

Open Source and Non-linearity - A futuristic Virtual Reality way of dealing with News in “News In Time And Space”

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September 2023

1 Introduction

Information has always been a driving factor in society, today more than ever. Enabling people to share information and stay informed allowed society to evolve beyond its limitations at the time. Revolutionary technologies shaped the way we as individuals interact with news and information, from the printing press creating newspapers, radio transmission enabling audio and video broadcasts, to the internet connecting devices and people all around the world.

News agencies are the main source of information for most individuals, but the limitations of each medium through the ages meant they were always facing challenges. Newspapers are rather limited in capacity so the local news outlet creating the paper had to decide what information is relevant and worth putting into print. A similar challenge persisted with radio and TV news broadcasts since airtime is limited and needs to be planned and produced. The digitalization of information pushed news publishers to provide their reports online via websites or apps which lead to the creation of news feeds that take reports from different sources and topics and present them to a user. But the problem of relevance is one that’s greater than ever. In such a fast moving medium the focus on always having the newest, most interesting, most attention grabbing information grew and grew. So the problem of judging what information is deemed important enough to present to individuals is still persisting but it is now being evaluated by algorithms that aim to personalize these feeds to certain user groups. This means that any individual is dependent on another entity, like an algorithm or directive board, that decides what is deemed relevant and worth presenting. Even with the capabilities of today’s technology this massively limits the number of available sources for news reports a person is presented with. News feeds for people in western countries for example mostly present news from western news outlets.

A big question arising from this is whether there still is a need for a separate entity to decide what is relevant enough to be brought to attention? With such advanced and fast access to information the possibility of bringing the power of deciding what is important back to an individual is achievable. What is needed now are the tools to enable everyone, companies and individuals alike, to allow them to explore this data for themselves rather than relying on somebody else to decide what is and isn’t relevant.

2 GDELT as our source

We have chosen GDELT¹, Global Database of Events, Language, and Tone, as our main source for our project. GDELT is a large database that collect a wide range of media content and especially news sources. The complete dataset is enhanced with additional information like sentiment analyses and extracted themes. One of GDELTs greatest strength, the unfiltered access to categorized events from all over the world and different outlets, is also

¹<https://www.gdeltproject.org/>

one of the main weak points. As the user is provided with mostly raw data it becomes hard to evaluate the quality and relevancy of each datapoint.

3 News In Time And Space

To propose a way of unbiased and nonlinear user interaction, we developed our program “News In Time And Space” [3], in short “NITS”. NITS is a virtual reality tool which is used to present data from the GDELT project in a highly interactive manner. Interacting with large, unfiltered data can be confusing and even frustrating which makes it inaccessible to most. Since virtual reality became more widespread, its main focus has been the ease of and building upon user to system interaction (e.g. [1, 4]). Systems to make interaction with large amounts of data in virtual reality possible aren’t fully researched, but appealing to our cause. Users can have a more hands-on approach, which is more stimulating than regular tools and might spark interest to further their exploration. Virtual reality presents a more intuitive way of human-computer interaction by immersing the user in a virtual environment and relying on natural gestures (Figure 4).

To make large amounts of data approachable via NITS one needs to be able to specify what they want to see and interact with. For this, filters have been implemented on the basis of the virtual reality environment. In order to specify relevant events there is a set of filters available like a timeline to specify when events occurred, the types of events to look at and participating actors like countries, people or institutions (Figure 2). Other metrics like the tone of news reports or their value on the Goldstein scale, an estimation of the impact an event had on the stability of a country, allow a user to compare differences in news coverage from different origins (Figure 1). Users can easily mix and match these filters interactively, allowing for seamless exploration of the available data. Events are placed on a globe at the location they took place at and are connected to the location of the participating actors (Figure 3, 6) This means that events present a small network of linked locations that imply their global or regional impact (Figure 6, 5). These tools try to enable a user to explore, adjust and interact with the available information by themselves in an unfiltered and not globalized way and make big data accessible to everyone.

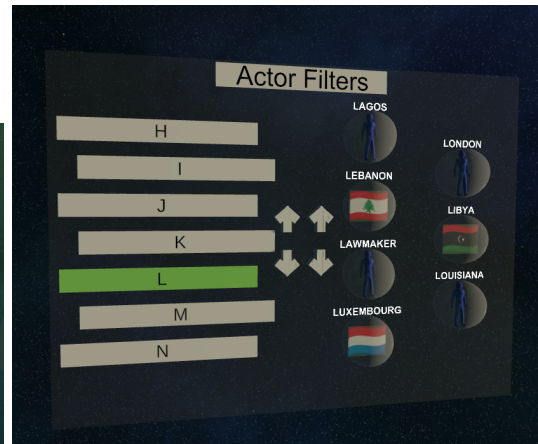


Figure 1: Tone-, Goldsteinscale- and Actor-filters

Figure 2: Actor-filter menu sorted after Actors starting with the letter L



Figure 3: Localized Events of a group of Events

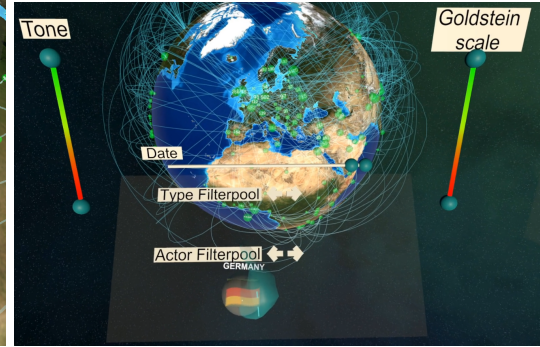


Figure 4: Filter being placed in the filter-box via VR hands



Figure 5: Info of an Event

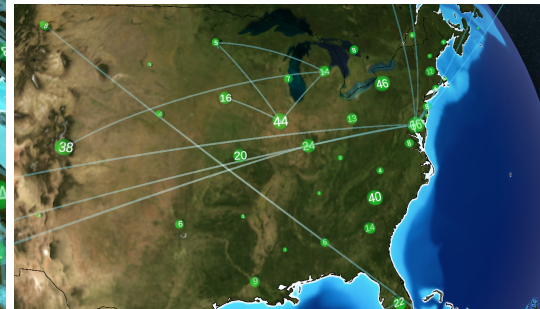


Figure 6: Events in the USA grouped and connected on a state level

4 The future of text is open source

In these days of information overload filtering relevant information is necessary. But who determines whether information is relevant? In our opinion: The user. A powerful search engine for information can never tackle the lack of transparency if its generated output of the underlying algorithm remains closed to the public. To understand how information is filtered it is necessary to get a view on the code base determining the importance of information. This should be the basis of information freedom in a digital world. Therefore, we advocate open-source solutions in this field and our project and code is open to the public on GitHub². However, our data relies on GDELT. Though GDELT's files are available to everyone, some of the underlying codebase of algorithms that filter information from news articles are not fully disclosed. As a consequence, we can publish our application open-source but we cannot guarantee completeness and accuracy of the database we use. Only fully open-source solutions create transparency and are thus an essential element for guaranteeing traceable results in the journalist and scientific sector.

With our plea for a certain degree of user-centricity, we indirectly tie in with a classic hypermedia concept, namely that of adaptive hypermedia [2]. Specifically, we envision our system to be open in several ways: with

²<https://github.com/texttechnologylab/NewsInTimeAndSpace>

respect to the underlying information source, e.g., online social networks, instant messaging systems, blog hosting services, news aggregation or discussion sites, or any other data repository that is at least temporally ordered and contains spatial information that can be localized in the way we have done with GDELT. In this way, the user is empowered to select the information sources that are of interest to her or him and that are to be made interactively accessible in VR by means of NITS. This requires the generic further development of NITS as a universal system for VR-based mediation of textual information with substantial temporal and spatial structuring. On the other hand, user adaptivity also refers to what is known from adaptive hypermedia [2], according to which the system builds a model of the intentions, goals, interests, and interaction history with the respective user, in order to offer information with different granularity and contextual fit, so that the interaction with the user becomes more central in the sense of human communication. With the advent of generative AI methods, we now see the possibilities of such adaptive systems, as the content of various media can be made subject to semantic modeling, as can the interactions with the user, in a way that contextualizes them reciprocally. In other words, user actions become an evaluable part of the interpretive context of information and vice versa, promising better, more user-adaptive information selection and more natural interaction. At the same time, however, the requirements for transparency and openness of system decisions and their reconstructability by the user are increasing. This applies not only to the actual information sources and the developed programs, but also to the user model that is created in the course of using the respective VR system and its accessibility, controllability and modifiability by the user at any time. This conclusion leads us back to the term Open Source, but in a way that distinguishes between three aspects. In our view, the future of text means increasing user adaptability, which in turn brings user-specific processes of text comprehension into focus, and ultimately underscores the need for open source.

References

- [1] G. Abrami, A. Mehler, M. Bagci, P. Schrottenbacher, A. Henlein, C. Spiekermann, J. Engel, and J. Schreiber. “Va.Si.Li-Lab as a Collaborative Multi-User Annotation Tool in Virtual Reality and Its Potential Fields of Application”. In: *Proceedings of the 34th ACM Conference on Hypertext and Social Media*. HT '23. Rome, Italy: Association for Computing Machinery, 2023.
- [2] P. Brusilovsky. “Adaptive Hypermedia”. In: *User Modeling and User-Adapted Interaction* 11.1 (2001), pp. 87–110.
- [3] J. Gagel, J. Hustedt, T. Lüttig, T. Berg, G. Abrami, and A. Mehler. “News in Time and Space: Global Event Exploration in Virtual Reality”. In: *Proceedings of the 34th ACM Conference on Hypertext and Social Media*. HT '23. Rome, Italy: Association for Computing Machinery, 2023.
- [4] A. Mehler et al. “A Multimodal Data Model for Simulation-Based Learning with Va.Si.Li-Lab”. In: *Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management*. Ed. by V. G. Duffy. Cham: Springer Nature Switzerland, 2023, pp. 539–565.