Conformal predictors: properties and applications

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Abstract:
The talks present a new machine learning technique, called Conformal Predictors or Transductive Confidence Machine and describe its applications to several real-world problems. The technique allows us to make reliable predictions, and to supply valid measures of confidence in both "batch" and "online" modes. The advantages are as follows:
1. It gives **valid** measures of confidence in the sense that when used in online mode the confidence measures are well-calibrated, that is we can guarantee that given certain confidence, say 99%, the number of errors will not exceed 1%;
2. Can be used in **high-dimensional** problems where number of features greatly exceeds the number of observations;
3. Unlike many conventional techniques the approach does not make any additional assumption about the data beyond the **iid assumption**, that is the examples are independent, and identically distributed;
4. It allows making estimation of confidence of the prediction for **individual examples**;
5. Can be used as a **region predictor**, with a number of possible predicted values.
6. It gives well-calibrated predictions that can be used in on-line and off-line learning as well as in "intermediate" types of learning, e.g. "slow", "lazy".

The talks describe this technique and outline a number of applications in medical and other fields.

Keywords:
Transduction, high-dimensional data analysis, kernel methods, classification and regression as problems of prediction, confidence, iid assumption