

Preface

Harris Papadopoulos

Frederick University, Cyprus

Khuong An Nguyen

Royal Holloway University of London, UK

Henrik Boström

KTH Royal Institute of Technology, Sweden

Lars Carlsson

Jönköping University, Sweden

Royal Holloway University of London, UK

H.PAPADOPOULOS@FREDERICK.AC.CY

KHUONG.NGUYEN@RHUL.AC.UK

BOSTROMH@KTH.SE

LARS.CARLSSON@JU.SE

This volume contains the Proceedings of the Twelfth Symposium on Conformal and Probabilistic Prediction with Applications (COPA 2023), organised by Frederick University, Cyprus. The Symposium is held in Limassol on September 13–15, 2023.

Overall, 33 full papers and 7 extended abstracts have been accepted for publication in the Proceedings of Machine Learning Research. The papers are divided into 7 groups:

- **Applications**, 10 papers and 3 extended abstracts;
 - *Conformal Regression in Calorie Prediction for Team Jumbo-Visma* by Kristian van Kuijk, Mark Dirksen and Christof Seiler.
 - *Applying the conformal prediction paradigm for the uncertainty quantification of an end-to-end automatic speech recognition model (wav2vec 2.0)* by Fares Ernez, Alexandre Arnold, Audrey Galametz, Catherine Kobus and Nawal Ould-Amer.
 - *Confident Object Detection via Conformal Prediction and Conformal Risk Control: an Application to Railway Signaling* by Léo Andéol, Thomas Fel, Florence de Grancey and Luca Mossina.
 - *Enterprise Disk Drive Scrubbing Based on Mondrian Conformal Predictors* by Rahul Vishwakarma, Jinha Hwang, Soundouss Messoudi and Ava Hedayatipour.
 - *An Uncertainty-Aware Sequential Approach for Predicting Response to Neoadjuvant Therapy in Breast Cancer* by Alberto García-Galindo, Marcos López-De-Castro and Rubén Armañanzas.
 - *Market Implied Conformal Volatility Intervals* by Alejandro Canete.
 - *Evaluation of conformal-based probabilistic forecasting methods for short-term wind speed forecasting* by Simon Althoff, Johan Hallberg Szabadváry, Jonathan Anderson and Lars Carlsson.
 - *Evaluating potential sensitive information leaks on a smartphone using the magnetometer and Conformal Prediction* by Robert Choudhury, Zhiyuan Luo and Khuong An Nguyen.

- *Neural Networks based Conformal Prediction for Pipeline Structural Response* by Sara El Mekkaoui, Carla J Ferreira, Juan Camilo Guevara Gómez, Christian Agrell, Nicholas James Vaughan and Hans Olav Heggen.
 - *Applications of Conformal Regression on Real-world Industrial Use Cases using Crepes and MAPIE* by Nasir Uddin and Tuwe Löfström.
 - *Online NoVaS Conformal Volatility Prediction* by Alejandro Canete.
 - *Capturing prediction uncertainty in upstream cell culture models using conformal prediction and Gaussian processes* by Tien Dung Pham, Uwe Aickelin and Robert Bassett.
 - *Variable Sparing of Disk Drives Based on Failure Analysis* by Rahul Vishwakarma, Mahshid Fardadi and Bing Liu.
- **New adaptations**, 8 papers and 1 extended abstract;
 - *Recommendation Systems with Distribution-Free Reliability Guarantees* by Anastasios N. Angelopoulos, Karl Krauth, Stephen Bates, Yixin Wang and Michael I. Jordan.
 - *Data-driven Reachability using Christoffel Functions and Conformal Prediction* by Abdelmouaiz Tebjou, Goran Frehse and Faïcel Chamroukhi.
 - *Conformal Credal Self-Supervised Learning* by Julian Lienen, Caglar Demir and Eyke Hüllermeier.
 - *Self Learning using Venn-Abers predictors* by Côme Rodriguez, Vitor Martin Bordini, Sebastien Destercke and Benjamin Quost.
 - *Conformal Prediction with Partially Labeled Data* by Alireza Javanmardi, Yusuf Sale, Paul Hofman and Eyke Hüllermeier.
 - *Conformal Association Rule Mining (CARM): A novel technique for data error detection and probabilistic correction* by Ilia Nouretdinov and James Gamerman.
 - *Anomalous Edge Detection in Edge Exchangeable Social Network Models* by Rui Luo, Buddhika Nettasinghe and Vikram Krishnamurthy.
 - *Conformalized Adversarial Attack Detection for Graph Neural Networks* by Sofiane Ennadir, Amr Alkhatib, Henrik Boström and Michalis Vazirgiannis.
 - *Efficient Approximate Predictive Inference Under Feedback Covariate Shift with Influence Functions* by Drew Prinster, Suchi Saria and Anqi Liu.
 - **Hypothesis Testing and Anomaly/Adversarial Detection**, 2 papers and 1 extended abstract;
 - *A Conformal Martingales Ensemble Approach for addressing Concept Drift* by Charalambos Eliades and Harris Papadopoulos.
 - *The power of forgetting in statistical hypothesis testing* by Vladimir Vovk.
 - *The Venn-ABERS Testing for Change-Point Detection* by Ilia Nouretdinov and Alex Gamerman.

- **Regression**, 5 papers;
 - *A Review of Nonconformity Measures for Conformal Prediction in Regression* by Yuko Kato, David M.J. Tax and Marco Loog.
 - *On training locally adaptive CP* by Nicolo Colombo.
 - *Mondrian Predictive Systems for Censored Data* by Henrik Boström, Henrik Linusson and Anders Vesterberg.
 - *Evaluating Machine Translation Quality with Conformal Predictive Distributions* by Patrizio Giovannotti.
 - *Online aggregation of conformal predictive systems* by Vladimir G. Trunov and Vladimir V. V'yugin.
- **Explainability**, 2 papers and 1 extended abstract;
 - *Approximating Score-based Explanation Techniques Using Conformal Regression* by Amr Alkhatib, Henrik Boström, Sofiane Ennadir and Ulf Johansson.
 - *Investigating the Contribution of Privileged Information in Knowledge Transfer LUPI by Explainable Machine Learning* by Niharika Gauraha and Henrik Boström.
 - *CONFIDERA: CONFormal Interpretable-by-Design score function for Explainable and Reliable Artificial Intelligence* by Sara Narteni, Alberto Carlevaro, Fabrizio Dabbene, Marco Muselli and Maurizio Mongelli.
- **Classification**, 3 papers and 1 extended abstract;
 - *Multi-label Classification under Uncertainty: A Tree-based Conformal Prediction Approach* by Chhavi Tyagi and Wenge Guo.
 - *Confidence Classifiers with Guaranteed Accuracy or Precision* by Ulf Johansson, Cecilia Sönströd, Tuwe Löfström and Henrik Boström.
 - *Coverage vs Acceptance-Error Curves for Conformal Classification Models* by Evgueni Smirnov.
 - *How do the performance of a Conformal Predictor and its underlying algorithm relate?* by Giovanni Cherubin.
- **Implementations / Libraries**, 3 papers;
 - *Flexible and Systematic Uncertainty Estimation with Conformal Prediction via the MAPIE library* by Thibault Cordier, Vincent Blot, Louis Lacombe, Thomas Morzadec, Arnaud Capitaine and Nicolas Brunel.
 - *PUNCC: a Python Library for Predictive Uncertainty Calibration and Conformalization* by Mouhcine Mendil, Luca Mossina and David Vigouroux.
 - *Tutorial on using Conformal Predictive Systems in KNIME* by Tuwe Löfström, Alexander Bondaletov, Artem Ryasik, Henrik Boström and Ulf Johansson.

The Symposium includes one tutorial and two keynote presentations:

- **Tutorial**

- *Conformal Prediction Under Distribution-Shift* by Anastasios Angelopoulos, University of California, Berkeley, USA.

- **Keynote presentations**

- *Recommendation Systems in Scholarly Publishing* by Yannis Manolopoulos, Open University of Cyprus, Cyprus.
- *Conformal prediction is robust to label noise* by Yaniv Romano, Israel Institute of Technology, Israel.

We are very grateful to the Programme and Organising Committees; the success of the Symposium would have been impossible without their hard work. We are also indebted to our sponsors.

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