The IJCAI-21 Workshop on Artificial Intelligence Safety (AISafety2021)

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Abstract
We summarize the IJCAI-21 Workshop on Artificial Intelligence Safety (AISafety 2021)¹, virtually held at the 30th International Joint Conference on Artificial Intelligence (IJCAI-21) on August 19-20, 2021.

Introduction
Safety in Artificial Intelligence (AI) is increasingly becoming a substantial part of AI research, deeply intertwined with the ethical, legal and societal issues associated with AI systems. Even if AI safety is considered a design principle, there are varying levels of safety, diverse sets of ethical standards and values, and varying degrees of liability, for which we need to deal with trade-offs or alternative solutions. These choices can only be analyzed holistically if we integrate technological and ethical perspectives into the engineering problem, and consider both the theoretical and practical challenges for AI safety. This view must cover a wide range of AI paradigms, considering systems that are specific for a particular application, and also those that are more general, which may lead to unanticipated risks. We must bridge the short-term with the long-term perspectives, idealistic goals with pragmatic solutions, operational with policy issues, and industry with academia, in order to build, evaluate,
deploy, operate and maintain AI-based systems that are truly safe.

The IJCAI-21 Workshop on Artificial Intelligence Safety (AISafety 2021) seeks to explore new ideas in AI safety with a particular focus on addressing the following questions:

- What is the status of existing approaches for ensuring AI and Machine Learning (ML) safety and what are the gaps?
- How can we engineer trustworthy AI software architectures?
- How can we make AI-based systems more ethically aligned?
- What safety engineering considerations are required to develop safe human-machine interaction?
- What AI safety considerations and experiences are relevant from industry?
- How can we characterize or evaluate AI systems according to their potential risks and vulnerabilities?
- How can we develop solid technical visions and new paradigms about AI safety?
- How do metrics of capability and generality, and trade-offs with performance, affect safety?

These are the main topics of the series of AISafety workshops. They aim to achieve a holistic view of AI and safety engineering, taking ethical and legal issues into account, in order to build trustworthy intelligent autonomous machines. The first edition of AISafety was held in August 10-12, 2019, in Macao (China) as part of the 28th International Joint Conference on Artificial Intelligence (IJCAI-19), and the second edition was held in January 7-8, 2021 virtually also as part of IJCAI. This third edition was held online (because of the COVID-19 situation) at the 30th International Joint Conference on Artificial Intelligence (IJCAI-21) on August 19-20, virtually.

**Program**

The Program Committee (PC) received 25 submissions. Each paper was peer-reviewed by at least two PC members, by following a single-blind reviewing process. The committee decided to accept 11 full papers and 7 posters, resulting in a full-paper acceptance rate of 44% and an overall acceptance rate of 72%.

The AISafety 2021 program was organized in four thematic sessions, two keynote and two (invited) talks.

The thematic sessions followed a highly interactive format. They were structured into short pitches and a group debate panel slot to discuss both individual paper contributions and shared topic issues. Three specific roles were part of this format: session chairs, presenters and session discussants.

- **Session Chairs** introduced sessions and participants. The Chair moderated sessions and plenary discussions, monitored time, and moderated questions and discussions from the audience.
- **Presenters** gave a 10 minute paper talk and participated in the debate slot.
- **Session Discussants** gave a critical review of the session papers, and participated in the plenary debate.

Papers were grouped by topic as follows:

**Session 1: Trustworthiness of Knowledge-Based AI**

- Applying Strategic Reasoning for Accountability Ascription in Multiagent Teams, Vahid Yazdanpanah, Sebastian Stein, Enrico Gerding and Nicholas R. Jennings.
- Impossibility of Unambiguous Communication as a Source of Failure in AI Systems, William Howe and Roman Yampolskiy.

**Session 2: Robustness of Machine Learning Approaches**

- Assessing the Reliability of Deep Learning Classifiers Through Robustness Evaluation and Operational Profiles, Xingyu Zhao, Wei Huang, Alec Banks, Victoria Cox, David Flynn, Sven Schewe and Xiaowei Huang.

**Session 3: Perception and Adversarial Attacks**

- Deep Neural Network Loses Attention to Adversarial Images, Shashank Kotyan and Danilo Vasconcellos Vargas.
- An Adversarial Attacker for Neural Networks in Regression Problems, Kavya Gupta, Jean-Christophe Pesquet, Beatrice Pesquet-Popescu, Fateh Kaakai and Fragkiskos Malliaros.

**Session 4: Qualification / Certification of AI-Based Systems**

- Artificial Intelligence for Future Skies: On-going Standardization Activities to Build the Next
Certification/Approval Framework for Airborne and Ground Aeronautic Products, Christophe Gabreau, Béatrice Pesquet-Popescu, Fateh Kaakai and Baptiste Lefèvre.


AISafety was pleased to have several additional inspirational researchers as invited speakers:

**Keynotes**

- Emily Dinan (Facebook AI Research, USA), Safety for E2E Conversational AI
- Simon Burton (Fraunhofer IKS, Germany), Safety, Complexity, AI and Automated Driving - Holistic Perspectives on Safety Assurance

**Invited Talks**

- The Anh Han (Teesside University, UK), Modelling and Regulating Safety Compliance: Game Theory Lessons from AI Development Races Analyses
- Umut Durak (German Aerospace Center - DLR, Germany), Simulation Qualification for Safety Critical AI-Based Systems

Posters were presented with 3-minute pitches. Most posters have also been included as short papers within this volume.

**Posters**

- Uncontrollability of Artificial Intelligence, Roman Yampolskiy.
- Chess as a Testing Grounds for the Oracle Approach to AI Safety, James Miller, Roman Yampolskiy, Olle Häggström and Stuart Armstrong.
- Epistemic Defenses against Scientific and Empirical Adversarial AI Attacks, Nadisha-Marie Aliman and Leon Kester.
- On the Differences between Human and Machine Intelligence, Roman Yampolskiy.
- A Mixed Integer Programming Approach for Verifying Properties of Binarized Neural Networks, Christopher Lazarus and Mykel Kochenderfer.

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