AI4media

Netherlands Institute
for Sound & Vision

AI Techniques and Tools for Social Sciences and Humanities Research

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Executive Summary

The potential of AI for Social Sciences and Humanities (SSH) research is the focus of the AI4Media use case led by the authors of this white paper from the Netherlands Institute for Sound & Vision (NISV).

This white paper aims to harmonise requirements articulated by SSH researchers working in Media Studies, for AI-based tooling. The aim is to inform the development and implementation of AI techniques and tools for this user group. Data was gathered through remotely conducted interviews, desk research and in-person workshops with representative stakeholders.

After the general introduction, the white paper first provides an overview of current uses of AI tools in Media Studies and how AI tools could support the investigation of concepts such as framing and mise-en-scene analysis. And it outlines what supporting mechanisms and infrastructures are necessary to ensure the use of and critical engagement with AI tools by media scholars. Second, the paper provides an overview of five main requirements expressed by Media Studies researchers as expressed in the interviews and workshops conducted by the authors.

A second iteration of this white paper (to be published in the second quarter of 2024) will cover additional academic disciplines in the SSH.

Key takeaways

- Use of AI tools is a relatively new development in SSH research, requiring scholars to acquire new digital skills and explore the merits of computational research methods. That being said, researchers with a Media Studies background tend to have an advantage over the generic "non-technical user" due to their familiarity with analysing media material. The development of tools for scholars in Media Studies should be guided by considerations for theoretical SSH research concepts.
- The development of tools for scholars in Media Studies should be guided by affordances for source and digital tool criticism to ensure their meaningful application.
- While many researchers are well-versed and are technically supported in textual analysis, AI tools for multimodal content analysis of still images, moving images and sounds fall short to meet the requirements by end-users. This is due to algorithmic limitations and UI/UX considerations not being fully taken on board. Another factor is the availability of tools, with tools for textual analysis being available earlier than tools for image and video analysis. Also Media Studies researchers have specific demands related to level of detail for the analysis and level of specificity.
- Individual components for analysis often might (have to) be very specific to be useful; the way to make them broadly applicable is to ensure that they can be combined and configured in flexible ways and require interoperability, including semantic interoperability. Hence, to fully integrate AI tools into their workflows, researchers require flexible, easily configurable, transparent and explainable solutions that could be adopted in a variety of research scenarios.
- Results of AI analysis should be easily exportable in a commonly used format so other researchers can replicate experiments, or easily work together.
- Graphical User Interfaces and digital research infrastructure tools can help bridge the gap between lower level technical modules that require custom code to be executed on one hand and researchers asking high level research questions who often lack the programming skills required to operate those modules directly.

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Introduction

Background: the field of Social Sciences and Humanities Research

Social sciences and humanities (SSH) research encompasses a broad range of disciplines such as political sciences, history, journalism and gender studies, that use analytical and critical methods to study the complexity of human behaviour, culture, history and society (UNESCO, 2011).

SSH accounts for well above 40% of students in European Higher Education. Researchers from SSH fields represent the largest European research community, with more than 30% of EU researchers in Higher Education, corresponding to about 500.000 Full Time Equivalent (FTE) positions (EUROSTAT, 2018). Media is a regular source of investigation for this type of research as media artefacts and our engagement with them reflect societal norms, worldviews and power relations. For instance, researchers in the field of gender studies might analyse gender and race representation in television programmes to measure societal injustices and understand the underlying causes. Historians might subject historical media to discourse analysis in examinations of, for instance, manifestations of propaganda across time. Likewise, investigation by journalism students into strategies that are employed to spread misinformation on social media.

The rapid advance of Artificial Intelligence (AI) combined with the increasing availability of digitised and born-digital media sources provides a fertile ground for SSH research and provides new lenses for media investigation. The most dramatic change is seen in the increased scale and scope of research. Traditionally SSH rely on "close reading" methods with respect to media research, in which individual sources are analysed manually by individuals, which inevitably imposes limits on the number of sources that can be investigated by a

single researcher. Digital tools, on the other hand, have brought about a turn towards "distant reading", which allows researchers to scrutinise and compare a large number of sources, spanning across extended periods of time, languages and media formats (Moretti, 2013). It allows SSH to better map and compare historical developments, and connections and discrepancies, which in turn helps to understand present day phenomena better. And it can also find patterns that emerge that were "invisible" beforehand. The development of a new generation of AI-based tooling will allow new interpretative models to further support such research.

The potential of AI for SSH research is the focus of the AI4Media use case led by the authors of this white paper from the Netherlands Institute for Sound & Vision (NISV). To support SSH scholars doing research on large audio-visual archives, NISV develops and maintains the CLARIAH Media Suite - a research environment for researching multimodal datasets from Dutch heritage organisations. Tools currently available in the Media Suite enable metadata inspection, exploratory browsing, search, visualisation, analysis (annotation support), automatic speech recognition and name-labelling. Within AI4Media, Media Suite is being extended with AI-based tooling that are intended to assist users in analysing multivocality, representation and framing in media collections (Vos, 2021). An important element of this work is gaining an understanding into how AI technologies can support SSH research in meaningful ways.

This white paper aims to harmonise SSH researcher requirements for AI-based tooling with the goal to inform the development and implementation of AI techniques and tools for this user group. By evaluating the current work and the future requirements of these researchers, this white paper seeks to inform the work done by technology partners within the AI4Media project, but more importantly, to inform the European research agenda in a direction that aligns with the needs of users from Media Studies and broader SSH.

Methodology

Each discipline under SSH comes with its own research questions, methodologies and practices. Creating an inventory of generalisable requirements for AI-based tooling across all these disciplines presents us with a challenge of formulating questions in such a way that all disciplines could answer them.

Presented with this challenge, the authors adopted a two-stage approach, aligned with the AI4Media project timeline:

Iteration 1. Media Studies: This first iteration focuses on Media Studies as a specific discipline within the SSH that comprises disparate researchers and disciplines. This focused approach allows us to zoom in on one discipline to gain an in-depth understanding of existing problems, challenges and user needs, and use it as a basis for formulating overarching observations and requirements that could be applied to other SSH disciplines. Media Studies has been selected as the focus since this discipline is already advanced in its use of AI (Routledge, 2022), hence there is a mature understanding within the researcher community of the limitation and potentialities of AI-based tooling which can be translated into concrete AI developments in the immediate future;

Iteration 2. Broad SSH disciplines: In the second version of the white paper (to be delivered in the autumn of 2024), the scope will be broadened and generalised to a wider range of SSH research disciplines. Among its goals, the white paper will raise awareness about the potential use of AI tooling, and stimulate the development of innovative AI-based research methods to disciplines where they are not used yet, but could provide great benefit for.

To gather in-depth insights from Media Studies scholars, a qualitative approach was selected in a format of semi-structured interviews. Interviewees were identified from NISV's own network of researchers, consisting of (i) the users of the CLARIAH Media Suite employed at Dutch Universities, (ii) international Media Studies researchers, and (iii) experts (working at research institutes) with experience in developing tools for SSH researchers. All of them have proven proficiency in using AI tooling. The researchers were selected based on their interest in (multi-)media archives, affinity with digital methods, familiarity with the current tooling offered in the CLARIAH Media Suite and their seniority. A total of 12 researchers were interviewed in a series of one-on-one remotely conducted video calls. Additional insights and observations were gathered during an in-person AI4Media use case evaluation session in a focus group setting with four researchers. This white paper also draws from the extensive experience that NISV has gathered over the years in facilitating SSH research via the Media Suite and various collaborative projects (SEMIA; Koolen et al, 2020; Martinez-Ortiz et al, 2017).

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Current SSH Research Landscape: Applications and Challenges

The use of AI techniques in SSH research is still an emerging field but it has already resulted in a wide variety of applications, applying and combining for instance solutions for data extraction, information retrieval, content analysis, Semantics (Linked Data, Knowledge Representation), image retrieval and natural language processing, to name a few. In this chapter, we zoom in on three areas guiding SSH research with media content and the related challenges for AI applications that emerged after analysing the literature: (i) Content Modality, (ii) Media Theory, and (iii) Digital Tool Criticism.

Content Modality

An important aspect guiding SSH research with media content is modality. Depending on the scope of their investigation, researchers might focus only on information and insights that can be extracted from text, audio, still imagery, moving imagery, or a combination of multiple of these modalities. For instance, a researcher studying political opinions in TV broadcasts might rely entirely on textual analysis of transcripts, while another researcher investigating the reuse of an iconic speech in other programmes might combine text, audio and moving image analysis. The table below illustrates how existing AI tools can serve the analysis of such different media modalities to facilitate SSH research.

Media content modality	SSH research examples
Text - including descriptive metadata, transcripts from audiovisual materials, textual content such as newspapers or social media posts. Approaches needed for different languages.	'Media Monitoring of the Past' produces a natural language processing tool suite to mine two centuries of papers and includes a case study on trends in anti-Europeanism in the public opinion. 'WORDij' is a semantic network tool with a word pair approach to information retrieval that enables the user to create word network structure mapping. 'DISPUTool' uses AI for argument extraction in political debates from American presidential elections (1960-2016). Tools like 'eScriptorium', 'Phythia' and 'Ithaca' are restoring and attributing (handwritten) texts using deep neural networks and are of great help in epigraphic and palaeographic processing. 'America's Most Redacted' investigates the most censored figures during Eisenhower's presidency in declassified state records by visual and textual analysis such as named entity recognition. '4CAT' is a research tool that can be used to analyse and process data from social media to perform 'web scraping', e.g. tracking socio-political sentiments and trending topics. 'Responsible Terrorism Coverage' uses text analytic methods to extract knowledge from 70 years of global terrorism-related media coverage and intends to expand the available data on the way media ecologies respond to terrorism.

Media content modality	SSH research examples
Audio - including radio and television programmes, speech, music, soundscapes.	'Polifonia' uses music information retrieval techniques such as harmonic and melodic pattern analysis and builds a knowledge graph to link music-related information from the 1500s to the 1950s. 'SPeech Across Dialects of English' aims to develop and apply user-friendly software for large-scale speech analysis of existing public and private English speech datasets, and to understand how English speech has changed over time and space
Still Image - including digitised content (e.g. paintings, scans of newspapers), digital born (e.g. digital photographs), screenshots from moving image content.	'Krant en Foto's' links press photos to newspaper pages or the original photo series, by using image recognition techniques. 'Saint George on a Bike' expands conventional machine learning approaches, centred on image recognition, with the ability to decipher the complex pictorial language that characterises iconographic symbols and sacred imagery. 'Operatie Nachtwacht' reconstructs the original appearance of the well-known, but incomplete painting by Rembrandt, by training neural networks on Rembrandt's painting techniques and colour-use and using a copy of the famous painting as input data. 'GallicaPix' is an iconographic search tool that allows users to run text- and content-based queries into five different corpora. 'Deep Discoveries' aims to create a computer vision search platform that can identify and match images across British digitised collections. The 'Hand of the Artist from 3D Surface Data' project established that neural networks can determine the authenticity of artworks. An Allard Pierson pilot trains software with the 'Atlas der Neederlanden' in order to facilitate the increasing need for image recognition on digitised maps.
Moving Image - including early low-quality back and white footage and recent broadcast quality materials.	'The Distant Viewing Lab' uses and develops a toolkit with Python packages designed to facilitate the computational analysis of visual culture on a large scale. INRIA & INA are conducting research to what extent AI software 'Snoop' extracts information and patterns from black and white films between 1902 and 1952. AI is used for enhancing, upscaling and remastering of old films and with that opening up 'new window to the past' (ai-powered restorations examples: 'Neural Love', 'Peter Jackson's They Shall Not Grow Old'). For several pilots within 'Time Machine' 3D virtual reconstructions of cultural heritage were created by the use of AI-aided photogrammetric processing on historical moving images.
Combination of multiple modalities	'Talking XTC. Drug discourse in post-war Dutch newspaper and radio debates' makes use of OCR and ASR techniques to track the public debate. 'Living with Machines' tracks the human experience of industrialisation by subjecting newspapers, photos and cartographic data to image and text analysis. 'Science Stories' brings scientific work of underrepresented scientists into social spaces, by bringing together textual and visual sources, through linked open data, Wikidata knowledge base and semantic web technologies. 'In Search of the Drowned' combines testimonial fragments of various nature (text, audio, visual) into an annotated linguistic corpus in order to discover the voice of Holocaust victims. 'Text-Bild-Gefüge. Digital Humanities und der Diskurs der Moderne' offers a virtual research environment that allows for a close integration of text-centred and image-centred topics, methods, and techniques and explores how modernist thought and aesthetics unfolded via the interplay of text and image. Journalism and research collective 'Bellingcat' uses various AI, web crawling and image recognition techniques to reveal information on historical and modern audio-visual sources. 'Who's speaking? Coalitiemannen spreken over (internationale) veiligheid' maps the presence of politicians and parties in the media during the Dutch election campaign 2021 with use of speech, voice and facial recognition tools.

The current use of AI in SSH scholarship is largely dominated by text-based analysis. A concentration that is related to the long tradition in the study of textual sources especially in the humanities field. Further practical and technical factors play a role in the maturity of text-based analysis: (i) scalability (low computational power needed to process text), (ii) technological maturity (especially for dominant languages), and (iii) access to training datasets (availability of large-scale contemporary and historic textual datasets).

The potential for multimodal analysis of still images, moving images and audio is still underexplored. This is due to algorithmic limitations of AI tools to understand and combine non-textual sources and UI/UX considerations not being fully taken on board. Also, analysis across data providers is cumbersome. In effect, researchers currently rely on non-computational visual and audio methodologies to conduct multimodal analysis (Ordelman et al, 2018). On one hand, improvements are needed both for the development and adaptation of individual extractors and analysis components for the different content types (especially A/V), and on the other hand the combination of analysis components (semantic interoperability, creation and execution of workflows etc.).

Media Theory

SSH researchers approach media content investigation through various approaches from media theory, including framing analysis (presentation of a particular event in a way that determines how this event is perceived and interpreted by the audience), discourse analysis (understanding how the use of language in a particular context creates meaning) and narrative theory (understanding the key elements of a story and how the narrative is being communicated) (Noordegraaf, 2016).

This presents a challenge for AI tools as such complex concepts that are largely dependent on the specific context of investigation are difficult to translate into technical specifications. A way to understand this challenge is to look at different levels of abstraction that are possible through AI-based analysis of media content. The majority of existing AI tools for SSH researchers support knowledge extraction on a low level of abstraction - identifying individual semantic elements such as tagging objects in an image or segmenting speech into sentences. As the abstraction level increases (see figure 1 below), more complex meanings are assigned to these elements - for instance, face recognition techniques might help to associate a face in a video with an actual person. On the high end of the abstraction level, meaning can be constructed from an understanding of what the particular combination of individual elements mean - a scene with a fridge, cooking pans and cupboards in the background would be interpreted as a kitchen. AI tools providing a high level of abstraction could significantly boost SSH, enabling researchers to increasingly investigate more complex questions. The challenge here is to ensure that the solutions stay generic enough to support a wide range of research angles. Cross-disciplinary collaborations between SSH scholars and AI engineers are necessary to guide such developments.

Abstraction Level

	Low	Medium	High
Textual analysis	Segmentation into sentence	Named-entity recognition	Identifying concepts such as (dis)agreement, conflict, etc.
Visual analysis	Object detection	Face recognition	Identifying concepts such as background setting, narrative elements

Figure 1 Abstraction levels of AI tools

Source and Digital Tool Criticism

The increasing role of digital technologies in SSH research has resulted in an increasing focus on data and digital tool criticism (McGillivray, 2020). Data criticism has historically been a core element of SSH research and has evolved with the onset of digital data.

Digital tools criticism is a relatively new element. With techniques that go far beyond keyword search functionalities, these tools have an impact on how researchers perceive, analyse and engage with media content, in essence enabling as well as obstructing different lines of investigation (Koolen et al, 2019). For instance, an algorithm trained on datasets of restaurant reviews or Twitter posts might not be suitable for the analysis of 19th century newspapers, because the evolution in the use of language would lead to misinterpretations (Giuliano, 2017). To make meaningful use of AI, it is essential for researchers to understand the purposes for which digital tools were created, how they were evaluated (evaluation criteria, data used etc.) and what biases and implications this might introduce into their research. For this reason, researchers are encouraged to document the choices they make as well as reflect on how the tools they use steer their interpretation of data. For instance, provide information on the datasets used, metadata-dating, anomalies, confidence rate explanations in research papers. Challenges in this area are twofold:

1. Digital tools often are not transparent enough to support such critical investigations.

2. SSH researchers often lack technical knowledge and skills to critically engage with such tools. The successful uptake of AI solutions in SSH scholarship is largely dependent on the skill set that researchers bring. Especially in humanities, statistical skills/data analytics are gradually entering curricula, but more usually than not as an elective activity rather than a key skill for scholars. This results in the general lack of familiarity of computational tools as having merit for SSH research. This includes the need to be able to understand the technical evaluation of the tools applied to some extent and the ability to "translate" between your own research questions and that evaluation (i.e. to know which tool can or can't be used for the falsification or validation of certain hypotheses, for instance). In addition, it would be helpful for SSH researchers to understand the technical meaning of the principles behind trustworthy AI, and the tools to support it, so that they can use the tools more effectively.

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Researcher Needs for AI Tools

Synthesising insights from interviews with 12 scholars - some of which are experienced at using computational tools for their research while others are involved in the design and development of computational research tools - this section presents the needs of media researchers towards AI tools and methods.

Fit-for-purpose User Interfaces

Numerous scholars stressed the importance of graphical user interfaces (GUIs) in inviting researchers to incorporate computational methods into their work. Given the aforementioned gap in digital literacy in SSH education, GUIs provide access to computational techniques to users who do not have coding experience. Rather than requiring custom written code in order to retrieve, process, analyse and visualise data, commonly used functions can be represented graphically via a user interface, making them accessible to users in the form of pointing, clicking and typing. Interfaces such as the Impresso App or the CLARIAH MediaSuite that do not require coding skills while still supporting complex queries are preferred. Speaking from previous expertise, interviewed researchers highlighted interdisciplinary collaborations as key to designing such interface features. This allows to bring together domain experts with knowledge of the material, developers with the skills to develop robust software and designers who can translate between technical functionality and intuitive interaction patterns.

Modular Workflows

In conducting their research, researchers often take unexpected, exploratory routes following insights that they continuously develop. A workflow for each research question is likely to follow a slightly different path, using a combination of computational and non-computational methods in different order and configuration. Flexibility and modularity is key to support such practices. From a technical point of view, individual components for analysis often might (have to) be very specific to be useful; the way to make them broadly applicable is to ensure that they can be combined and configured in flexible ways (which is not at all trivial from a technical standpoint) and requires interoperability, including semantic interoperability.

Developing self-contained AI techniques that are clearly defined in terms of input and output and are mutually interoperable could support such researcher needs. General purpose, repetitive and low level tasks, rather than overly specific end-to-end functions are preferred. In such scenarios, researchers would like to have access to research environments where they can create their own

toolchains of interoperable smaller tools. One researcher proposed adopting a "Do It Yourself" approach where a user could use different tools as building blocks to create their own workflows. This way one application with multiple AI techniques could serve multiple purposes. To guide researchers, a pedagogical layer in the form of step-by-step tutorials is needed to illustrate how the tools could be employed and combined.

Configurability & Control

Besides the flexibility desired on the level of different tools working in consort, multiple interviewees mentioned experimentation at the level of single AI tools as a desirable feature. They would like to configure and continuously tweak **parameters** of tools as they perform their queries to better understand the provided results. Again, considerations for a user-friendly GUI are important here to support the navigation of different parameters. Such configurability features in general would bring more trust in AI as they enable researchers to better understand the performance and limitations of the tooling they use.

Even within a single research field, research questions vary widely between researchers and are often dependent on external contexts such as recent developments in society. Research tooling should support this variety as much as possible. Rather than high level tools that are specifically aimed at answering a few specific questions, low level tools that analyse more general patterns in media or metadata have the potential to benefit a wider range of researchers. With the required configurability, researchers can instrumentalise these general techniques in service of their own specific research questions. To facilitate this instrumentalisation, underlying tools and techniques need a level of flexibility in terms of the data or content they take as input and the way this is processed. This flexibility then needs to be exposed to end users in, ideally, the form of an intuitive GUI.

While there are several research infrastructures that provide both source data and tools, there is equally a need for tools that allow researchers to bring their own datasets to be processed and analysed. Parameter configurability is even more critical in such cases to support meaningful analysis of diverse data. In some of these cases, researchers would benefit from the ability to make existing tooling more specific to their dataset or corpus by providing training data or fine-tuning pre-trained ML models used in their tooling to achieve desired results.

Most importantly, the issue of control came up in many interviews. The responsibility to understand and interpret results provided by AI analysis lies with the researcher, not with the tools. Users must make their own interpretations and judgements, especially since in most cases they deal with complex societal issues that do not have binary answers but rather depend on the context and nuances that can only be spotted by an expert. Since research work often leads to scientific publications, the notion of reproducibility is key. In terms of control and configurability this means researchers need to be able to have a good understanding of the relationship between the inputs and parameters of the used techniques and the results provided by AI based tooling.

Shareable Results & Outputs

Researchers have specific requirements for accessing the outputs of analysis performed by AI tools. They need to document the steps and decisions taken as well as make their research reproducible. For this reason, results should be easily exportable in a **commonly used format** (CSV file or other standard representation). Using **common file formats** that researchers are already familiar with and can work with on their own terms will also enable them to take next steps and perform further analysis on the data, as alluded to in the above section on modular workflows.

Interviewees also expressed a desire to support other researchers using the same research infrastructure performing similar analysis. For instance, they would like to save and share with other researchers the configuration parameters they used and the analysis results they acquired. There is a general desire for **interoperability** and **shareability** so that data, tools, models and results could be reused in different contexts.

Trustworthiness

The concept of trustworthy artificial intelligence covers many aspects. Zooming in on the needs of SSH researchers, trustworthiness of AI tools are dependent upon several aspects in particular. First, trustworthiness relates to **transparency** about the tool's performance and robustness. Researchers want to understand the limitations of the tools they are using so they can take those into account into their interpretation of data. As an example, one researcher mentioned that when performing speech-to-text analysis, it would be useful to know whether the tool is trained to work with a variety of accents. If not, they would compensate for that by taking additional steps when analysing the data. Generally speaking, when tooling uses ML models that are trained on data, the provenance of this data forms relevant context for the researchers using the tooling. While mostly a concern of research infrastructure application managers, SSH researchers need AI-based tooling to work robustly and reliably at scale so they can trust that processes run and complete accurately. This is especially important in the context of vast multimedia archives where analyses might rely on the processing of many thousands of records. Transparency also relates to data completeness, which is relevant for AI tools that are built around existing corpora. Researchers need to be aware how gaps in the corpus (due to lack of metadata or missing records from a specific period) could have an impact on their analysis. Documenting and making these gaps visible can assist researchers in taking informed decisions in their interpretation of the results.

Secondly, researchers associate trustworthiness with the feeling of **predictability** and the **explainability** of results produced by algorithms. Scholars want to understand how underlying processes produce their results on the basis of supplied input data. Metrics about the internal performance of an algorithm, such as confidence scores, could be used to support this.

Finally, trustworthiness is an important consideration when it comes to the **digital tool criticism** step in research workflows. Scholars should be able to access resources (documentation on techniques used, training datasets, etc.) that enable them to critically reflect on the tools. This would support researchers in formulating the implications the use of a specific AI tool and techniques might have led to in their analysis. Another source of comparative information on AI based tooling is data from benchmarking initiatives, which allows comparison of underlying techniques and algorithms on a standardised dataset.

Tools have a history and are made by people. For critical tool users like SSH researchers, it is important to have access to accountability information including:

Known authorship; who made the tool and for which context?

- Tooling provenance; what is the tool based on. What are the underlying models and algorithms? What previous versions exist? Does the sound operation of the tool depend on third party platforms?
- Data provenance: given that many tools are trained on datasets; where did these come from and how and why, by whom and about whom were they gathered (Timnit Gebru et al, 2021)?
- Clear legislative coverage: does the usage of tools and data fall under a particular legislation? What happens when harm done in the world can be traced back to the tool used?

We refer to the "Ethics guidelines for trustworthy AI" for a definition of the term transparency. These Guidelines put forward a set of 7 key requirements that AI systems should meet in order to be deemed trustworthy. In this paper, we focus specifically on aspects that were highlighted by Media Studies researchers as being of particular importance to them. See: https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai

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Conclusion

The use of AI tools has a transformational effect on various academic disciplines within the SSH. Specifically in Media Studies, AI tools support macro-level analysis, e.g. the role of political and gender bias in media programmes, and micro-level analysis, e.g. close reading of specific programmes, bias effects of speaker selection and topic presentation.

Researchers in the SSH domain have been using AI tools in their work over the past decade, often working closely together with researchers from the computer science domain. As shown in this white paper, researchers are able to ask new research questions, leveraging large quantities of complex and distributed multimodal data. In conducting research for this paper, the authors could tap into a growing body of research and capture requirements through remote interviews and in-person reflection workshops.

What became clear is that the full potential of using AI tools still needs to be reached. Our work found that significant opportunities exist related to supporting research across modalities, connecting AI tools with various media theories and supporting researcher proficiency in executing source and tool criticism. From a user requirements perspective, this research identified five distinct areas that need to be taken into consideration in designing AI tools to be adopted by SSH researchers in Media Studies:

- Fit-for-purpose User Interfaces
- Modular Workflows
- Configurability & Control
- Shareable Results & Outputs
- Trustworthiness

The authors will take these insights on board in AI4Media, as they continue to develop, integrate and evaluate the demonstrators with and for SSH researchers. As mentioned, a second iteration of this white paper will be published in 2024, covering more academic disciplines within the SSH.

As a final note, we hope insights captured in this white paper will support other parties that work on similar challenges and that it can serve to support ongoing discussions that will shape the way AI tools are developed and applied. One topic that will require specific attention for the further development of the tools is the topic of fairness: The AI tools used should properly reflect what is in the data, and sample biases which are due to inadequate training data variability (e.g. imbalances regarding specific demographic groups) need to be avoided as much as possible.

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Relevant projects and initiatives

4CAT: https://github.com/digitalmethodsinitiative/4cat

Allard Pierson pilot Atlas der Neederlanden: https://allardpierson.nl/blog/oude-kaarten-automatisch-analyseren/

America's Most Redacted: http://history-lab.org/declassificationengine/americas-most-redacted

Bellingcat: https://www.bellingcat.com/

Deep Discoveries: https://tanc-ahrc.github.io/DeepDiscoveries

DISPUTool: https://disputool.uni.lu

eScriptorium: https://www.escriptorium.uk/

GallicaPix: https://gallicapix.bnf.fr/

Hand of the Artist from 3D Surface Data: https://www.factumfoundation.org/pag/1688/the-hand-of-the-artist-from-3d-surface-data

In Search of the Drowned: https://lts.fortunoff.library.yale.edu

Ithaca: https://ithaca.deepmind.com/

Krant en Foto's: https://krant-en-fotos.nl/

Living with Machines: https://livingwithmachines.ac.uk/

Media Monitoring of the Past: https://impresso-project.ch/

Neural Love: https://neural.love/

Operatie Nachtwacht: https://www.rijksmuseum.nl/nl/zien-en-doen/tentoonstellingen/operatie-nachtwacht

Peter Jackson's They Shall Not Grow Old: http://www.theyshallnotgrowold.movie/

Phythia: https://wiki.digitalclassicist.org/Pythia

Polifonia: https://polifonia-project.eu/

Responsible Terrorism Coverage: https://responsibleterrorismcoverage.org/

Saint George on a Bike: https://saintgeorgeonabike.eu

Science Stories: http://www.sciencestories.io/

Snoop: https://raweb.inria.fr/rapportsactivite/RA2018/zenith/uid44.html

SPeech Across Dialects of English: https://spade.glasgow.ac.uk/

Talking XTC. Drug discourse in post-war Dutch newspaper and radio debates: https://www.imperativeofregulation.nl/publications/2022/talking-xtc

Text-Bild-Gefüge. Digital Humanities und der Diskurs der Moderne: https://www.uni-weimar.de/de/medien/professuren/medienwissenschaft/theorie-medialer-welten/forschung/text-bild-gefuege-digital-humanities-und-der-diskurs-der-mod

The Distant Viewing Lab: https://www.distantviewing.org/

Time Machine: https://www.timemachine.eu/

Who's speaking? Coalitiemannen spreken over (internationale) veiligheid: https://mediasuitedatastories.clariah.nl/elections-2021-first-results/

WORDij: https://www.wordij.net

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