

PREFACE

This special issue contains extended and revised versions of selected papers from the 34th International Conference on Concurrency Theory (CONCUR 2023). The conference was held at the University of Antwerp as part of CONFEST 2023, together with QEST, FORMATS, and FMICS. CONCUR is the main annual forum for researchers working on the theory of concurrency and its applications, bringing together contributions on the semantics, verification, analysis, and implementation of concurrent and related computational systems.

The 2023 edition of CONCUR received 98 submissions, of which 37 were accepted for presentation in the conference proceedings. The accepted papers reflected the breadth and vitality of current research in concurrency theory, ranging from foundational questions in automata, logics, and process theory to quantitative verification, neural-network-based systems, and infinite-state models such as Petri nets. From among the papers accepted to the conference, five contributions were identified as being of exceptional quality and were invited for this special issue in an extended form:

- Quantitative Verification with Neural Networks
- Universal Quantification Makes Automatic Structures Hard to Decide
- Constraint Automata on Infinite Data Trees: From $CTL(Z)/CTL^*(Z)$ to Decision Procedures
- Safety and Liveness of Quantitative Properties and Automata
- On the Home-Space Problem for Petri Nets and its Ackermannian Complexity

Together, these articles illustrate several important directions in contemporary concurrency theory. They address fundamental decision problems, develop new techniques for quantitative and logical verification, and deepen our understanding of the algorithmic complexity of models central to the analysis of concurrent systems. The extended versions presented in this issue provide additional technical material, fuller explanations, and broader perspectives on the results originally presented at CONCUR 2023.

We are grateful to the authors for preparing these extended contributions and for their care in revising and improving their work. We also thank the reviewers for their thorough and constructive reports, which helped ensure the quality of the final articles. Finally, we thank all those who contributed to the success of CONCUR 2023 and CONFEST 2023, including the program committee and our sponsors the Research Foundation – Flanders (FWO) and the Fund for Scientific Research (F.R.S.–FNRS).

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