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THE USE OF ARTIFICIAL INTELLIGENCE WITHIN SOCIAL RESEARCH: A CLASSIFICATION PROPOSAL

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Abstract

Artificial Intelligence (AI) has recently been applied to different areas of behavioral and social sciences, offering significant benefits at various stages of the research process. Through a multi-channel strategy, it was analyzed the content published by AI experts and users to construct a classification of AI-powered tools functions and return a reflection on possible limitations and opportunities, focusing on the assistance these tools can provide within social research phases.

Keywords

Artificial Intelligence; Social research; Digital social research; Mapping AI

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1. THE USE OF AI IN SOCIAL RESEARCH

Artificial Intelligence (AI), understood as a field of study concerned with the development of "thinking" machines and related technologies (McCarthy, 2007), has only recently been applied to different areas of behavioral and social sciences (Robila, Robila, 2020). It should be noted that until a few years ago, AI was talked about mainly from a theoretical point of view (Prather et al., 2023); only in the last period, thanks to the increase in intellectual and financial investments by researchers and major technology companies, the changes linked to the AI diffusion are underway and have captured the collective awareness also from an instrumental point of view (Markowitz, Boyd, Blackburn, 2024), attracting considerable attention in recent years due to the strong impact that generative AI is starting to have on daily routines, on work routines, but in general on everyday life (Giordano et al., 2024). Nowadays, AI tools are also increasingly recognized as a powerful tool in the field of social research, offering significant benefits at various stages of the research process (Grossmann et al., 2023). Recently, several authors (Alowais et al., 2023, Li, 2023; Markowitz, Boyd, Blackburn, 2024) focused the attention on the ways in which AI can be leveraged to make social research more efficient, especially with regard to the use of digital technologies. To date, after all, it is difficult to find studies or research that have not included, at least in one of the research phases, the support of digital technologies – just think of querying online databases or using the main analysis software systems: the current socio-technological context is the result of a society completely immersed in the digital world (Lupton, 2014), where the distinction between online and offline social life has become increasingly porous (Pink, 2009) and where the "digital world" (Rogers, 2013; 2019), configured as an interdisciplinary dimension and a meeting point between all scientific sectors that question human behavior (Cavagnuolo, 2022), consists of the so-called Open and Big Data.

Nevertheless, in the social research community, the adoption of AI is not yet a common practice, because there are still many doubts about its use, like ethical constraints and large language models (LLMs) biases (Grossmann et al., 2023). In the ever-evolving landscape of technology, each new technology often encounters a phase of perceived perplexity: this initial condition is a natural response to the unfamiliarity of groundbreaking advancements. Just as the telephone, the internet, and smartphones once seemed daunting and complex, today's emerging technologies be it AI, virtual reality, or blockchain face similar skepticism

and uncertainty. However, history has shown us that this perplexity is merely a steppingstone (Smiley and Fisher, 2022). Over time, as individuals begin to understand and adapt to these new tools, they gradually integrate them into their daily lives (Hamad and Jia, 2022). The initial barriers of comprehension and acceptance dissolve, paving the way for widespread adoption (Murthy and Mani, 2013). Reflecting on the trajectory of past technologies, it is possible to see a pattern: what was once revolutionary becomes routine. The same will hold true for today's innovations.

Researchers' reservations towards the transformative innovation linked to AI may be attributed to the perspective from which these new technologies are observed, analyzed, and ultimately perceived (Bewersdorff et al., 2023). For example, it is not well-known the relation between generative AI and AI-powered tools; this makes people worried that AI could replace researchers in the future (Frey and Osborne, 2017; Colombo et al., 2019). Generative AI, indeed, is capable of generating new content, such as text, images, videos, codes, etc., starting from previous examples or instructions; AI-powered tools, on the other hand, by taking advantage of a user-friendly interface, make it possible to take advantage of the benefits derived from AI without necessarily possessing technical knowledge in computer science or engineering. In this way, even software that was not designed to help social research can be used by a well-prepared social scientist and identified as tools that can improve social research quality. While some researchers may be hesitant to incorporate AI-powered tools and techniques into their work, in recent years lots of social researchers have been exploring the potential of digital technologies (Punziano and Amaturo, 2018; Capogna, 2023; Rogers, 2013, 2024; Es-haghi, Anitescu, Rabczuk, 2024) and therefore among some of them there is a growing recognition of the potential benefits that these technologies can offer, such as enhancing data analysis, improving research efficiency, and the ability to uncover novel insights (Perkins and Roe, 2024; Markowitz, Boyd, Blackburn, 2024). Indeed, AI can offer numerous opportunities to researchers (Alowais et al., 2023). This disparity between the potential of AI and its actual implementation within the field of social research could be due to the realities that researchers face in their daily work, particularly those working in academia (Hajkowicz et al., 2023). Academics in the social sciences often face significant constraints, such as limited funding, heavy teaching loads, and pressure to publish in high-impact journals, since career progression in the academic domain is inextricably linked to the production of scholarly contributions, which in turn facilitate the attainment of national teaching

qualifications. Moreover, it is well established that researchers constantly navigate their daily lives amidst a myriad of challenges: they must balance a heavy workload, juggling teaching commitments, research deadlines, and navigating administrative bureaucracy on a regular basis (Bellè et al., 2015). These factors can make it challenging for researchers to dedicate sufficient time and resources to exploring new technologies like AI; indeed, even the adoption of AI-powered tools may require additional training and expertise that are not always readily available within the social science community. Consequently, some researchers may be hesitant to invest in these new technologies, preferring to rely on more familiar methods and approaches that are well-established within their respective fields; on the other hand, these circumstances create an opening for a specific application of AI as an assistant to researchers in various phases of their work (Chubb et al., 2021), not solely to conserve time and energy, but also for uncover novel insights that further the advancement of social research (Perkins and Roe, 2024). In order to support scholars who could benefit from the support of this software, this paper aims to provide a practical overview of the possible uses of AI-powered tools in social research.

2. METHODOLOGY AND REVIEW OF ARTIFICIAL INTELLIGENCE TOOLS

Based on these considerations, this study aims to develop a comprehensive classification of functionalities of AI software used in social research. This classification aims to categorize these tools according to the specific assistance they can provide at different stages of the research process (Corbetta, 1999; Dave and Patel, 2023; Tovar, 2023; Ali, 2024; Khalifa, Albadawy, Iqbal, 2024).

To facilitate the extraction of relevant AI tools, a multichannel strategy was employed. This strategy involved the use of various keywords[1] about the application of AI, which were input into leading search engines (such as Google, Bing, and Yahoo), academic databases (including Scopus, Web of Science, and Google Scholar), and prominent social media platforms (such as Facebook, Instagram, TikTok, and YouTube). The purpose of this approach was to systematically gather

[1] AI tools, Artificial intelligence tools, AI instruments, AI-powered tools, Intelligent System, LLM (Large Language Models), AI-driven software, AI-enabled applications, AI-assisted technology, AI automation tools, Intelligent automation, AI-based solutions, AI-powered platforms, AI writing assistant, AI-powered writing tools, AI-generated content, AI-powered document analysis, AI task automation, AI-powered scheduling, AI-powered email assistant, AI for workflow automation, AI transcription tools.

papers, tools, videos, and workshops from experts in the field[2], thereby elucidating the functions and potential of these AI tools.

Through this initial reconnaissance, approximately 350 AI tools were identified. Subsequently, through a manual coding of their functions, AI tools were organized into six overarching domains of expertise. These domains are pertinent to a wide range of contexts, encompassing both professional and everyday activities:

1. *Content Creation and Editing:* AI dedicated to content creation and editing refers to systems and algorithms designed to assist or automate the production and modification of multimedia content, including text, images, video, and audio. These AI systems can generate new works or optimize existing content, thereby enhancing the efficiency of the creative process.

2. *Analysis and Research:* AI systems focused on analysis and research are designed to process, interpret, and derive insights from large volumes of data across various domains. These AI tools leverage advanced algorithms, such as machine learning and natural language processing, to identify patterns, make predictions, and provide data-driven recommendations.

3. *Development and Innovation:* This type of AI, focused on development and innovation, is designed to facilitate the creation of new technologies, products, and processes. In development, AI assists in automating complex design tasks, improving efficiency in engineering processes, and enabling rapid prototyping. In innovation, AI enables the discovery of novel solutions, drives technological advancements, and fosters creativity by analyzing vast datasets and simulating potential outcomes. The integration of AI in development and innovation accelerates progress, reduces time-to-market, and supports cutting-edge research, making it a critical tool for advancing modern industries.

4. *Assistance and Support:* AI systems focused on assistance and support are designed to enhance human tasks by providing real-time help, automating routine activities, and offering personalized solutions across various domains. Utilizing natural language processing,

[2] "Experts" are defined as users on the main social media platforms who provide courses and publish content about the functionality and use of AI tools.

machine learning, and data-driven algorithms, these systems understand user needs and streamline workflows. In customer service, AI-powered chatbots and virtual assistants efficiently handle inquiries and solve problems. In professional environments, AI tools aid in decision-making, schedule management, and task automation, improving productivity and reducing human error. By integrating into everyday processes, AI enhances user experiences, optimizes operations, and facilitates seamless interaction between humans and technology.

5. *Commerce, Marketing and Finance:* AI systems focused on assistance and support are designed to enhance human tasks by providing real-time help, automating routine activities, and offering personalized solutions across various domains. Utilizing natural language processing, machine learning, and data-driven algorithms, these systems understand user needs and streamline workflows. In customer service, AI-powered chatbots and virtual assistants efficiently handle inquiries and solve problems. In professional environments, AI tools aid in decision-making, schedule management, and task automation, improving productivity and reducing human error. By integrating into everyday processes, AI enhances user experiences, optimizes operations, and facilitates seamless interaction between humans and technology.

6. *Leisure and Relationship*: AI systems focused on assistance and support are designed to enhance human tasks by providing real-time help, automating routine activities, and offering personalized solutions across various domains. Utilizing natural language processing, machine learning, and data-driven algorithms, these systems understand user needs and streamline workflows. In customer service, AI-powered chatbots and virtual assistants efficiently handle inquiries and solve problems. In professional environments, AI tools aid in decision-making, schedule management, and task automation, improving productivity and reducing human error. By integrating into everyday processes, AI enhances user experiences, optimizes operations, and facilitates seamless interaction between humans and technology.

Follow a specific example of use:

Table 1. AI domains mapping

AI domains	***Example of use in all fields***
Content creation and editing	Art, Audio, Avatar generation, Content Creation, Copywriting, Image Editing, Video Editing, Storytelling, Summarizer, Transcription, Presentation, Educational, Podcasting, Translation.
Analysis and Research	Digital Data Analys, Research, Search Engine, Spreadsheet.
Development and Innovation	Code Assistant, Build AI, Startup Tools.
Assistance and Support	Career, ChatBots, Plugins Tools, Coaching, Life Assistant, Healthcare, Legal Assistant, Productivity, Writing.
Commerce, Marketing and Finance	Business, Ecommerce, Marketing, Finance, Logo Generator, Gaming, Design, Real estate.
Leisure and Relationship	Fashion, Travel, Experiments, Gift Ideas, Astrology, Dating.

The AI tools corresponding to the six domains were subsequently analyzed using a content analysis as a survey (Losito, 1993; Faggiano, 2022), focusing on their functions and their hypothetical contributions to the various stages of research. Specifically, to provide both a summary of the types of AI applicable within research and subsequently a synoptic table outlining the specific indications regarding the stages where these tools can act as assistants, several variables were included in the analysis framework: *name, link, available version, monthly price, annual price, free functions, functions, common usage, hypothetical application within social research, support during the literature review phase, support in identifying hypotheses and research questions, support in the construction and testing of instruments, support during data collection, support during data analysis, support during dissemination, and researcher notes.*

Indeed, a key aspect of this work is the examination and placement of AI software within the various stages of social research (Dave and Patel, 2023; Tovar, 2023; Ali, 2024; Khalifa, Albadawy, Iqbal, 2024), aiming to establish an initial attempt at classification and to provide a reflection on the potential limitations and opportunities.

3. ARTIFICIAL INTELLIGENCE TOOLS APPLICABLE IN SOCIAL RESEARCH

Approximately 31% of the types of AI analyzed through the development of the content analysis framework were identified as potential assistants in academic social research. These findings enabled the construction of a mapping of AI types applicable within the context of social research. In this regard, a detailed overview of various AI tools designed for applications in social research is proposed. These tools are aimed at enhancing the efficiency, effectiveness, and creativity of research methodologies, thereby facilitating improved collection, analysis, and presentation of data. Each category of AI tool serves specific purposes, making significant contributions to the evolving landscape of social research.

The first category is *art tools*, which includes comics-based research and visual narratives. These innovative approaches promote creative methodologies that engage audiences effectively. Comics-based research utilizes visual storytelling to convey complex ideas, making findings accessible to a broader audience. By integrating imagery and sequential art, researchers can communicate outcomes more effectively. Visual narratives serve a similar purpose, allowing researchers to depict social phenomena visually. The integration of these art tools signifies a shift toward more inclusive and engaging research practices, enabling the participants to take an active role in the research process and the researchers to present data creatively and compellingly (Kuttner, Weaver-Hightower, Sousanis, 2020; Moretti, 2023).

The use of *avatars* is another critical development in social research. Avatars facilitate anonymity, especially in sensitive research contexts where participants may be uncomfortable revealing their identities. By generating virtual representations, researchers ensure confidentiality while promoting active engagement in the research process (Bente et al., 2010). This is particularly relevant for studies addressing sensitive topics, such as mental health. Furthermore, avatars encourage active participation by enabling individuals to interact in virtual settings, allowing for greater expression without real-world identity constraints. This sense of safety fosters richer data collection and enhances the quality of research outcomes. Furthermore, avatars can facilitate the active involvement of multiple subjects in social research (Zhang et al., 2020) and function as virtual tutors (Dede, 2009). Additionally, they can be employed for dissemination activities (Baker et al., 2020).

The *Build AI* category allows researchers to seamlessly integrate various research instruments, facilitating the development of customized

tools tailored to specific research needs. This integration enhances the research experience by streamlining workflows and reducing redundancy. The ability to generate personalized instruments helps researchers design tools that directly address their objectives, adapting to the dynamic nature of research methodologies (Chaudhry, Wajid, Hussain, 2023).

Chatbots provide guidance and support across various tasks, helping researchers navigate databases, retrieve information, and suggest relevant literature. Immediate access to assistance streamlines the research process, allowing researchers to concentrate on analysis rather than spending excessive time searching for resources. In addition to information retrieval, chatbots can manage schedules and remind researchers of tasks, ultimately enhancing productivity and efficiency throughout the research process (Schneider and Walther, 2019; O'Neill, 2021).

In the realm of data science, *code assistants* play a vital role in helping researchers create and refine programming code. These tools offer guidance on best practices, troubleshoot errors, and suggest improvements, reducing the learning curve for those less experienced in programming. By simplifying the coding process, researchers can focus more on analysis and interpretation rather than getting bogged down in coding complexities. This support accelerates the development of research tools and enhances the quality of analyses, which is critical in a data-driven research environment (Ray and Ghosh, 2020; Moussa and Ragan, 2022).

AI tools for *content creation* provide significant advantages for researchers involved in producing digital materials, including reports and presentations. By automating content generation, researchers save time while ensuring their materials are well-structured and effectively communicate findings. For example, these tools can convert complex data into visually appealing graphics or summarize key findings, allowing researchers to focus on narrative and interpretation (Kumar and Gupta, 2021; Gürhan-Canli, 2022; Singh and Kumar, 2024).

In the field of data analysis, AI tools *assist researchers* throughout the analytical process, encompassing data collection, cleaning, and analysis. By automating data collection, researchers can efficiently gather large datasets from diverse sources. AI-driven data cleaning tools identify and rectify inconsistencies, ensuring the reliability and accuracy of datasets. Once the data is cleaned, AI tools facilitate advanced analytical techniques, helping researchers extract meaningful insights from complex datasets. The application of AI in data analysis extends to digital

user behaviors, enabling researchers to analyze trends and derive conclusions that inform their research objectives. These tools are particularly useful for studies involving online users and digital data analysis. Researchers can also request AI to generate formulas based on inquiries, which can then be used in programs like Excel, R and Python (Khanna and Choudhury, 2022; Hussain, 2023; Ganaie and Aakanksha, 2023).

AI tools also play a crucial role in ensuring ethical compliance in social research. *Legal assistant* tools simplify the creation of privacy forms and legal documents necessary for primary data collection, such as interviews and surveys. By automating the drafting process, these tools help researchers adhere to legal and ethical standards while saving time and resources. This support is critical in protecting participants' rights and enhancing the credibility of the research (Gonzalez, 2023).

Another category of AI tools focuses on *cataloging and interrogating content*. Productivity and research tools facilitate the cataloging and querying of both online and traditional content. Researchers can catalog materials gathered from websites or papers and subsequently query them to collect, classify, visualize (e.g., through mapping), and analyze the content (Huang and Wu, 2022; Alfawzan and Qureshi, 2023). These tools are valuable not only for literature review phases but also for extracting texts and structuring analytical tools such as content analysis forms for inquiries or meta-analyses.

AI tools also enable document aggregation across multiple platforms, including *search engines* and specialized databases. This function allows researchers to access a broader range of literature and data sources. By automating document retrieval, researchers save significant time and effort, focusing more on analysis and synthesis. The ability to aggregate documents enhances literature reviews and helps researchers stay current with developments in their fields, ensuring their work is informed by diverse perspectives. In detail, search engine AI tools collect documents across various search engines, specialized platforms, and academic databases (Xie and Li, 2021; Huang and Wu, 2022; Jiang and Wang, 2022; Feng and Zhang, 2023).

AI tools for content synthesis are valuable for researchers seeking to distill complex information into concise summaries. These tools can process various content types, enabling effective summarization of papers and presentations. The ability to generate synthesis maps helps researchers visualize their findings and organize their thoughts, improving the clarity of their work. AI-driven transcription tools also enhance efficiency by converting audio or video content into written text.

This capability is particularly useful for transcribing interviews and lectures, allowing researchers to document spoken content without the burdensome task of manual transcription. In particular, AI summarizer tools are designed for synthesizing various content types (written, audio, video) to summarize papers, presentations, and generate maps or summary diagrams (Liu and Li, 2022; Radev and Fan, 2022). While transcription tools are useful for transcribing interviews, lectures, or conference presentations from any content type (written, audio, video) (Khan and Yang, 2022; Gao and Li, 2023).

Finally, AI tools for *translation and writing* assistance significantly enhance the quality of research output. Translation tools enable researchers to access literature in multiple languages, facilitating collaboration across linguistic barriers. Writing assistance tools help refine texts, correct errors, and improve overall writing quality, leading to clearer, more impactful research outputs. The combination of translation and writing assistance empowers researchers to produce high-quality work that resonates with a broader audience, enriching the field of social research. More specifically, translation tools provide simultaneous translation for any type of content (written, audio, video), proving beneficial in various research stages (Hassan and Haffari, 2021; Gao and Li, 2023). Instead, writing AI tools assist in writing, proofreading, and drafting, enabling the implementation or correction of written texts and the reformulation of notes and ideas (O'Reilly and Maher, 2022; Kumar and Singh, 2023; Zou and Zhang, 2023).

4. AI-POWERED TOOLS FUNCTIONS: A PROPOSAL OF CLASSIFICATION AND APPLICATION IN SOCIAL RESEARCH

The mapping presented shows that there is numerous software whose functions can help social researchers in their work; however, their use may require advanced technical skills (e.g. those related to programming) and this can make these tools difficult to access. For these reasons, it was decided to classify the functionality of only AI-powered tools, thus excluding software that required technical training (different from that typical of a social researcher) to be used. The choice to focus on AI-powered tools derives in part from the difficulty for social researchers to engage in parallel training on computer programming and on the other hand from the possibility of exploiting the advantages deriving from this type of technology thanks to the facilitated usability of these tools that do not require programming skills.

Based on the results of the analysis conducted to map the AI tools that could be used in the social research, it was indeed possible to identify 57 AI software and 4 macro-categories of functions useful in the different research phases: Citation Assistance, Communication Assistance, Data Analysis Assistance and Data Extraction Assistance.

4.1. Citation Assistance

This macro-category includes functions that have in common the possibility of helping the researcher in identifying citations to be included, both because some software tools provide libraries of open-source papers, and because others suggest papers to read based on what is being written, allowing an integration of the literature starting from the researcher's intuitions relating to the research problem instead of relying only on the preliminary study on the topic of interest. In addition, the functions of this macro-category include the visualization of the rankings of published contributions and the connections between different papers, as well as verifying the context of a citation. In this way, it is possible to improve the quality of one's scientific contributions because one can achieve a more accurate epistemic genealogy of the investigation problem and verify the correctness of one's own and others' citations, thus avoiding incurring an erroneous and overgeneralized dissemination of supposed research findings (Horbach et al., 2021). Of course, these functions can be particularly useful in the literature review and research dissemination phases, but also as an aid in conducting analyses such as a systematic literature review or network analysis.

4.2. Communication Assistance

This macro-category encompasses functions that have in common the possibility of helping the researcher to overcome problems related to communication barriers, whether linguistic, temporal or cultural, as they allow to generate personalized messages (Shalom, 2024). These are therefore both tools that allow researchers to correct their own or others' texts from a grammatical or formal point of view (also through autocomplete suggestions), and to translate them into written or oral form. In addition, with some tools it is also possible to generate avatars or short videos in different languages. These functions can be useful both in the data collection and dissemination phases, as they allow the researcher to reach a wider audience more easily, regardless of the languages spoken by the researcher. Similarly, the use of avatars instead

of real people used within video stimuli or as interviewers can avoid some reactions in the interviewees due to the imbalance of status between them and the interviewer (Pitrone, 2009). Finally, the possibility of relying on language tutors also makes it possible to check how comprehensible a question is in a questionnaire or interview outline, a function that is ideal in the construction phase of survey tools since it allows them to be pre-tested by simulating the participants' answers (Grossmann et al., 2023); moreover, this can also be useful to refine the difficult identification of the items for the evaluation rubrics (Capozza, 2024; Tremblay and Fraser, Bertrand, 2017).

4.3. Data Analysis Assistance

The functions that fall into this macro-category help the researcher in the analysis of both numerical and textual data: the software that can be used for this purpose can support in the analysis of voice conversations, in categorizing text files and in the generation of Excel formulas. Although these tools are specialized in supporting data analysis, they can also be useful for other phases of the research. For example, the filter options can help a literature review starting from a matrix containing a list of papers. Moreover, some tools help in data cleaning, while others can provide a guide to perform more complex analyses on software such as Python, R or SPSS.

4.4. Data Extraction Assistance

This macro-category includes functions such as automated transcription (from audio or visual content) and synthesis (textual or graphic) of document content. These features are often accessible thanks to AI-powered tools that allow researchers to interact with files.

Data extraction assistance can be useful at different stages of research. For example, the possibility of obtaining detailed summaries can facilitate the work of the researcher when reviewing the literature. Similarly, by interacting with documents it is possible to request specific information within scientific papers and this can be particularly useful for research such as systematic literature review, or to identify key points within interviews in order to understand which items to include in a content analysis sheet. In general, the extraction of data from audio, visual or textual sources can be of great support for content analysis, whether one intends to carry out a more hermeneutic or a more standardized type of analysis (Losito, 1993). In fact, in addition to the aforementioned

search for specific information, software that synthesizes content is often also able to transcribe what is said during an audio or video recording and even to do so at the very moment of data collection. The union of these functions can therefore, for example, immediately return the transcription of an interview; this allows on the one hand to request a summary of the same at its end, in order to have material to support the drafting of an ethnographic note (Gobo, 1999); on the other hand, it can help researchers to double-check the answers obtained during the interview, so as to verify the presence of interesting content for the purposes of the investigation objectives and on which to ask in-depth questions. Graphical summaries can be particularly helpful in linking theory to observation and research practices (Kane and Trochim, 2009). The production of graphs and tables can also be useful in the dissemination phase, for the inclusion of these images in scientific papers or within slides. In addition, some tools can generate PowerPoint presentations for conferences, seminars or academic lectures from the upload of a pdf file. For the same purpose, functions such as transforming a pdf file into key questions or extrapolating textual content from images and videos could be used. Finally, data extrapolation can also take place within excel matrices, which facilitates cleaning operations and the choice of specific graphical representations.

There are also some tools (such as Monica.ai) which not specialized in these macro-functions, but which a basic level can still provide assistance with respect to these macro-categories, embracing even more than one if not even all. In general, transversality is a typical feature of AI software; For this reason, as can be seen in the synoptic table below, each software can fall into several macro-categories, as well as provide assistance in the different phases of social research, which have been grouped as follows:

I. Literature review: it refers to all the preliminary phases of social research related to the reading of contributions on the topic of investigation, useful for delimiting the research problem, identifying the questions and hypotheses from which to start, as well as the operational definition of the concepts of interest.

II. Construction and testing of survey tools: the tools that can give support in this phase are those that provide practical help to the researcher, who thanks to the possibility of helping him in the construction of an ad hoc platform for data collection or in verifying the correctness and comprehensibility of the items to be proposed to the interviewees.

III. Data collection: in this case, the focus is not on the tool that allows the collection of data of interest, but on the functions that

allow the researcher to concretely obtain the data to be analyzed and interpreted.

IV. Data analysis: includes not only quantitative and qualitative numerical or textual analysis, but also the cleaning of matrices or corpora and the interpretation of results.

V. Support for dissemination: finally, what emerged and interpreted is disseminated through papers, conferences, lessons, etc. All this is part of this last phase.

Table 2. AI-powered tools classification and uses[3]

AI Tools	***Macro-category***	***Phase 1***	***Phase 2***	***Phase 3***	***Phase 4***	***Phase 5***
Kipper.ai	DE			✓		✓
Coconote.ai	DE	✓		✓		
unstuckstudy.com	DE	✓		✓		✓
Paraphrase Online	CO					✓
Quillbot	CO		✓	✓		✓
Grammarly	CO	✓				✓
Heygen	CO			✓		✓
Fireflies.ai	DA, DE		✓	✓		
ChatPDF	DE	✓			✓	✓
Monica.im	MIX		✓			✓
Mindgrasp	DE			✓		✓
Scribe	DE			✓		✓
Formulabot	DA				✓	
mymap.ai	DE	✓			✓	
PopAi	DE	✓				✓
Rapid Journal quality check	CI	✓				
ASKyourPDF	DE	✓		✓		
Dende.ai	DE	✓				
Bigguru	CI					✓
Perplexity.Ai	CO	✓		✓		✓

[3] CI = Citation Assistance, CO = Communication Assistance, DA = Data Analysis Assistance, DE = Data Extraction Assistance, MIX = Multiple Assistance

AI Tools	*Macro-category*	*Phase 1*	*Phase 2*	*Phase 3*	*Phase 4*	*Phase 5*
Vidnoz Flex	CO			✓		✓
Compose AI	CO					✓
SelectText	DE			✓		
Scholarcy.com	DE	✓				
Otter.ai	DE					✓
Chatdoc.com	CO, DE	✓				
Jenni.ai	CI, CO	✓				✓
WPS Office AI	MIX			✓	✓	✓
GPTEXCEL	DA	✓			✓	
Consensus	DE	✓				
Paperpal	CO					✓
Julius	DA				✓	
research rabbit	CI	✓		✓	✓	
SciSpace	CI, CO	✓				✓
Audemic	CO	✓	✓	✓		✓
mapthis ai	DE	✓				✓
Pdf.ai	DE	✓	✓	✓		✓
numerous.ai	DA, DE		✓	✓	✓	✓
ossa.ai	CO		✓			✓
afterword.tech	DE	✓	✓	✓	✓	
sharly.ai	DE	✓	✓	✓		✓
llamacoder ai	MIX		✓	✓	✓	✓
lens.org	CI	✓				✓
anna's archive	CI	✓				
Rayyan	DA	✓			✓	
Scite	CI	✓				
Connected Papers	CI	✓	✓	✓	✓	✓
Litmaps	CI	✓				
Semantic Scholar	CI	✓				
Humanize	CO		✓			✓
Copy.ai	CO					✓
Praktika	CO		✓			✓
UnRiddle	CI, DE	✓		✓		✓

AI Tools	*Macro-category*	*Phase 1*	*Phase 2*	*Phase 3*	*Phase 4*	*Phase 5*
Power Drill	DA				✓	✓
Sourcely	CI	✓				
Heuristi.ca	DE			✓	✓	✓
SciSpace	MIX	✓		✓		

Starting with the content analysis sheet used to analyze these 57 tools, it was decided to also calculate the average prices (in euros) divided by macro-category of functions and research phase. In fact, 45 tools have a free trial version. However, only 10 are unpaid and 31 have free features exclusively.

Table 3. AI-powered tools average price by macro-category and research phase

	€/month	**€/year**
Citation Assistance	15	97
Communication Assistance	20	165
Data Analysis Assistance	22	227
Data Extraction Assistance	14	124
Multiple Assistance	18	150
Phase 1	15	122
Phase 2	16	147
Phase 3	15	129
Phase 4	16	166
Phase 5	17	149

What is evident is the economic commitment required of the researcher, which however can imply a gain in terms of time saved and quality of research. The use of AI software makes it possible to speed up and standardize many operations, essential aspects in a world of research that always requires an increasing number of contributions to be published and projects to be carried out simultaneously due to the *publish or perish logic* (Colarusso and Giancola, 2020). In addition, the fact that the various steps and prompts are tracked facilitates both teamwork - as operational definitions and tasks become clearer - and the transparency of the work carried out and the technical reproducibility of the research process. However, some less specialized software (e.g. ChatGPT) does not allow the reproducibility of the output. Finally, the use of this software opens the door to new epistemological reflections, as they act as mediators in

the researcher-interviewee and researcher-tool relationship. In particular, the resulting human-computer interaction leads to two main problems: the gulf of execution and the gulf of evaluation. The first one represents the gap between the users' intentions and the output provided by the computer: if it occurs, it means that the user has not been able to give clear instructions to the software. Similarly, the gulf of evaluation is the gap between users' expectations and computer's presentation (Sharples, 1996). From this point of view, it is important that researchers are able to provide AI-powered tools with well-defined prompts, to the point that it would be correct to talk not only about prompt engineering as a new digital competence (Korzynski et al., 2023), but also about prompt providing. Moreover, it is indispensable to remember that AI software could produce some errors, thus their outputs have to be checked by the researcher.

5. CONCLUSIONS

The adoption of AI in social research has been limited by doubts about its ethical and quality implications (Crawford, 2021; Prem, 2023; Bankins and Formosa, 2023). Nevertheless, remembering the active role of the researcher and the supportive role of this software, the perplexity surrounding AI could give way to familiarity and utility, ultimately enriching researchers' lives as already happened for other new technologies (Smiley and Fisher, 2022), even though there could be not only positive but also negative implications of the widespread use of AI on the academic and research fields (e.g. an even higher number of publications required to advance in one's career or a decreasing of the quality of the scientific production due to a superficial and careless use of AI-powered tools). In this journey from confusion to integration, it is essential to embrace the learning curve and remain open to the possibilities that these advancements bring. Just as the technologies of yesterday have been adopted in everyday life, AI will probably find its place in the world shaped by the innovations of tomorrow.

Nevertheless, as already highlighted in the text, nowadays there is still a strong distrust of the use of AI due to three main reasons:

- ethical and safety issues (Ma and Jiang, 2023): the debate on the ethics of the use of AI in the social sciences is crucial in the current context of rapid technological evolution. Concerns about privacy, fairness, transparency, and data control have generated in-depth

discussions about protecting individuals involved in AI-powered social research (Boyd, Crawford, 2012);
- the use of AI-powered tools could be risky due to the now well-known hallucinations produced by LLMs (Ferrara, 2023);
- some AI-powered tools, especially the less specialized ones, when faced with insufficiently structured data and prompts could raise some problems related to the reproducibility of the exact same result.

However, as has happened in the past with other technologies considered innovative initially debated for their ethical implications, industry and academia have demonstrated the ability to address these issues. Furthermore, the use of AI-powered tools does not cancel the role of the researcher, but they reshape it as a bias hunter or AI-data validator (Grossman et al., 2023), reducing the problem of hallucinations.

On the contrary, as shown in this paper, AI can strongly help researchers for three main reasons:

1. To enhance the robustness and objectivity of scientific product evaluations: AI-powered analysis tools can provide assessments of research outputs not affected by the researcher's subjectivity, as proposed for the educational setting (Owan et al., 2023). For example, in this context, AI-powered tools can be used to enhance check for plagiarism or to check whether an empirical basis has also been used in other papers.
2. To expedite the production of scientific outputs: thanks to AI, it is possible to process large amounts of information in a much shorter time than traditional methods, thus offering greater predictive capabilities and a better understanding of complex social models (Mittelstadt et al., 2016).
3. To facilitate the reconciliation of researchers' work-life balance by automating administrative tasks, streamlining workflow, and providing personalized time management support: the quality of life of university researchers suffers from work rhythms and, above all, from the difficult reconciliation of the work domain with other life domains such as leisure and the domestic-family domain (Matrella, 2024). AI could help researchers save resources, thus making their daily routine less tiring and stressful (Loureiro, Bilro, Neto, 2022; Samtharam and Baskaran, 2023).

These reflections suggest that the perplexities that lead to a limited use of AI in social research can be abandoned by remembering that human-computer interaction can be used to empower people, if used with ease (Sharples, 1996): a wrong usage could lead researchers to reduce the

attention paid to the research process; on the contrary, AI-powered tools should help researchers in increasing research quality, offering them the possibility to not waste time and energy and to allocate the saved resources in the most important aspects of their work. However, the analysis conducted highlighted a major obstacle in the implementation of these tools by researchers, namely their cost, especially considering the cuts to the world of research that have affected the scientific community and in particular Early Career Researchers (Wöhrer, 2014), who are often those with a higher digital literacy. Moreover, it is important to remember that only people with higher social background can make the most of the opportunities and resources offered by new technologies (Parziale, Cavagnuolo, Matrella, 2024). As a result, rather than worrying about how ethical or reliable it can be to do research with AI, the problem of accessibility may soon arise, both in terms of money, expertise and capital enhancement.

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