,

ISWC 2024 Special Session on Harmonising Generative AI and Semantic Web Technologies

Reham Alharbi[†], Jacopo de Berardinis[*,†], Paul Groth[‡], Albert Meroño-Peñuela[§], Elena Simperl[§] and Valentina Tamma[†]

[1]*Department of Computer Science, University of Liverpool, UK*
[2]*Informatics Institute, University of Amsterdam, Netherlands*
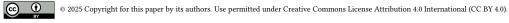[3]*Department of Informatics, King's College London, UK*

This volume presents the proceedings of the Special Sessions on "Harmonising Generative AI and Semantic Web Technologies: Opportunities, Challenges, and Benchmarks", held on November 13, 2024, as part of the International Semantic Web Conference (ISWC) 2024.

ISWC is a leading venue for research on the Semantic Web, knowledge graphs, and web data. The Special Sessions were introduced this year to facilitate focused discussions, encourage participation, and build community around emerging topics. This year's focus was the intersection of Generative AI and Semantic Web technologies, addressing their synergies, limitations, and future directions.

The sessions aimed to advance research in this area by fostering discussions and collaborative problem-solving among researchers, practitioners, and industry leaders. A key focus was the integration of Large Language Models (LLMs) into knowledge engineering pipelines supporting the lifecycle of ontologies and knowledge graphs (KGs). This integration presents new opportunities for knowledge representation, reasoning, and data interoperability. The sessions were structured around three key themes, explored in a 90-minute slot. Each theme addresses a critical aspect of harmonizing Generative AI and Semantic Web technologies. The three themes for this year were:

1. **Benchmarking & Reproducibility in Generative AI for Knowledge Engineering:** This theme focused on the crucial need for robust evaluation methods and standardised benchmarks to assess the performance of LLMs in knowledge engineering tasks. The presentations and discussions in this slot highlighted the challenges of evaluating tasks like ontology construction, validation, and population, and explored the development of suitable datasets and metrics.

2. **Bridging the Gap: Building Knowledge-Enhanced Generative AI:** This theme delved into the core challenge of integrating structured knowledge from the Semantic Web with the powerful language processing capabilities of LLMs. The contributions in this slot showcased innovative approaches to leveraging knowledge graphs for improving the accuracy, consistency, and explainability of Generative AI systems. Key topics included using knowledge graphs to improve prompts or as a retrieval resource for Retrieval Augmented Generation (RAG), or how to build knowledge graph extraction pipelines with GenAI.

3. **Spotlight on Applications and Success Stories in Generative AI and the Semantic Web:** This theme provided a platform to showcase the practical impact and real-world applications of combining Generative AI and Semantic Web technologies. The presented case studies demonstrated the power of this synergy in diverse domains, such as scientific question answering, e-learning, and conversation generation, amongst others.

Each slot adopted an interactive format designed to foster collaboration and knowledge sharing. The slot started with concise presentations of selected short papers, setting the stage for focused discussions and working group activities. These discussions provided a platform for participants to delve deeper into the presented research, identify open challenges, and brainstorm potential solutions. The follow-up segments encouraged participants to form working groups, which would continue collaborating beyond the session to develop concrete outputs, such as white papers and research agendas.

Topics discussed by the working groups included: defining benchmarks for knowledge engineering pipelines, using LLMs for distributed knowledge graph and ontology alignment, leveraging LLMs for educational applications, ensuring explainability in AI-generated results, defining knowledge contexts, and integrating LLMs with semantic layers in common APIs.

These proceedings contain the kickstarter papers submitted to the Special Sessions, reflecting the authors' diverse perspectives and research interests. Participants were encouraged to continue their collaborations beyond the session and contribute to a white paper summarizing key findings, open problems, and research directions.

The Special Sessions were well attended, demonstrating strong interest in the convergence of Generative AI and Semantic Web technologies. They proved to be an effective platform for fostering collaboration and advancing research in this interdisciplinary domain.

We hope the ideas presented in this volume will contribute to future research and innovation at the intersection of Generative AI and the Semantic Web.

We are grateful to Aidan Hogan and the ISWC 2024 conference for their support in establishing this new forum for discussing and advancing research on these emerging topics.

Session Chairs

Reham Alharbi, University of Liverpool
Jacopo de Berardinis, University of Liverpool
Paul Groth, University of Amsterdam
Albert Meroño-Peñuela, King's College London
Elena Simperl, King's College London
Valentina Tamma, University of Liverpool

Programme Committee

Hanna Abi Akl, Data ScienceTech Institute
Samah Alkhuzaey, University of Liverpool
Bradley Allen, University of Amsterdam
Christian Bizer, University of Mannheim
Fajar J. Ekaputra, Vienna University of Economics and Business (WU)
Peter Haase, metaphacts
Filip Ilievski, VU Amsterdam
Nitisha Jain, King's College London
Ernesto Jimenez-Ruiz, City St George's, University of London
Jongmo Kim, King's College London
Liubov Kovriguina, metaphacts GmbH
Francesco Osborne, KMi, The Open University
Terry Payne, University of Liverpool
Marta Sabou, Vienna University of Economics and Business
Procheta Sen, University of Liverpool
Juan F. Sequeda, data.world
Raphaël Troncy, EURECOM
Bohui Zhang, King's College London
Xue Li, University of Amsterdam