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Preface

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In the midst of the Machine Learning and Artificial Intelligence revolution, it is increasingly important to have mathematical guarantees on the performance of automated learning tools. As data-driven models are deployed in high-stakes domains, users and regulators require principled ways of quantifying uncertainty and reliability. Conformal Prediction (CP) is emerging as the de facto standard tool in this respect, providing distribution-free finite sample guarantees under minimal assumptions.

Since its inception, the CP community has considerably grown; historically represented in the annual COPA symposia in Europe, the CP community now spans all continents and regularly publishes in the top Machine Learning conferences.

Thus, we present this AMAI special issue on CP to highlight the latest advances in this important field, building on the success of previous AMAI special issues on the same topic (Volumes 74 and 81).

This special issue contains six publications, which are partitioned into three themes:

- **Theoretical extensions**
  - Conformal Test Martingales for Hypergraphical Models by Ilia Nouretdinov.
  - Conformal Predictive Distribution Trees by Ulf Johansson and Henrik Linusson.
- **Methodological advances**
  - Investigating the Impact of Calibration on the Quality of Explanations by Helena Löfström, Tuwe Löfström, Ulf Johansson, Cecilia Sönströd.
  - A novel Deep Learning approach for one-step Conformal Prediction approximation by Julia A. Meister, Khuong An Nguyen, Stelios Kapetanakis and Zhiyuan Luo.
- **Online learning and sequential decision making**

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- Anomaly detection with superexperts under delayed feedback by Raisa Dzhamtyrova and Carsten Maple.
- Practical Investment with the Long-Short Game by Najim Al-Baghdadi, and David Lindsay, Yuri Kalnishkan, and Sian Lindsay.

These publications highlight the span of the CP community, that continuously investigates practical methods with theoretical guarantees. In addition to showcasing the diversity of research directions, this special issue also reflects on the ongoing innovation that characterises this field. Each contribution advances our understanding but also opens up new avenues for practical application and theoretical exploration. This reaffirms CP's role in bridging the gap between foundational guarantees and real-world deployment.