

Preface

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This volume contains the Proceedings of the Sixth Workshop on Conformal and Probabilistic Prediction with Applications (COPA 2017), which is co-organised by Royal Holloway, University of London, UK, and Karolinska Institutet, Stockholm, Sweden. The Workshop is held at Karolinska Institutet on June 13–16, 2017.

Conformal prediction was developed originally at the end of the 1990s and summarized in the monograph *Algorithmic Learning in a Random World*, Springer, New York, 2005. The main purpose of this method is to complement predictions delivered by various algorithms of Machine Learning with provably valid measures of their accuracy and reliability under the assumption that the observations are independent and identically distributed. Conformal prediction is a universal tool in several senses; in particular, it can be used in combination with any known machine learning algorithm, such as SVM, Neural Networks, Ridge Regression, etc. It has been applied to a variety of problems from diagnostics of depression to the behaviour of bots.

After almost 20 years of development, the method of conformal prediction is becoming popular among machine learning and statistical communities. Moreover, since the method is not just theoretically appealing but also useful in practice, there have been several successful examples of its application to real-life problems, including some in medicine, industry, and security. Last year, in 2016, the Fifth Workshop was held at CIEMAT, a large Physics laboratory in Madrid, reflecting the fact that conformal prediction has been used successfully in physics, in particular, plasma physics. This year, the Workshop is held in Karolinska Institutet, and this can be considered as a recognition of practical usefulness of conformal prediction in pharmaceutical industry and medical diagnostics.

A sister method of Venn prediction was developed at the same time as conformal prediction and is used for probabilistic prediction. The COPA series of workshops is a home for work in both conformal and Venn prediction, as reflected in its full name “Conformal and Probabilistic Prediction with Applications”. In the early years of conformal prediction there was a gap between conformal and probabilistic prediction, but at this time it is shrinking or even disappearing (see, e.g., the paper by Vovk, Xie, and their PhD students in these Proceedings). As last year, the Workshop is open not only to the study of conformal and Venn prediction, but also of a variety of other methods for probabilistic or probability-type prediction.

Overall, 17 papers have been accepted for publications in the Proceedings of Machine Learning Research. The papers can be roughly divided into three groups:

- conformal and Venn prediction;
- applications of conformal and Venn prediction in chemoinformatics (there is even a special session on chemoinformatics at the Workshop);
- other methods of probabilistic and even probability-free (such as the paper by V'yugin) prediction.

In addition, eight posters have also been accepted for presentation at the Workshop. The Workshop starts from a tutorial day (June 13):

- “Introduction to Conformal Prediction” (Henrik Linusson);
- “Conformal Prediction in Spark” (Marco Capuccini);
- “Venn Predictors” (Paolo Toccaceli).

To complete the picture, these are the titles of the three invited talks by leading authorities in their fields:

- Vladimir Vapnik “Intelligent Methods of Learning”;
- Mikhail Malyutov “Sir Ronald Fisher and Andrey N. Kolmogorov: An Uneasy Relationship”;
- Andreas Bender “Conformal and Probabilistic Prediction for Chemical and Biological Data”.

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