

# Special Issue NL4AI 2022: Workshop on Natural Language for Artificial Intelligence

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**Abstract.** The 2022 edition of NL4AI was co-located with the 21st International Conference of the Italian Association for Artificial Intelligence (AIxIA 2022) and took place on November 30th in Udine, Italy. The call for papers attracted 17 submissions by 52 different authors from Italy (44), the UK (2), Algeria (4), and Germany (2). After the review process, 13 of 17 papers were accepted for publication (acceptance rate 76.47%). In terms of topics, the contributions to the workshop span from pure NLP works to broader proposals bridging NLP with other AI applications. Among the accepted articles, we selected two that we considered the most relevant and inspiring for the Italian Natural Language Processing and Artificial Intelligence communities. The authors of these papers have been invited to extend their contribution to this volume, creating an exclusive venue to provide visibility to their egregious work.

Keywords: Natural Language Processing, Artificial Intelligence, NLP Frontiers, NLP Challenges, Editorial

## 1. Editorial

Natural Language Processing, Understanding, and Generation have emerged as pivotal research areas within the field of Artificial Intelligence (AI). They encompass various scientific and industrial interests, making it an essential focus for researchers and practitioners alike. Natural Language lies at the intersection of Learning, Knowledge Representation, and Cognitive Modeling, creating a fertile ground for exploration and advancements. Recent AI achievements have demonstrated the extraordinary impact of Human Language Technologies on very complex tasks. The applications of linguistic modeling, processing, inference, and generation are vast and hold significant potential. However, despite the significant progress, Natural Language Processing, Understanding, and Generation remain an active and vibrant research topic. Their interdisciplinary nature enables cross-fertilization with other areas like Cognitive Computing, Robotics, and Human-Computer Interaction. The combination of AI and NL aligns with the core mission of the Italian Association for Artificial Intelligence (AI\*IA) and

reflects the organization's dedication to advancing knowledge and understanding in the field. In the context of AI, NLP plays a crucial role in automation, and learning across various intelligent tasks, forming the backbone for Social Behaviors advancements. Exploring the diverse and promising interactions between Natural Language and other domains is crucial for advancing AI studies. The interdisciplinary nature of the subject fosters collaborations between various domains, making it a vibrant and evolving research area. By exploring the diverse interactions between Natural Language and other fields, researchers can unlock new opportunities and drive further progress in AI. The sixth workshop on Natural language for Artificial Intelligence (NL4AI 2022) engaged many trending topics worth of interest, including fact-checking, social media analysis, data analysis, natural interfaces, business process modeling, conversational agents, speech recognition, human-robot interaction, language modeling, and bias detection in AI systems. Moreover, the trending topic of text generation through Large Language Models (LLMs) has raised high interest among companies and users to exploit natural language ap-

proaches supporting decision-making. Such systems can automatically generate content for news articles, product descriptions, weather reports, and sports summaries. This can be particularly useful for generating personalized content at scale or in situations where human content creation is resource-intensive. Language models can be used to convert complex data and statistical information into easy-to-understand narratives or visual presentations. This enables non-technical users to gain insights from data without needing to interpret raw numbers or charts. These new research directions are our primary goal to foster natural language as a trending research area with a strict relationship among the communities of AI, cognitive sciences, and linguistics. In this special issue, we welcome two long papers as extensions of selected papers presented at the NL4AI 2022 workshop [1].

In particular, we focus on the work proposed by Hromei et al. [2] that discusses the improved interaction between humans and robots, by means of a Transformer-based architecture that combines inputs with a linguistic description of the environment. The research paper focuses on the importance of ensuring that virtual assistants and robotic platforms can understand human language effectively. With the increasing prevalence of these technologies in daily life, it is crucial for virtual assistants to comprehend commands and requests to fulfill user needs naturally. This is especially critical in scenarios involving robotic platforms performing sensitive or medical tasks controlled by speech. The paper highlights the potential of natural language as a means of controlling these platforms, enabling them to learn movements and actions through vocal instructions. While domestic robots are currently used for tasks like cleaning and cooking, they face complex challenges such as self-localization, object recognition, physical manipulation, and meaningful interaction with humans. The paper introduces the Grounded language Understanding via Transformers (GrUT) approach, which utilizes a Transformer-based architecture (e.g., BART) to generate linguistic interpretations of utterances. The linguistic interpretation is consistent with the Frame Semantics and can vary based on the disposition of objects in the environment. The paper presents an experimental evaluation comparing language-specific pre-trained Large Language Models (LLMs) and multilingual models for grounded interpretation. The results of the evaluation are discussed, providing insights into the accuracy and effectiveness of these approaches in supporting multilingual grounded interpretation.

As a second work worth of interest, we focus on the one discussed by La Barbera et al. [3]. The authors proposed a hybrid human-in-the-loop framework for fact-checking that relied on a combination of AI, crowdsourcing, and experts. Currently, fact-checking relies heavily on trained experts, which is not scalable. To overcome this limitation, the paper proposes a hybrid human-in-the-loop (HITL) framework that exploits a combination of both crowdsourcing and experts. One possible approach is a pipeline model, that allows for quick and automatic labeling by AI, followed by more accurate evaluations by the crowd and in-depth investigations by experts. The pipeline model minimizes costs by involving experts only for a limited number of statements. However, the pipeline model lacks feedback among components. An alternative approach suggested is a blackboard architecture, where each component is an autonomous agent accessing a central repository. This approach requires synergy between components and the division of classification tasks into atomic sub-tasks to leverage each component's strengths. The proposed HITL framework addresses these limitations of current fact-checking approaches by combining the capabilities of AI, crowdsourcing, and experts, offering a starting point for future research in effective and scalable fact-checking.

The aforementioned papers were originally submitted to the NL4AI 2022 Workshop and received very positive reviews. We invited the authors to submit extended versions of their papers based on the novelty and interest of the topic, the positive evaluation from the reviewers, and the quality of the writing.

## References

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