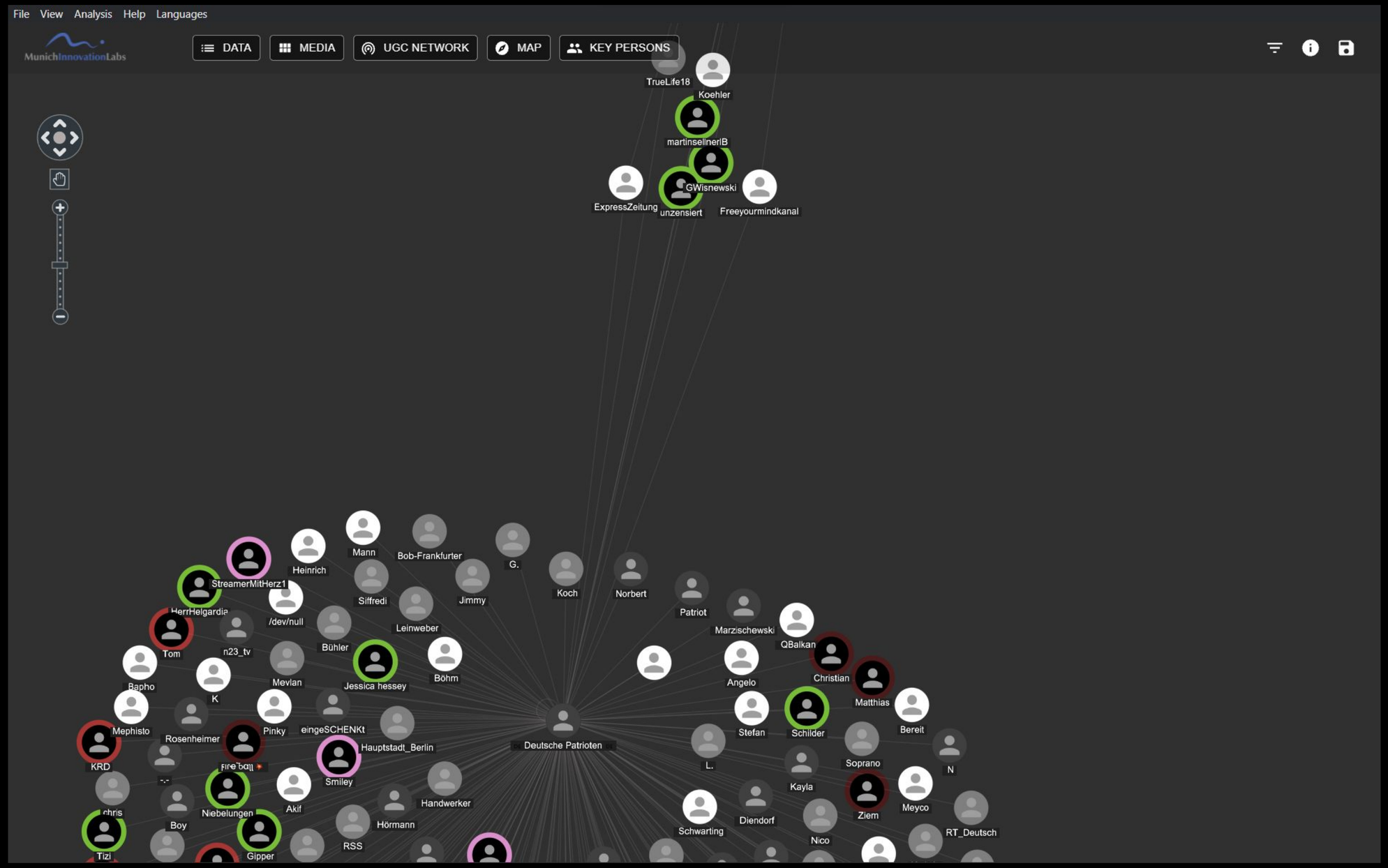
Media view for closer inspection of attached media files



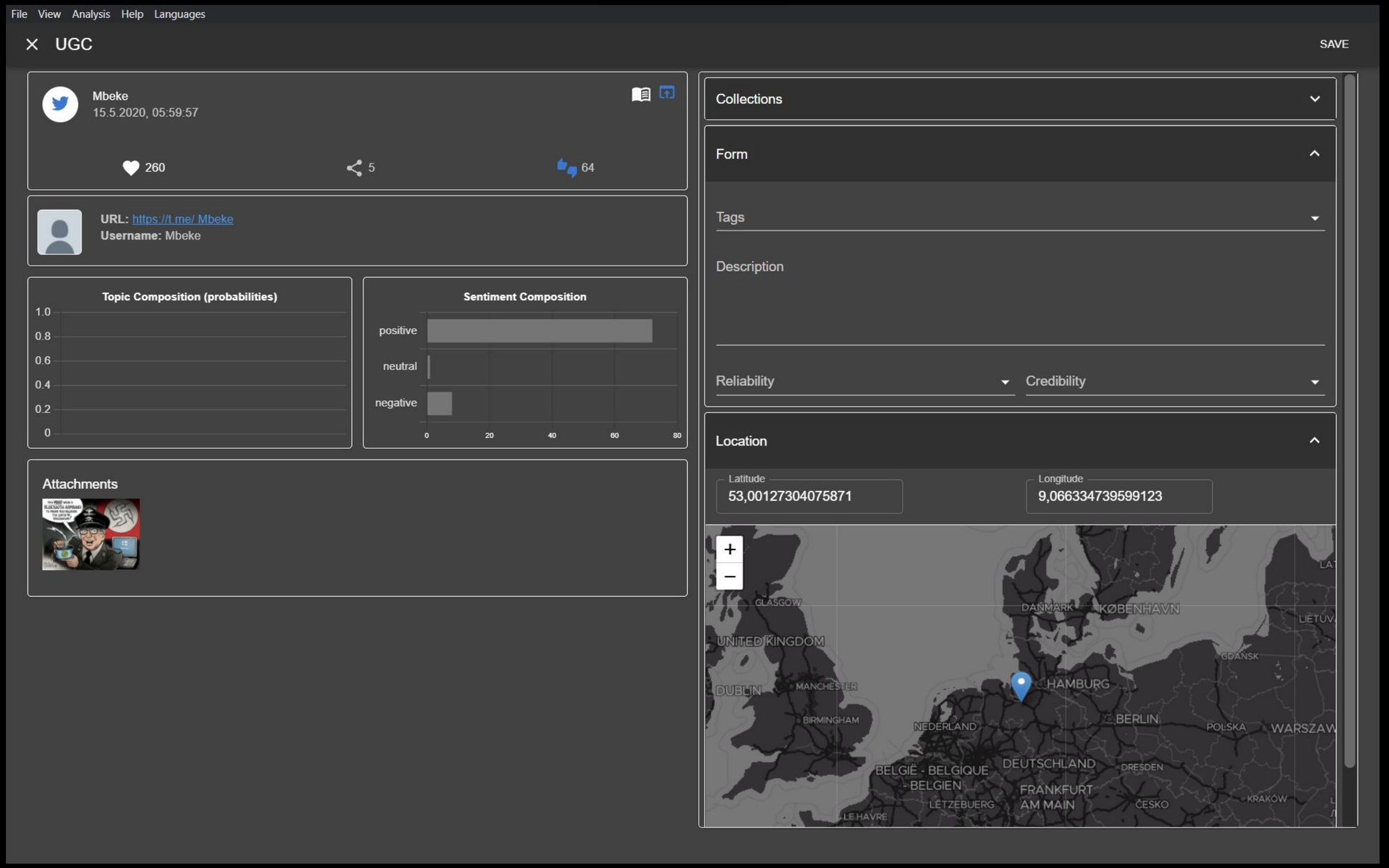
Media view for closer inspection of attached media files



Key persons network view for user connection analysis



6. Inspect filtered posts



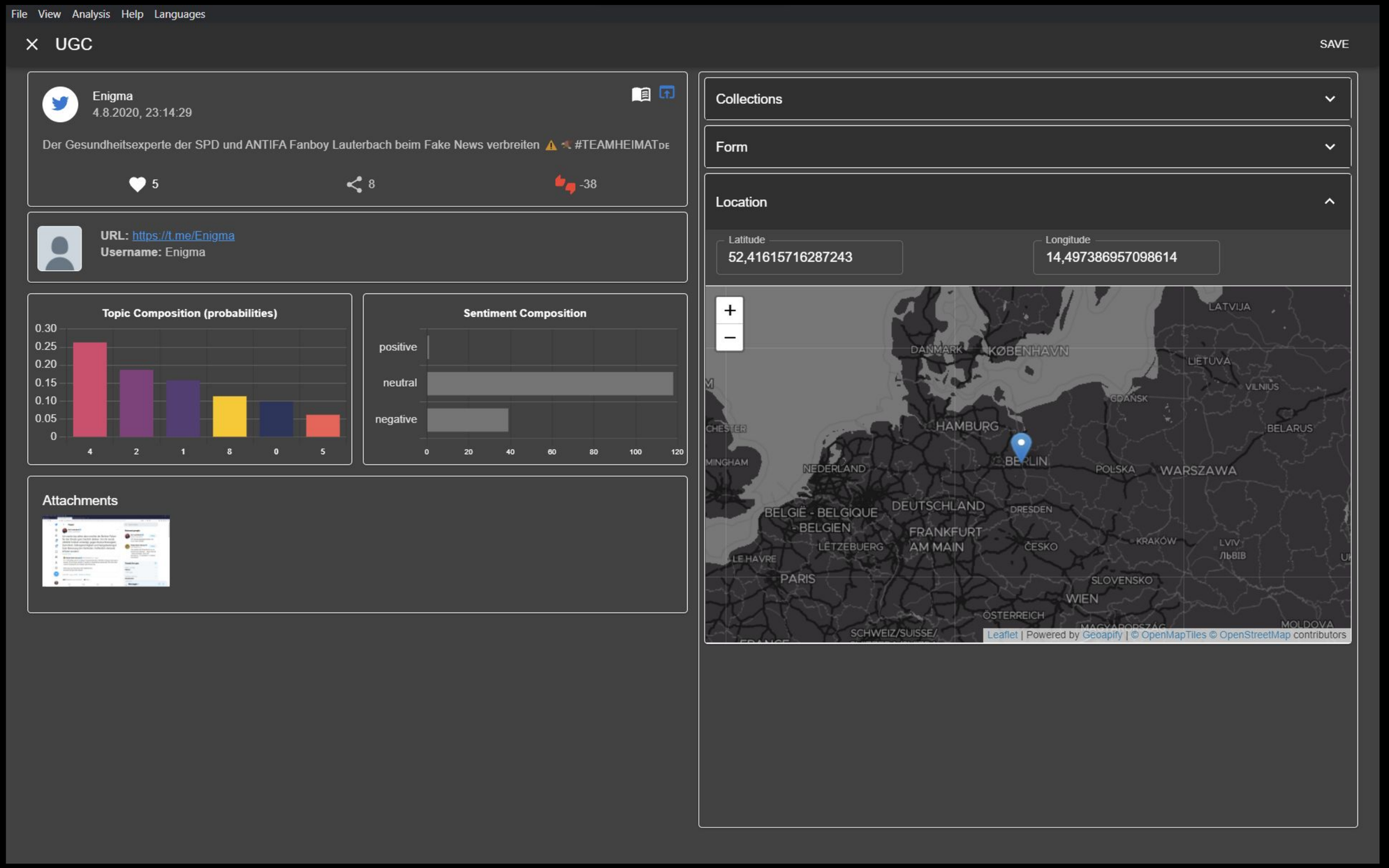
6. Inspect filtered posts

File View Analysis Help Languages

6d13caee59cc0c3e5aa39f0387ef9ebe.jpg

AI PREDICTIONS

6. Inspect filtered posts



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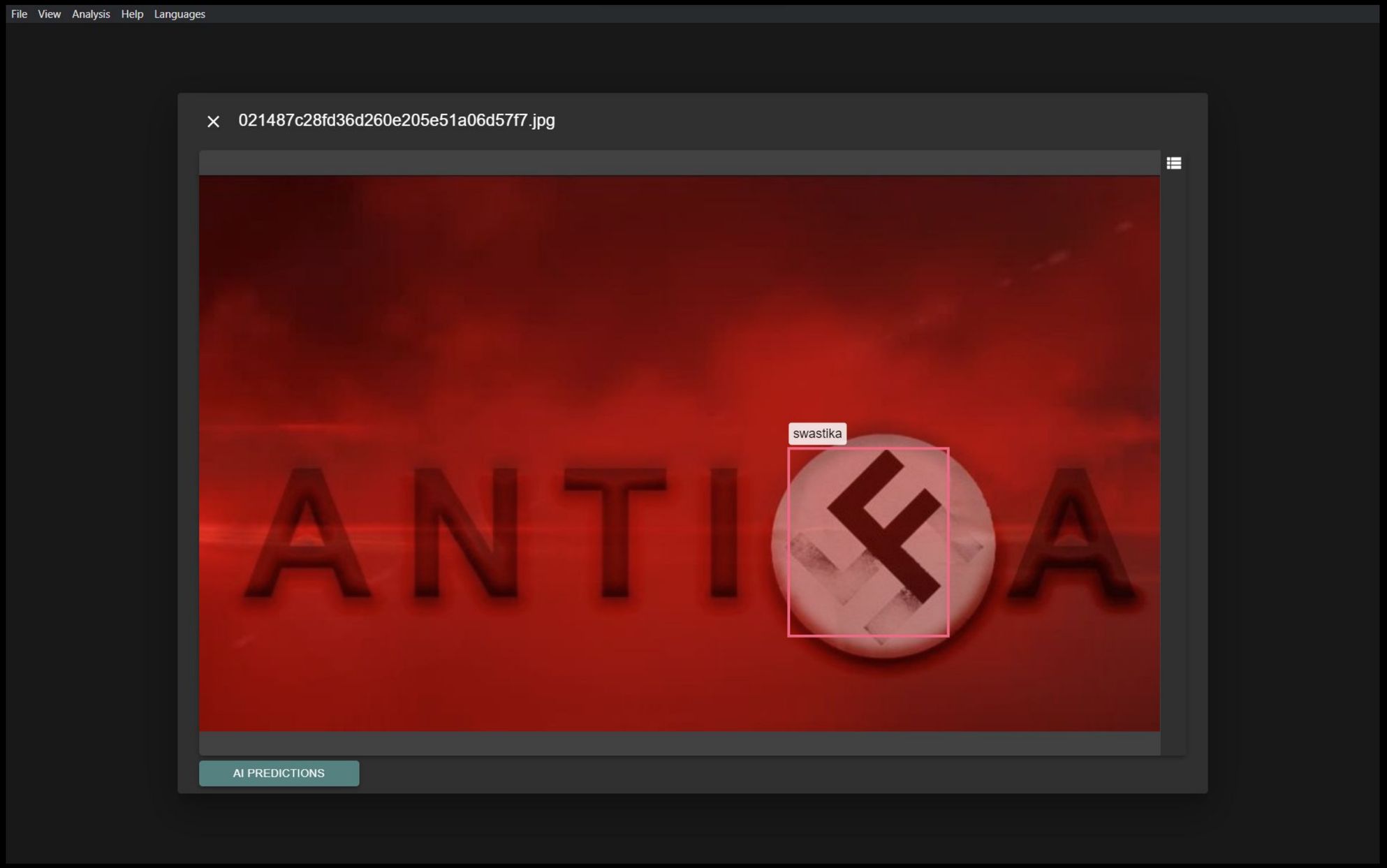
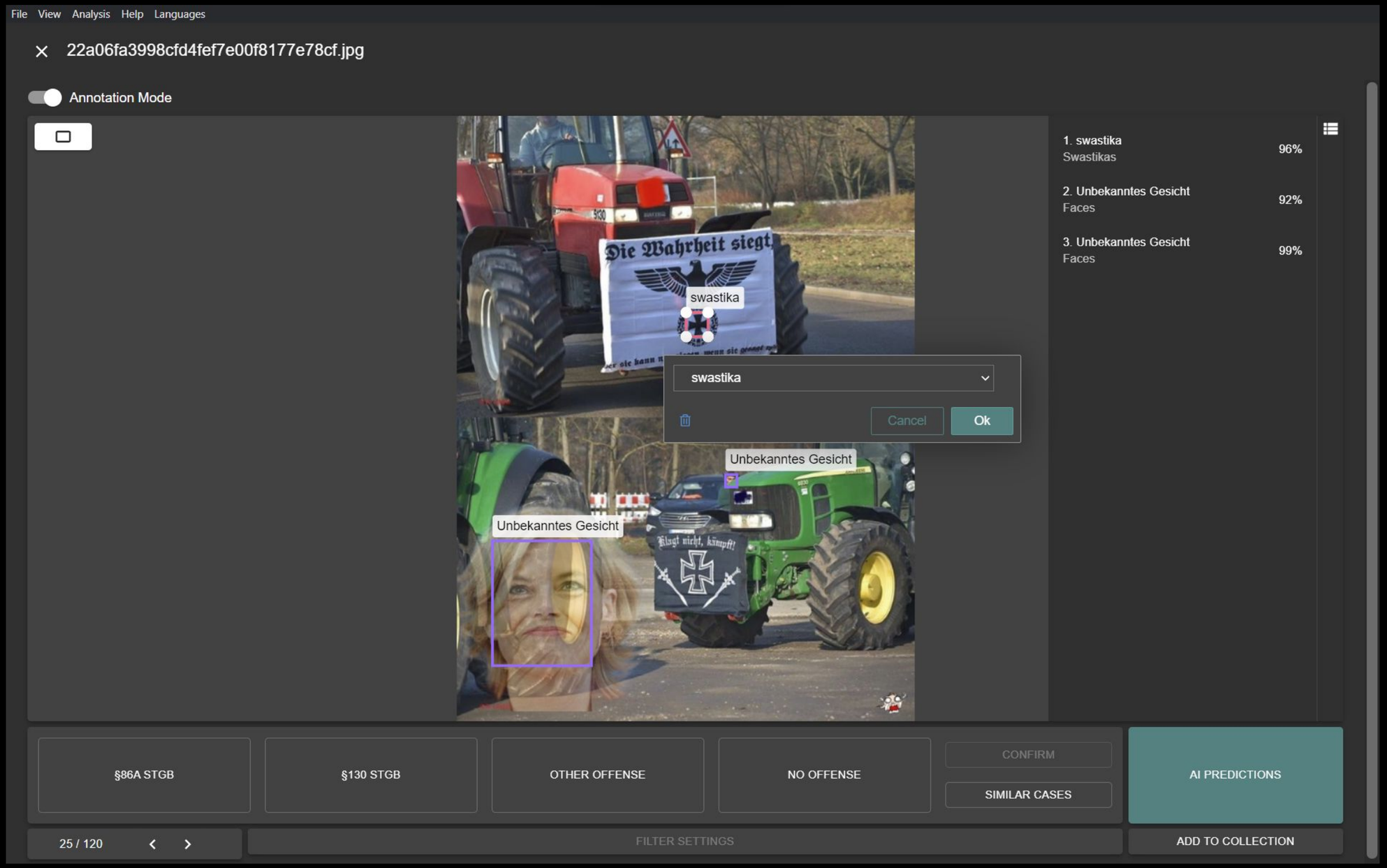
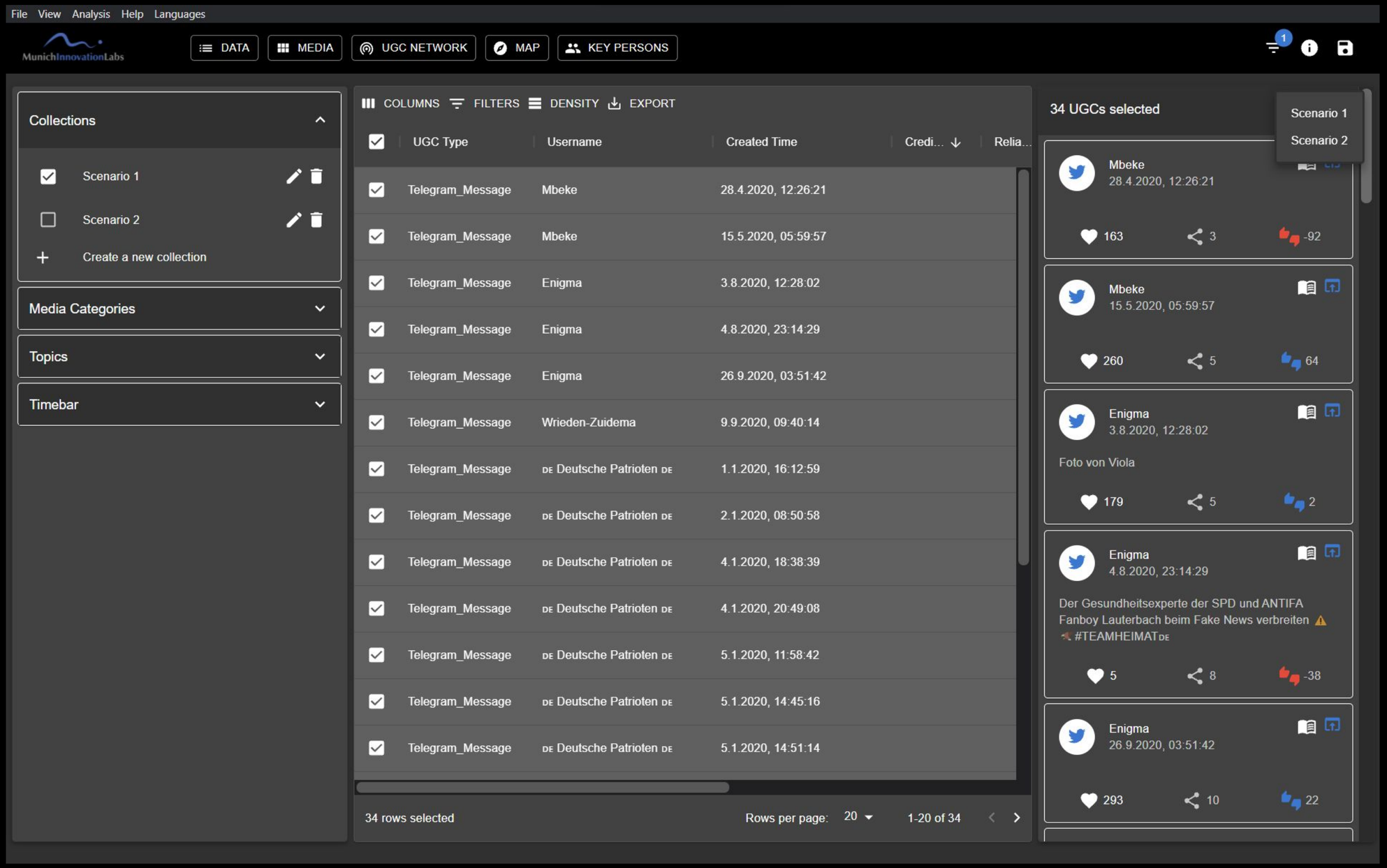


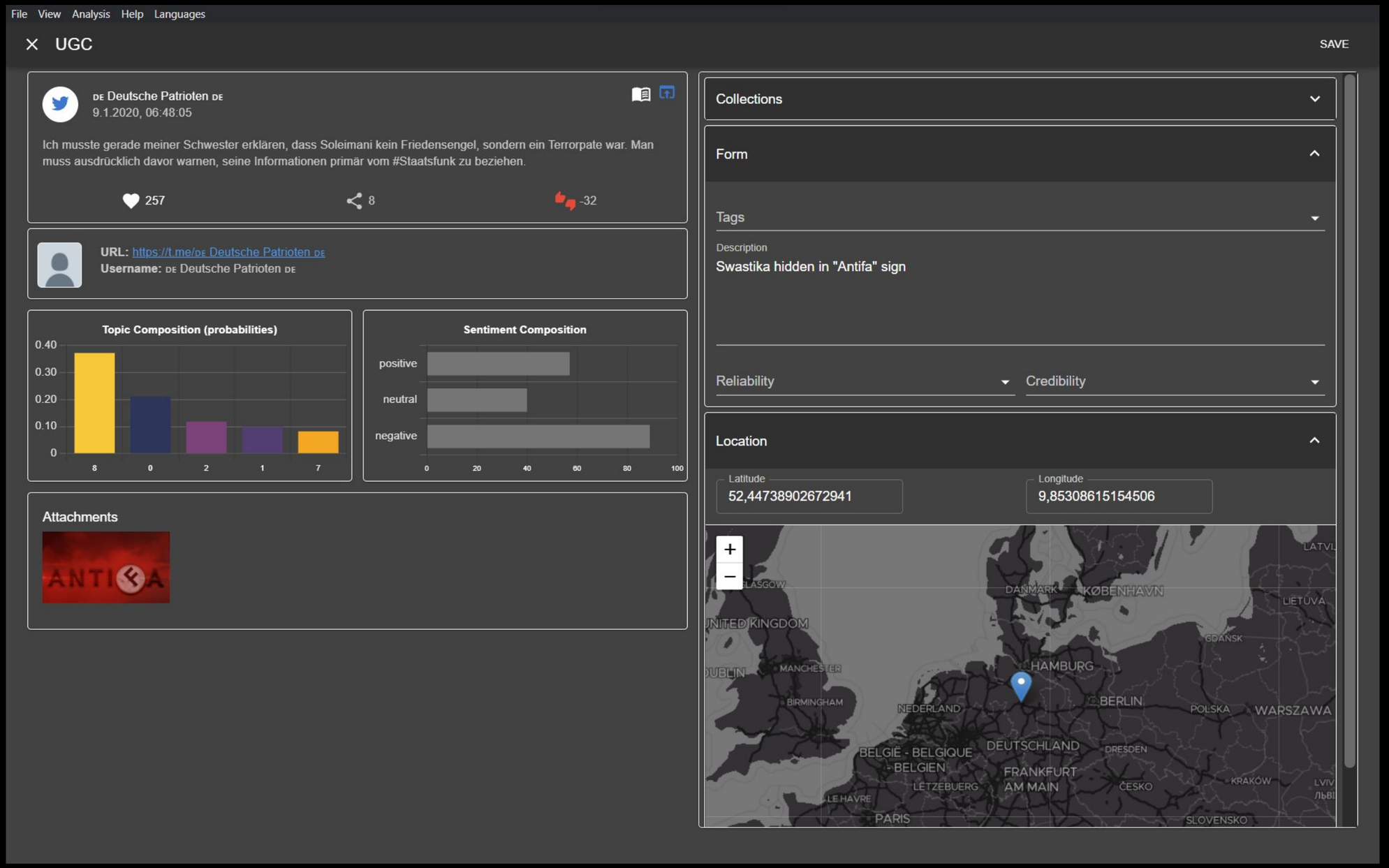
7. Remove false positives



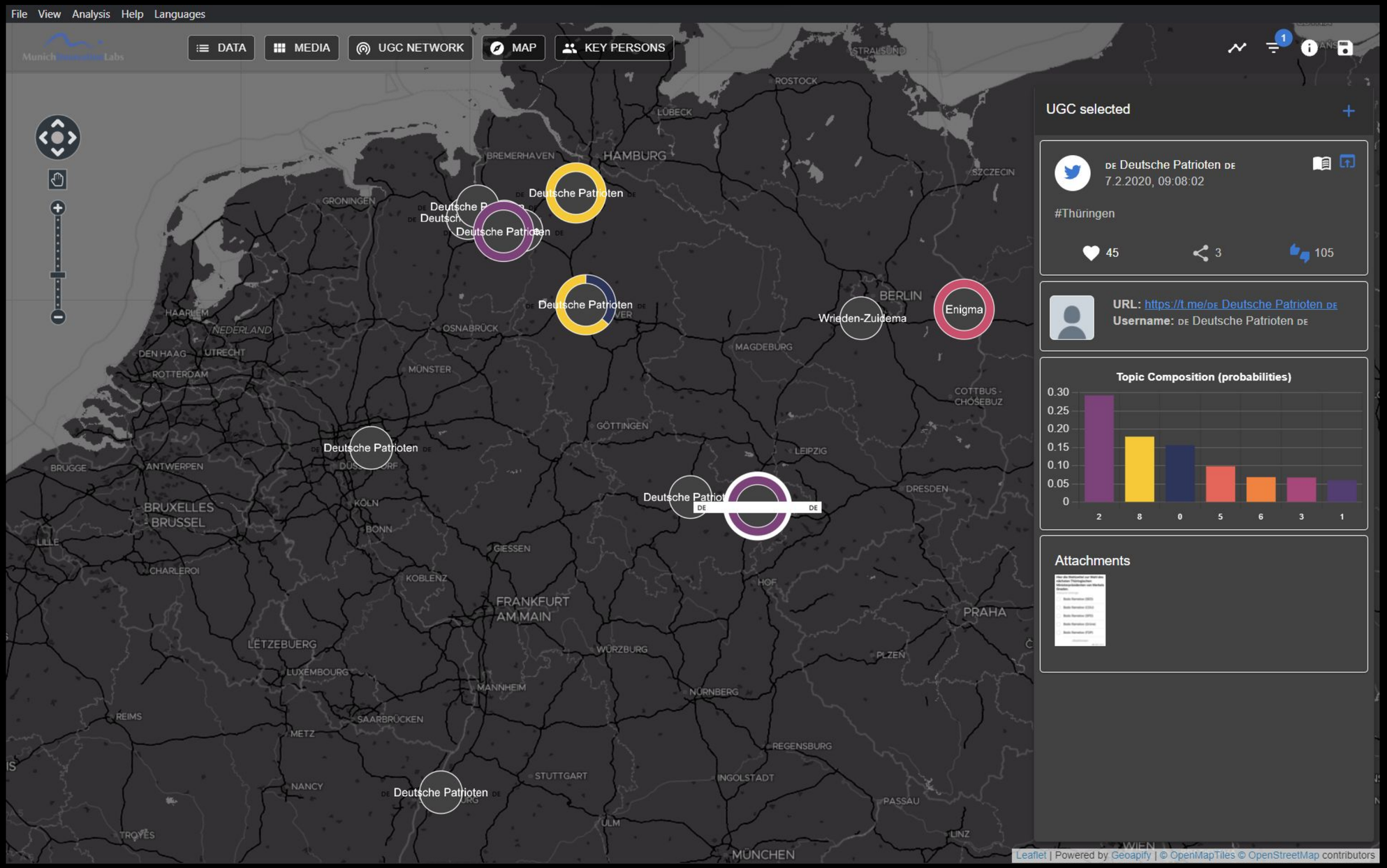
8. Add relevant posts to the collection



9. Add custom analyst input



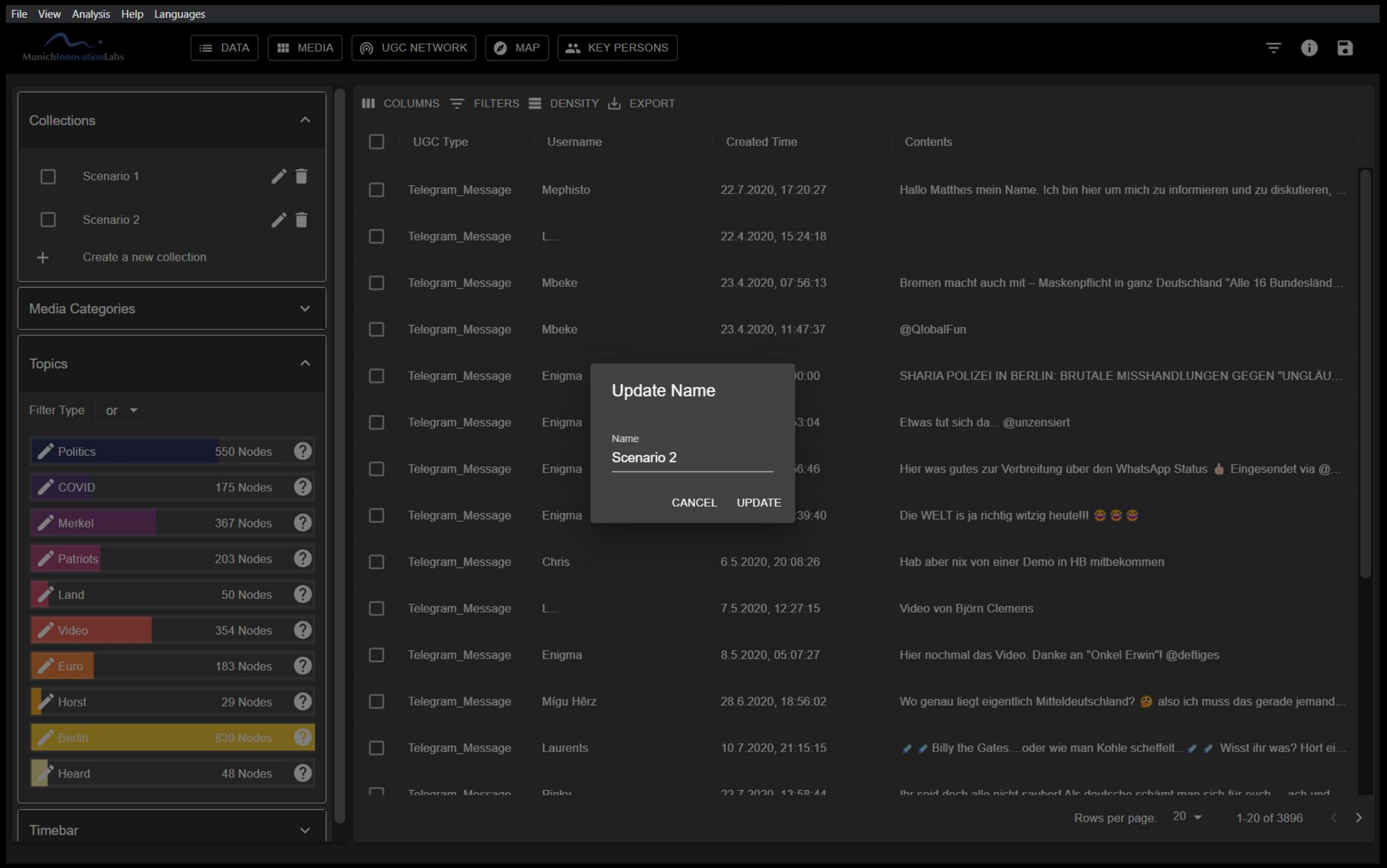
10. Evaluate/export findings



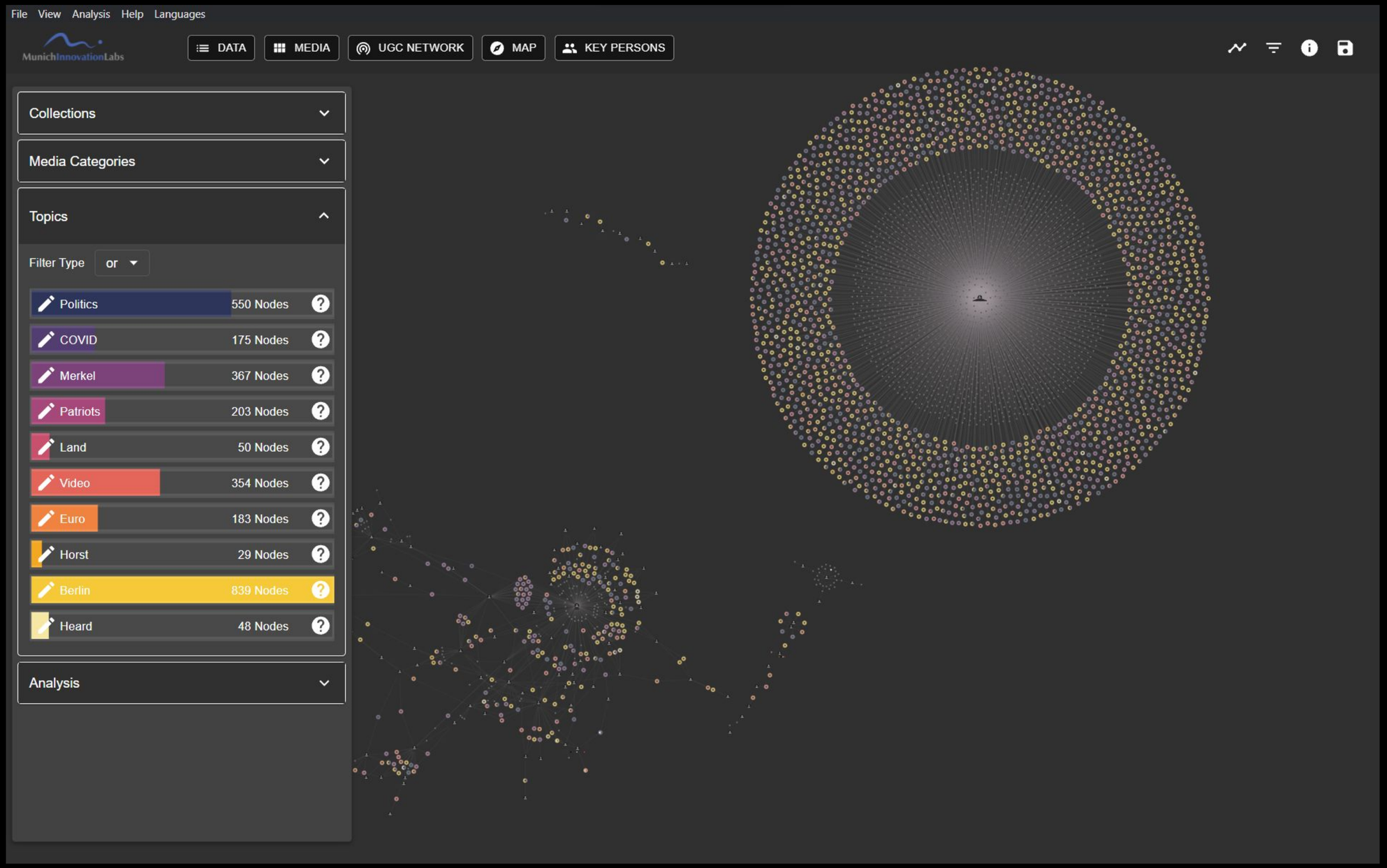
Scenario 2

Finding uncredible/unreliable claims, their spread and identifying the individuals responsible for them

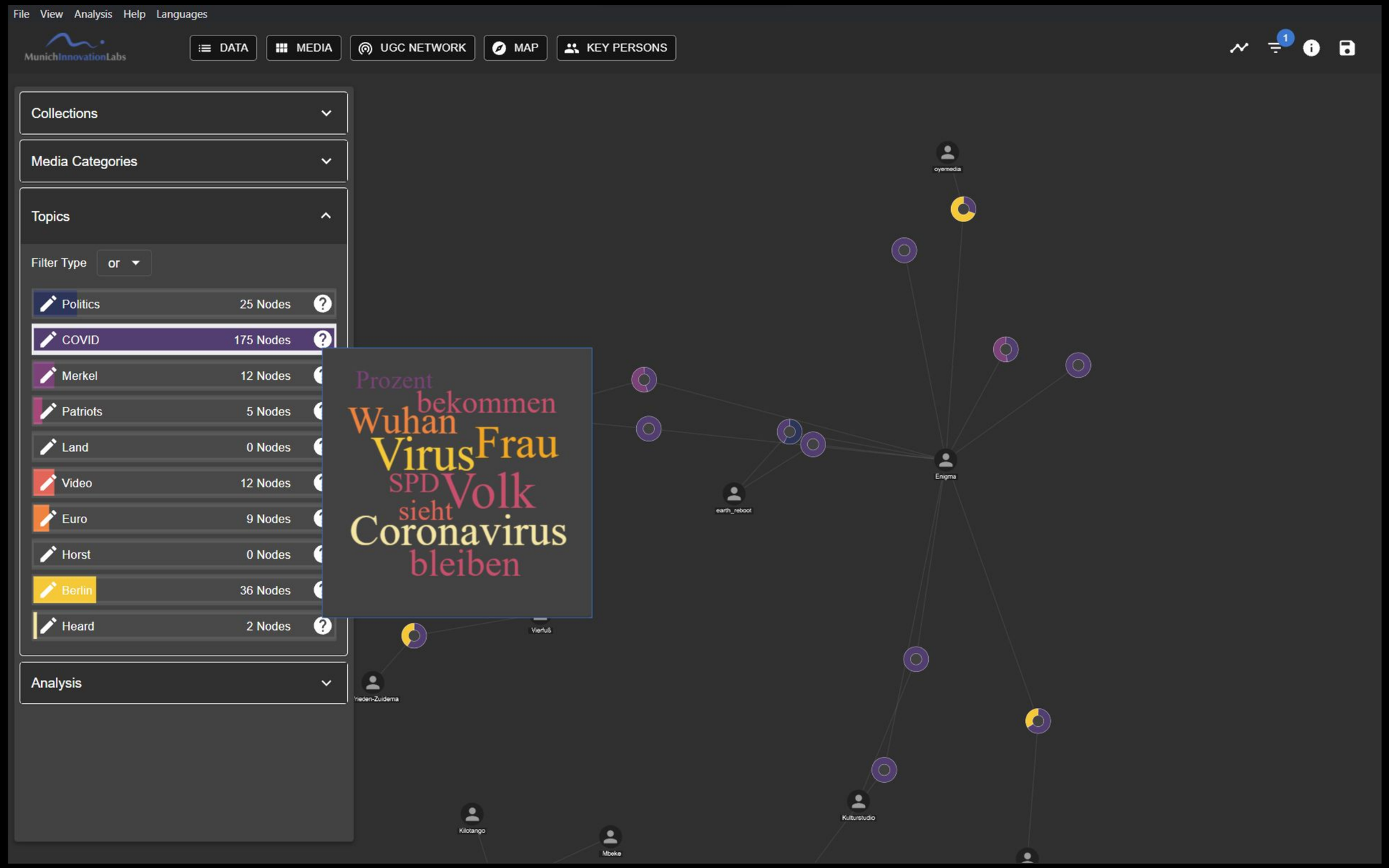
1. Create a new collection



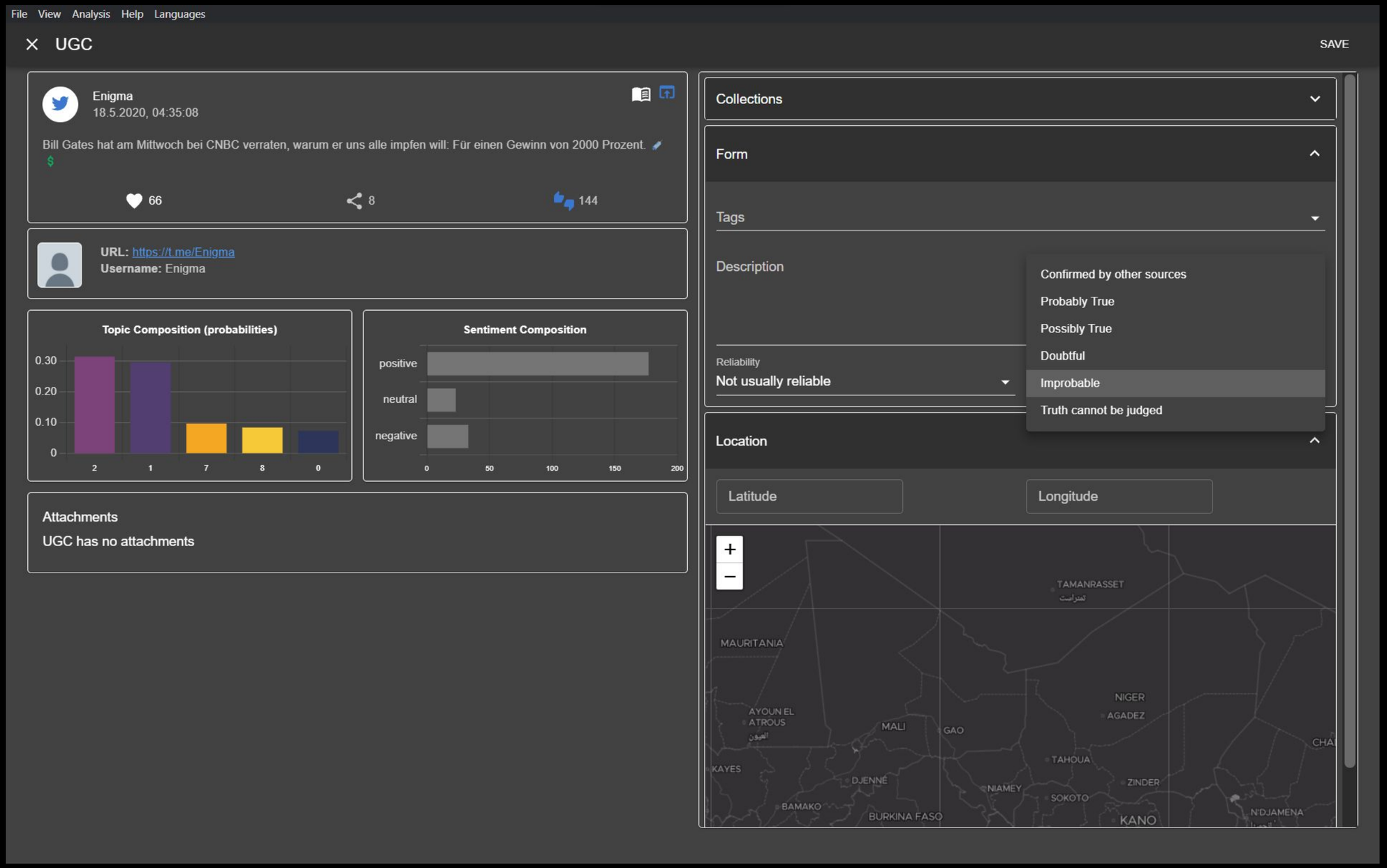
2. Look at the various identified topics



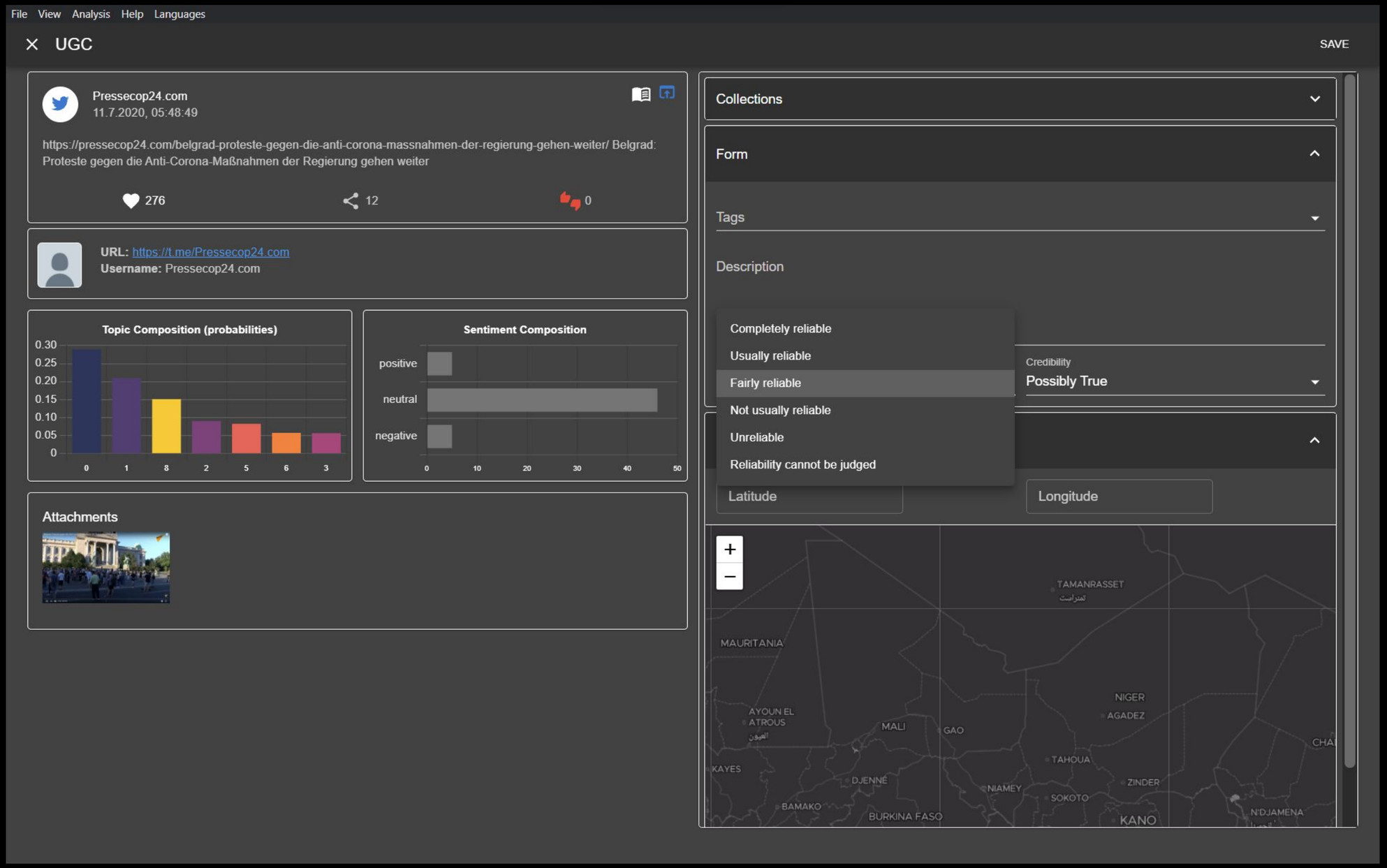
3. Choose and filter by topic(s) relevant to your research



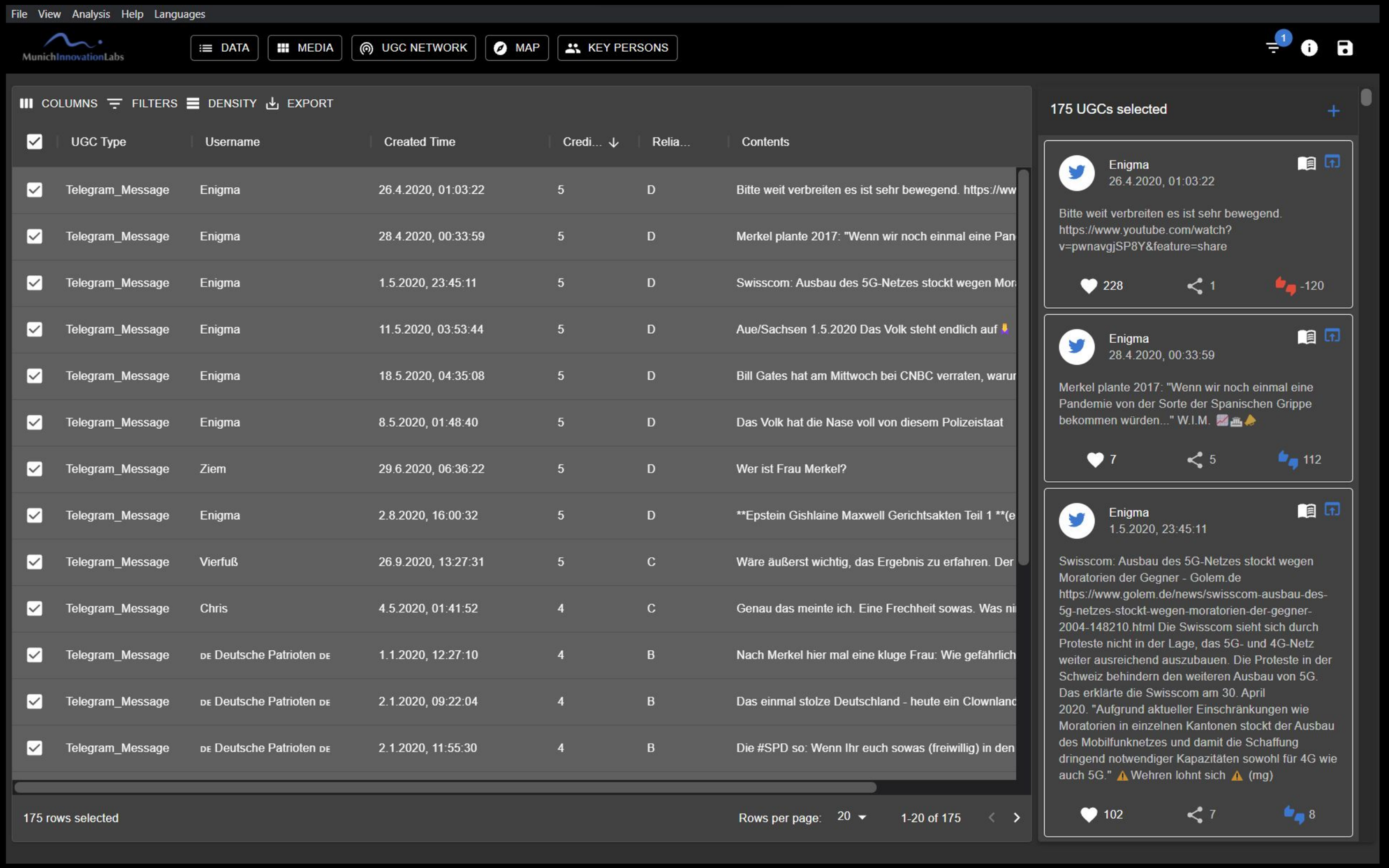
4. Assign credibility/reliability scores



Assign credibility/reliability scores



5. Sort and filter by credibility/reliability



Live Demo

Takeaways

- Time for finding relevant information can be reduced by more than 90%
- Completely manually processing these amounts of data is often not realistic
- The system is designed to be flexible
  - Supports different sources of data
  - AI algorithms can be adjusted depending on the use case
  - Additional analyst meta data input depending on the use case
  - Different export options/report generation planned

Funding acknowledgment

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KISTRA

GEFÖRDERT VOM

Bundesministerium für Bildung und Forschung

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