



UNIVERSITÀ
DEGLI STUDI
DI MILANO

Guidelines

AI
RESEARCH



Guidelines for Beneficial Use of AI in Research

The advent of Artificial Intelligence (AI) in the world of research is exciting and is happening at an unprecedented pace. Institutions and researchers have found themselves having to deal with the possibilities offered by a range of very powerful tools without having, in many cases, full awareness of the implications that adopting such tools in daily activities may entail.

This is why the University advises its research staff to learn about, exploit, and systematically implement the best existing tools while, at the same time, urging them to always do so while respecting three fundamental principles that must characterize the entire process of using these tools:

- responsibility,
- transparency, and
- respect.

1. Use Cases and Guidelines

USE OF AI SYSTEMS TO CREATE DOCUMENT SUMMARIES AND ABST

The use of AI systems to create summaries of particularly long and complex documents and for generating abstracts is permitted. However, always pay particular attention to the following three aspects:

Control of final work accuracy: it is essential to always carefully verify, word by word, the information generated. AI can “invent” data or oversimplify or erroneously simplify complex concepts or generate concepts divergent from the intentions of those provided as input, or even - especially in the case

of abstracts of scientific articles - give prominence to more marginal aspects compared to central ones. If the original document contains numbers, technical data, or experimental results, it is always essential that they are reported correctly.

Verification that there are no excessive generalizations or omissions: scientific, legal, and academic works often contain fundamental details (think of all the

complex nuances of legal language). An automatic summary could overlook relevant nuances.

Verification that appropriate technical language is maintained in the final work: AI can oversimplify or use generic, imprecise, inadequate, or semantically ambiguous language. If preparing an abstract for a journal or conference, it is necessary to always review the style and terminology used to ensure they conform to the author’s

intentions and the language of the discipline (think of *tortured phrases*), as well as the specific textual genre. It is important to be aware of the risks of text flattening that arise when human creativity is removed from text generation, especially given that AI outputs are the result of probabilistic calculations based on statistical models.

USE OF AI SYSTEMS TO GENERATE BIBLIOGRAPHY AND VERIFY SOURCES

This is a very delicate area, given the possibility that generative AI systems may invent references, notes, or citations. This entails the need to always verify, individually, each reference, and may therefore involve a critical cost/benefit ratio. The use of AI for these activities must therefore be carefully evaluated.

USE OF AI SYSTEMS FOR TRANSLATIONS, LINGUISTIC REVISIONS, AND TEXT IMPROVEMENT (including improvement or linguistic revision of research project texts)

In compliance with article 2 of the Decalogue “Governing Artificial Intelligence at the University”, when interacting with AI systems it is essential to ensure the protection of personal data and data governance and, in the case of research projects, also of the project idea.

In any case, the text produced by AI must be subjected to human supervision in order to verify its correctness and linguistic appropriateness. In the specific case of translations, and especially when these concern or constitute the very object of scientific production, it is important to verify them analytically and, where appropriate, include a detailed note of the tools and ways in which AI was used. In general, it is always good to keep in mind that AI provides solutions not only at the lexical level but also at the textual level, according to its own logic, based on its own algorithms, which could deviate from the intentions of the text author, in addition to proposing inappropriate stylistic choices.

It is therefore advisable to reason about the proposed solutions and intervene, not only at the conceptual and lexical level but also textually, taking into account the implications at the connotative and pragmatic level.

USE OF AI SYSTEMS IN COMPUTER SCIENCE FOR WRITING PROGRAM FRAGMENTS, FOR THEIR REVISION, FOR IDENTIFYING ERRORS (BUGS), FOR GENERATING UNIT TESTS, AND AS SUPPORT FOR TARGETED OPTIMIZATION

It is possible to use AI systems for the generation, optimization, and revision of previously developed code, provided that confidentiality, intellectual property, and licenses are protected when applied to an original document.

It is not appropriate to share portions of code protected by license and/or intellectual property with AI, especially access credentials or API keys. A purely instrumental use of AI is recommended, employed for support activities and supervised by an expert user.

When AI is used for code writing, it is recommended to report within the code itself or through appropriate repositories (e.g., *Github*) information relating to the AI tool used such as, for example, the tool name, version, provider, date of use, and purpose for which it was employed. The development team or developer still has full responsibility for code release.

USE OF AI SYSTEMS FOR CREATING SYNTHETIC DATA

The use of AI systems to generate synthetic data intended for algorithm training, statistical analysis, or software testing is permitted. The methods used to generate synthetic data must always be reported when their use leads to the production and publication of data or information. Additionally, the publication of data and information produced with the aid of synthetic data must include a comparison with real data through performance evaluation and *fairness* analysis. It is essential to report the generation date of the synthetic dataset and monitor the publication of new relevant information that may improve the accuracy of previously produced synthetic data.

USE OF AI SYSTEMS FOR DATA ANALYSIS

Machine learning models and neural networks can be used for data analysis, particularly to build analysis pipelines under the guidance and supervision of an expert who is able to establish the methods, criteria, and metrics that are most appropriate to use depending on the specific dataset under examination.

In any case, data protection, operation traceability, and regulatory compliance must be guaranteed throughout the entire analysis process. The dissemination of results derived from analysis with AI tools must include details relating to the AI tool and any details regarding the dataset used for algorithm training, testing, and validation.

USE OF AI SYSTEMS FOR STATISTICAL ANALYSIS

AI can be used to perform descriptive and inferential, exploratory and predictive statistical analyses. However, such analyses must be conducted within correctly specified models and under the supervision of expert personnel. The interpretation of results must take into account the underlying statistical assumptions and the context of the analysis. The use of AI does not exempt from scientific responsibility in data evaluation. Every inferential output must be traceable, justified, and communicated with transparency.

USE OF AI SYSTEMS FOR PEER-REVIEW ACTIVITY OR EVALUATION OF PROJECTS OR MANUSCRIPTS

It is not recommended to use AI systems for review activity or evaluation of project proposals. Before using them in review activity, the policies of individual publishers regarding the use of AI systems for the aforementioned purposes must be verified and respected.

It is important to consider that AI models are trained on defined information; therefore, they may have a *bias* regarding the application context. If a reviewer uses them, they must report all information regarding the AI tool used and the purpose (e.g., linguistic revision or typing errors). The reviewer assumes full responsibility for any errors or inaccuracies introduced by AI.

It is important that authors respect *the guidelines on AI use* for peer review that each journal now makes available. In case of absence of indications from the journal, the use must be declared, together with the description of how AI was used. A further point of attention is represented by data confidentiality especially if not yet published (e.g., as *preprint*). In general, however, at the current state there are too many *biases* in training data and hallucinations produced by AI tools; therefore, their use for such a delicate process as peer review is strongly discouraged.

USE OF AI SYSTEMS FOR GENERATING IMAGES, AUDIO, VIDEO

All multimedia material produced through AI systems must be marked and identified. Before producing multimedia material, it is necessary to verify that the model used was not trained on material protected by copyright. If the work portrays recognizable people or reproduces their voice, written consent is needed that authorizes the use of such features, since unauthorized dissemination may constitute a privacy violation or, in the most serious cases, a crime of impersonation.

It is essential to check that the produced object does not contain representations or information that could compromise its meaning. In the credits or related documentation, the model name, version, date of use, and purpose of the content should be indicated. It is appropriate to preserve the prompts, parameters used, and version of the model used, treating each tool update as a software dependency change with relative *changelog*.

USE OF AI TOOLS FOR OUTREACH/THIRD MISSION ACTIVITIES (e.g., creation of materials for websites and social networks, podcasts)

AI tools can accelerate the production of multimedia materials intended for the University's public communication, respecting the accuracy and integrity of the message to be communicated. Before publishing content generated or refined with AI support, human verification must be performed. It is recommended to verify that the stylistic guidelines that identify a *brand* (in this case the institution) are respected. Communication or third mission staff remains responsible for publication. Every content produced with AI support must be subjected to an editorial approval process, with post-release monitoring to promptly correct any inaccuracies or unwanted community reactions.

held, even in a possible judicial setting, responsible for the final product. This entails the need, at all times, for an approach that is not only responsible but also critical, especially toward possible biases, hallucinations, and inaccuracies generated by AI systems.

At the same time, it will be necessary for the researcher to understand, before using it, that AI cannot be considered, from a legal and research ethics standpoint, either "author" or "co-author"

of the final product, since it is a tool that has neither consciousness nor responsibility. The objective is to ensure that research staff consider as much as possible whether the **cost-benefit ratio** is convenient and useful in the decision to use AI tools in their research activity and understand at all times that they are solely responsible for their work, regardless of the tools they used to produce it and the levels of automation followed.

2. Best Practices

2.1. Responsibility

Throughout the entire research process, from the first hypotheses, theories, and brainstorming to the publication of works, from team management and organization to activity monitoring, the researcher (especially if leading a research team) must at all times

understand that they are fully **responsible** for all results produced by the tools used, regardless of AI use or not. Given the centrality, in the European regulatory system, of necessary supervision by a human being/natural person, the researcher will always be

2.2. Transparency

It is useful to reiterate three themes that are the essence of the research process itself and its history and tradition, especially in the scientific field, namely transparency of activities carried out, reproducibility and replicability of results.

The researcher who uses AI systems must be **honest and transparent** in the development, conduct, reporting, and communication of research activities, in order to achieve the important objectives of correctness and impartiality, always declaring AI use (e.g., in bibliographic research, data analysis, translation, synthesis, text rewriting). The objective is that at all times and in all research, there is a

transparent and complete indication of which tools were used in the research process and how their use conditioned (or not) the entire research process.

In observance of principles of transparency and research ethics, it is also appropriate to declare what were the inputs and outputs of AI systems, while remembering how generative AI produces different outputs even from the same input, with text generation having a purely probabilistic nature.

Within the limits of possibility, and if technically feasible, replicability of procedures and results must finally be guaranteed.

2.3. Respect for research integrity and ethics, for data protection, and for others' intellectual property

It is fundamental to guarantee respect for a range of principles and rights that are fundamental to ensuring the conduct of ethical, correct, and legally

sustainable research activity. First and foremost, AI use must occur, at all times, with maximum respect for every component of one's scientific

community, for authors, for colleagues, for research group participants, for readers, for the entire cultural and interdisciplinary ecosystem, for one's institution, for traditional rules, and for the environment. To this end, detailed knowledge of the University's AI Decalogue rules is required; these rules apply to any type of research regardless of the tools used.

The idea of respect then includes the need to correctly treat information entered into AI systems by respecting both privacy and data protection. Avoiding inserting particularly sensitive

data into AI systems achieves both the objective of protecting the University's industrial secrets (underlying important research) and the rights and freedoms of people to whom any personal and sensitive data may refer.

Finally, particular attention must be paid not to violate others' intellectual property rights, always verifying that content provided to AI systems is not owned by third parties or attributable to other authors. In this area, attention to avoiding cases of plagiarism or, moreover, artificial manipulation of results becomes essential.

3. Improper Uses and Risks

To ensure the integrity of research activity and products, all uses of AI that compromise the principles of responsibility, transparency, and respect, that violate data protection regulations, or that damage research quality are prohibited or strongly discouraged. Every use must be traceable, conscious, transparent, and supervised.

It is high risk to provide information that defines the innovative nature of inventions or know-how susceptible to protection through intellectual property rights: training AI systems could result in dissemination of aspects of innovation intended to be protected, compromising its protection.



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