

A two-way street between AI research and media scholars

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With the rapid advance of Artificial Intelligence (AI), increased availability of digitised and born-digital sources from a wide range of collection owners, researchers can gain new perspectives on large-scale audiovisual collections and study patterns that reach across media and time. But what are the actual requirements that humanities scholars have for the use of such AI-based tooling? This question is what the Netherlands Institute for Sound and Vision (NISV) brought into the European research project AI4Media.¹ Specifically, NISV is investigating how AI tools could open new research possibilities for the users of the CLARIAH Media Suite virtual research environment which enables exploration and analysis of distributed audiovisual collections. In this short paper presentation, we will present the requirements gathered from humanities scholars on AI tooling and describe how they are being translated into functional AI tools in the Media Suite.

Currently, the Media Suite provides tools for exploring the data and collections, creating personal selections, adding and exporting annotations such as tags, comments, and links (Melgar-Estrada et al., 2019). Additionally, to facilitate more generous access to this large-scale data for quantitative analysis, it provides Jupyter Notebooks in combination with the existing archive APIs that allow users to perform more advanced search queries and create data visualisations (Wigham et al., 2018). AI technologies can further enhance research possibilities within Media Suite, for example, by extracting patterns of political or gender bias across large datasets.² However, to fully exploit the potential of AI in the future, more research is needed to understand how AI tooling can support the specific needs of SSH researchers working with audiovisual collections. Specifically looking at (i) how such tools can adhere to the rigorous research methodologies that scholars apply in their work, and (ii) how researchers would like to interact with these technologies. Guided by research on these questions, our goal in the project is to extend the Media Suite infrastructure with state-of-the-art AI technologies for multimodal content analysis and understanding, and provide access to these functionalities via the graphical user interface (GUI) in a user-friendly manner.

We gathered user requirements through in-depth interviews with practitioners from the social sciences and humanities (SSH) field. We selected interviewees to strike a balance between people who are familiar with using computational methods in their research and people who have experience in designing and developing tools to enable the use of such computational methods for other researchers. We also brought in the perspective of an application manager of research infrastructure, looking after the integration and consecutive maintenance of the developed software modules. In total, 9 one-hour interviews were conducted.

Through these interviews, we established specific needs among scholars working with media, namely to identify, quantify and challenge issues of bias, framing (difference in the meaning given to a certain topic in different contexts) and representation. While AI-driven analysis can help researchers investigate the concepts, the challenge is that the definition of these complex societal issues is subject to debate. Thus it is important that AI-driven research infrastructures guide researchers while leaving enough room for them to develop their own understanding and identify more specific instances of these broad phenomena, for

¹ <https://www.ai4media.eu/>

² Example of political bias analysis enabled by the Media Suite Jupyter Notebooks: <https://mediasuitedatastories.clariah.nl/elections-2021-first-results/>

example, the degree to which talk show hosts interrupt female speakers versus male speakers, or the framing of violence in various news channels covering an international conflict.

In terms of the utility and usability of AI tools by SSH scholars, two key priorities emerged during the interviews. The first is trustworthiness, which concerns the transparency about the datasets used to train the algorithms as well as the explainability of results produced by AI tools. Importantly, it was noted that researchers with limited technical knowledge should be able to understand causal effects between input and output data, thus stressing the importance of interface design in facilitating trustworthiness in AI solutions. The second priority is analysis across multiple multimedia modalities. Researchers do not want to be limited by the medium of sources in their research and see great potential for AI to facilitate analysis across a combination of visual, audio and textual modalities. The ability for users to themselves configure and experiment with AI's parameters are needed to adapt the detection of various concepts within each modality to specific research queries.

Following the gathering of requirements, their prioritisation and translation into concrete technical functionalities, several AI tools will be integrated into the Media Suite environment. In the first development cycle, we are working on a *partial audio matching scenario* that combines the functionalities provided by audio fingerprinting extraction and audio fingerprint matching technologies developed by Fraunhofer IDMT (see figure 1). This scenario is designed to enable researchers to analyse the concept of framing which was expressed as the key research priority by the interviewed scholars. It will enable researchers to find out which audio segments of a given programme have been reused and how they have been combined and framed in other media (see figure 1). Our work on technical integration and user experience design is helping the researchers at Fraunhofer IDMT to further tweak their modules and at the same time reveal possible ways of applying the partial audio matching functionality in an archival research setting.

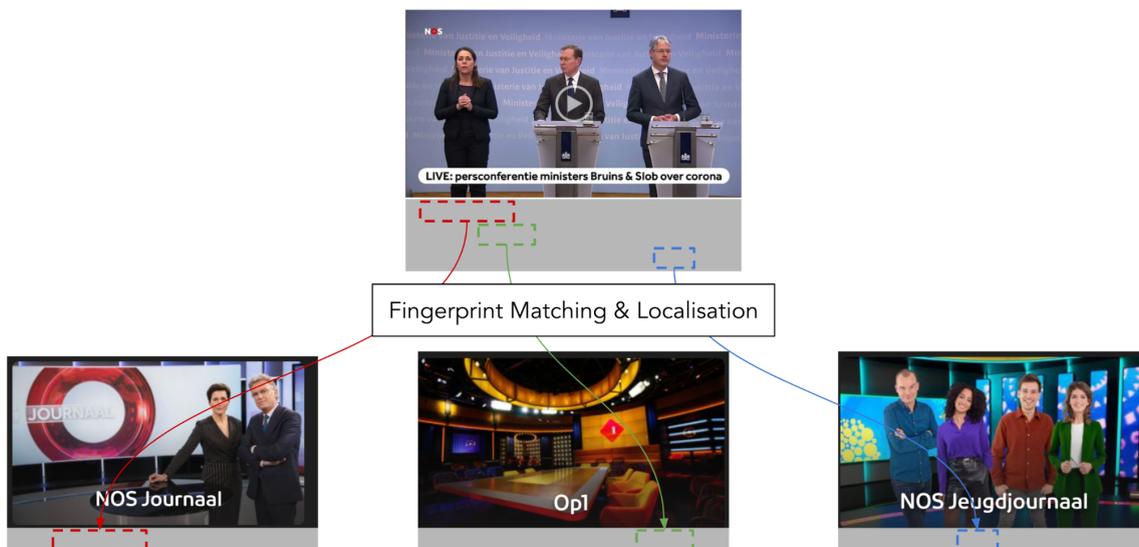


Figure 1. Conceptual diagram of fingerprint matching and localisation.

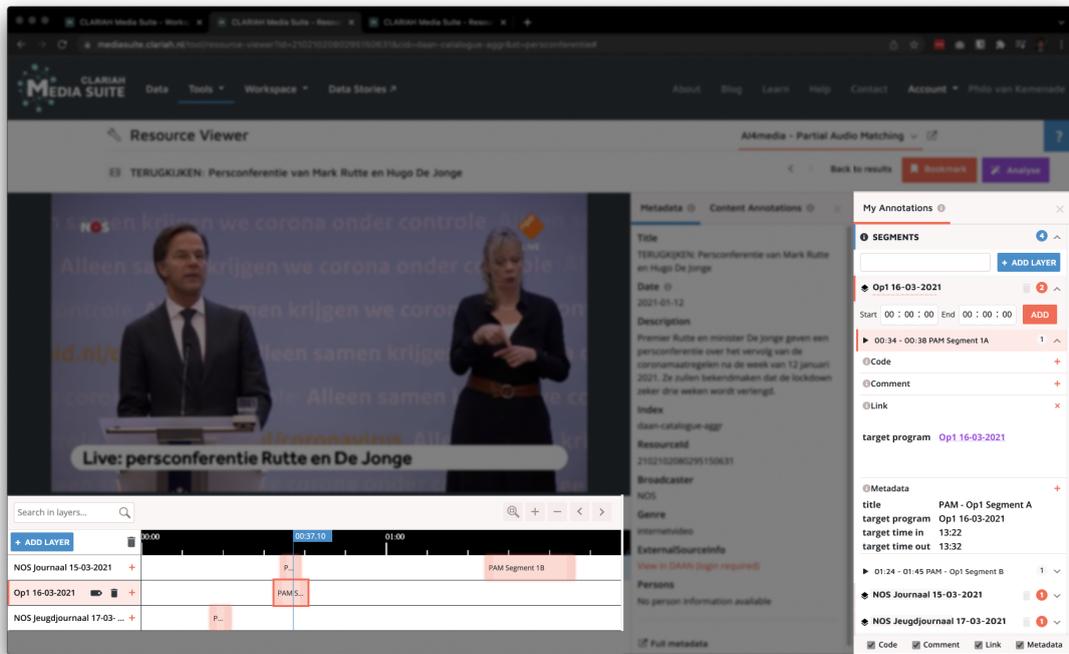


Figure 2. Media Suite interface with the integration of fingerprint matching and localisation functionalities.

During the presentation, we will go into a detailed discussion about the user requirements and demonstrate the Media Suite interface prototype with the partial audio matching capabilities. In the next phases of the project, we will be integrating additional AI functionalities, performing user testing and improving the Media Suite GUI. Additionally, we will explore how the requirements expressed by researchers to interact with AI tools in a more transparent and configurable manner can be transferred to other application domains and influence how AI applications are developed in the broader media sector as well as in other fields.

Acknowledgement. This work was supported by European Union's Horizon 2020 research and innovation programme under grant agreement No 951911 - AI4Media.

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