Welcome to the 19th International Symposium on Automated Technology for Verification and Analysis (ATVA 2021)!

ATVA 2021 was planned to be hosted on the Gold Coast, Australia, in late October 2021. However, due to the pandemic and travel restrictions, the Steering Committee decided to host the conference virtually. ATVA 2021 received 75 submissions covering theory and applications in automated verification and analysis techniques. Each paper was reviewed by at least three reviewers, and the programme committee accepted 19 Regular Papers and 4 Tool Papers, leading to a competitive and attractive scientific programme.

**Keynote Speakers**

Sir Tony Hoare  
Prof Andrew Yao  
Prof Moshe Vardi  
Prof Somesh Jha

This edition of ATVA is blessed by the presence of four prestigious keynote speakers. The first keynote will be given by Sir Tony Hoare, a Turing Award and Kyoto Prize laureate. He will discuss the link between geometry and programming testing. The second keynote speaker, Prof Andrew Chi-Chih Yao of Tsinghua University, is also a Turing Award and Kyoto Prize laureate. His expertise is in complexity theory and cryptography, and he will present novel ideas about probabilistic reasoning in machine learning. Prof Moshe Vardi of Rice University is another widely recognised top computer scientist and a Godel Prize
winner. He will talk about linear temporal logic and its applications in analysis and synthesis. Last but not least, Prof Somesh Jha of the University of Wisconsin will present insightful views of security and trustworthy machine learning. The four talks cover current hot research topics and many new interesting research directions.

After the success of the workshops of the previous edition, we decided to co-host the conference with three workshops in related research areas: Security and reliability of Machine Learning (SRML) 2021, organised by Shiqi Wang, Huan Zhang, Kaidi Xu and Suman Jana; the Workshop on Hyperproperties: Advances in Theory and Practice (HYPER) 2021, organised by Daniel Fremont and Hazem Torfah; and the Workshop on Open Problems in Learning and Verification of Neural Networks 2021, organised by Anna Lukina, Guy Avni, Mirco Giacobbe and Christian Schilling. All three workshops will be hosted virtually on the 18th of October 2021. We thank all the workshop organisers for their hard work.

ATVA 2021 would not have been successful without the contribution and involvement of the Programme Committee members and the external reviewers who contributed to the review process (with more than 225 reviews) and the selection of the best contributions. This event would not exist if authors and contributors did not submit their proposals. We address our thanks to every person, reviewer, author, programme committee member and organizing committee member involved in the success of ATVA 2021.

The EasyChair system was set up for the management of ATVA 2021 supporting submission, review and volume preparation processes. It proved to be a powerful framework.

Sponsors

Although ATVA 2021 will be hosted virtually, the local host and sponsor Griffith University has provided tremendous help with registration and online facilities. The other sponsors, Formal Methods Europe, Springer LNCS, and the National University of Singapore, have contributed in different forms to help run the conference smoothly. Many thanks to all the local organisers and sponsors.

We wish to express our special thanks to the General Chair and steering committee members, particularly Jing Sun, Farn Wang, Jie-Hong Roland Jiang and Yu-Fang Chen, for their valuable support.
Workshops have their own schedules.

Security and Reliability of Machine Learning (SRML) 2021
Workshop on Hyperproperties: Advances in Theory and Practice (HYPER) 2021
Workshop on Open Problems in Learning and Verification of Neural Networks 2021
Day 2

19/10/2021
N.B. The schedule is in Brisbane time.

10:00 – 10:30  Opening

Session 1 (Chair: Guangdong Bai)

10:30 – 11:00  Edi Muškardin, Bernhard K. Aichernig, Ingo Pill, Martin Tappler and Andrea Pferscher
AALpy: An Active Automata Learning Library

11:00 – 11:30  Jean-Raphaël Gaglione, Daniel Neider, Rajarshi Roy, Ufuk Topcu and Zhe Xu
Learning Linear Temporal Properties from Noisy Data: A MaxSAT-based Approach

11:30 – 12:00  Sara Mohammadinejad, Jyotirmoy V. Deshmukh and Laura Nenzi
Mining Interpretable Spatio-temporal Logic Properties for Spatially Distributed Systems

12:00 – 15:30  Day Break

Session 2 (Chair: Yan Xiao)

15:30 – 16:00  Tobias John, Simon Jantsch, Christel Baier and Sascha Klüppelholz
Determinization and Limit-determinization of Emerson-Lei automata

16:00 – 16:30  Alessandro Cimatti, Alberto Griggio and Enrico Magnago
Automatic discovery of fair paths in infinite-state transition systems

16:30 – 17:00  Orna Kupferman, Nir Lavee and Salomon Sickert
Certifying DFA Bounds for Recognition and Separation

17:00 – 17:30  Afternoon Break (Announcement)

17:30 – 18:30  Keynote: Sir Tony Hoare (Chair: Zhe Hou)
A Geometric Theory for Program Testing
Day 3

20/10/2021
N.B. The schedule is in Brisbane time.

Session 3 (Chair: Zhe Hou)

10:30 – 11:00 Lukas Stevens and Tobias Nipkow
A Verified Decision Procedure for Orders in Isabelle/HOL

11:00 – 11:30 Dirk Beyer, Karlheinz Friedberger and Stephan Holzner
PJBDD: A BDD Library for Java and Multi-Threading

11:30 – 12:00 Brae Webb, Mark Utting and Ian Hayes
A Formal Semantics of the GraalVM Intermediate Representation

12:00 – 15:30 Day Break

Session 4 (Chair: Yun Lin)

15:30 – 16:00 Igor Khmelnitsky, Daniel Neider, Rajarshi Roy, Xuan Xie, Benoît Barbot, Benedikt Bollig, Alain Finkel, Serge Haddad, Martin Leucker and Lina Ye
Property-Directed Verification and Robustness Certification of Recurrent Neural Networks

16:00 – 16:30 Peter Gjøl Jensen, Stefan Schmid, Morten Konggaard Schou, Jiri Srba, Juan Vanerio and Ingo van Duijn
Faster Pushdown Reachability Analysis with Applications in Network Verification

16:30 – 17:00 Bernd Finkbeiner, Felix Klein, and Niklas Metzger
Live Synthesis

17:00 – 17:30 Afternoon Break

17:30 – 18:30 Keynote: Prof Andrew Yao (Chair: Jin Song Dong)
Probabilistic Reasoning in Machine Learning
Day 4

21/10/2021
N.B. The schedule is in Brisbane time.

9:00 – 10:00  **Keynote**: Prof Moshe Vardi *(Chair: Jun Sun)*
Linear Temporal Logic: From Infinite to Finite Horizon

**Session 5 (Chair: Rajeev Gore)**

10:30 – 11:00  Christel Baier, Florian Funke, Simon Jantsch, Jakob Piribauer and Robin Ziemek
Probabilistic causes in Markov Chains

11:00 – 11:30  Stefan Pranger, Bettina Könighofer, Lukas Posch and Roderick Bloem
TEMPEST - Synthesis Tool for Reactive Systems and Shields in Probabilistic Environments

11:30 – 12:00  Zixin Huang, Saikat Dutta and Sasa Misailovic
AQUA: Automated Quantized Inference for Probabilistic Programs

12:00 – 15:30  Day Break

**Session 6 (Chair: Tobias Nipkow)**

15:30 – 16:00  This session starts at 16:00.

16:00 – 16:30  Vedad Hadžić, Robert Primas and Roderick Bloem
Proving SIFA Protection of Masked Redundant Circuits

16:30 – 17:00  Norine Coenen, Bernd Finkbeiner, Christopher Hahn, Jana Hofmann and Yannick Schillo
Runtime Enforcement of Hyperproperties
Day 5

22/10/2021
N.B. The schedule is in Brisbane time.

9:00 – 10:00  **Keynote:** Prof Somesh Jha  *(Chair: Vijay Ganesh)*
**Trustworthy Machine Learning and the Security Mindset**

**Session 7 (Chair: Jing Sun)**

10:30 – 11:00  Dario Guidotti, Luca Pulina and Armando Tacchella
**pyNever: a Framework for Learning and Verification of Neural Networks**

11:00 – 11:30  Siddharth Priya, Xiang Zhou, Yusen Su, Yakir Vizel, Yuyan Bao and Arie Gurfinkel
**Verifying Verified Code**

11:30 – 12:00  Murad Akhundov, Federico Mora, Nick Feng, Vincent Hui and Marsha Chechik
**Verification by Gambling on Program Slices**

12:00 – 15:30  Day Break

**Session 8 (Chair: Zhilin Wu)**

15:30 – 16:00  Shaun Azzopardi, Nir Piterman and Gerardo Schneider
**Incorporating Monitors in Reactive Synthesis without Paying the Price**

16:00 – 16:30  Guillaume Dupont, Yamine Ait Ameur, Marc Pantel and Neeraj Singh
**Event-B Refinement for Continuous Behaviours Approximation**

16:30 – 17:00  Bernd Finkbeiner and Noemi Passing
**Compositional Synthesis of Modular Systems**
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