

Preface

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This volume contains the Proceedings of the Tenth Symposium on Conformal and Probabilistic Prediction with Applications (COPA 2021), co-organised by Royal Holloway, University of London, and University of Brighton, UK. This year the Symposium is held online on September 8–10, 2021. This due to the ongoing Covid-19 pandemic. Hopefully, we will all be able to meet face-to-face next year.

For general information about conformal prediction and its sister methods, see the preface to the [Proceedings of COPA 2017 \(volume 60 of the PMLR\)](#), [Proceedings of COPA 2018 \(volume 91 of the PMLR\)](#), [Proceedings of COPA 2019 \(volume 105 of the PMLR\)](#), and [Proceedings of COPA 2020 \(volume 128 of the PMLR\)](#).

Overall, 15 papers have been accepted for publication in the Proceedings of Machine Learning Research, and an additional paper describing the tool Orange that is covered in the tutorials. The papers are divided into four groups:

- theoretical, four papers;
 - *Approximation to object conditional validity with inductive conformal predictors* by Anthony Bellotti
 - *Mondrian conformal predictive distributions* by Henrik Boström, Ulf Johansson and Tuwe Lofström
 - *A lower bound for a prediction algorithm under the Kullback-Leibler game* by Raisa Dzhamtyrova and Yuri Kalnishkan
 - *Shapley-value based inductive conformal prediction* by William Lopez Jaramillo and Evgeni Smirnov
- new methods, three papers;
 - *Conformal uncertainty sets for robust optimization* by Chancellor Johnstone and Bruce Cox
 - *Synergy conformal prediction* by Niharika Gauraha and Ola Spjuth
 - *Calibrating multi-class models* by Ulf Johansson, Tuwe Lofström and Henrik Boström
- experimental studies of different existing methods, four papers;

- *Conformal testing in a binary model situation* by Vladimir Vovk
- *Impact of model-agnostic nonconformity functions on efficiency of conformal classifiers: an extensive study* by Marharyta Aleksandrova and Oleg Chertov
- *Using inductive conformal martingales for addressing concept drift in data stream classification* by Charalambos Eliades and Harris Papadopoulos
- *Retrain or not retrain: conformal test martingales for change-point detection* by Vladimir Vovk, Ivan Petej, Ilia Nouretdinov, Ernst Ahlberg, Lars Carlsson and Alex Gammerman
- application of various confidence predictors to real world problems, four papers;
 - *Class-wise confidence for debt prediction in real estate management: discussion and lessons learned from an application* by Soundouss Messoudi, Sébastien Destercke and Sylvain Rousseau
 - *Evaluation of updating strategies for conformal predictive systems in the presence of extreme events* by Hugo Werner, Lars Carlsson, Ernst Ahlberg and Henrik Boström
 - *Transformer-based conformal predictors for paraphrase detection* by Patrizio Giovannotti and Alex Gammerman
 - *A non-conformity approach towards post-prostatectomy metastasis estimation using a multicentre prostate cancer database* by Christos Chatzichristos, Jose-Felipe Golib-Dzib, Andries Clinckaert, Wouter Everaerts, Maarten De Vos and Martine Lewi

In addition, four posters have also been accepted for presentation and their extended abstracts are included in the proceedings:

- *Confidence machine learning for cutting tool life prediction* by Nishant Wilson, Steve Barwick, Vince Booker, Tom Mildenhall, Laura Still, Yan Wang and Khuong An Nguyen
- *Protected probabilistic classification* by Vladimir Vovk, Ivan Petej and Alex Gammerman
- *Conformal changepoint detection in continuous model situations* by Ilia Nouretdinov, Vladimir Vovk and Alex Gammerman
- *Fast conformal classification using influence functions* by Umang Bhatt, Adrian Weller and Giovanni Cherubin

The Symposium starts with a tutorial day and the invited speaker (September 8). It will also end with a tutorial (September 10):

- “Conformal Prediction” (Henrik Linusson);
- “Venn Predictors” (Ulf Johansson);
- “Workshop on Federated Machine Learning” (Ola Spjuth and Andreas Hellander);

- “Conformal Prediction in Orange” (Tomaž Hočevar and Blaž Zupan).

As a part of COPA 2021 programme, we are extremely happy to have Dr. Shen-Shyang Ho as an invited speaker presenting; *Anomaly Detection in Data Streams using Martingales: New Research Issues and Results*. Dr. Ho is an Associate Professor in the Department of Computer Science at Rowan University, New Jersey, USA. His current research includes anomaly detection, reinforcement learning, federated learning, continual learning and their application to real-world problems.

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 the sponsors: Royal Holloway University of London and University of Brighton.

Programme Committee

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