

# IPMU special session

## Uncertainty management in machine learning

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**Aim & context:** The purpose of this special session is to foster discussions and collaborations around the development of new theories and algorithms to manage uncertainty in complex machine learning problems. It is also a mean to bridge the machine learning and uncertainty management communities.

To date, most of the major machine learning developments assume a statistical framework where (1) uncertainty is represented by probability distributions, (2) the data are i.i.d. (independent and identically distributed). However, in everyday life, these assumptions do not always hold, so that frameworks based on relaxed assumptions are required.

**Scope:** We propose to focus on problems where

- (1) The training and testing data are imprecise or are prone to uncertainties which cannot be appropriately modeled in the probabilistic framework (imprecise data, imprecisely known labels, missing values, weak learning, etc.);
- (2) The models are not based on the i.i.d. assumption and require more complex representations;
- (3) The decision step is not a precise, classical one and may allow for abstention/cautiousness (imprecise decision, cautious decision, rejection strategy, etc.).

Researchers are invited to submit their original and premium quality results in the IPMU 2014 conference format (<https://www.easychair.org/account/signin.cgi?conf=ipmu2014>). The topic of this special session includes numerous issues, such as (but not limited to):

- (1) Machine learning problems:
  - Classification, clustering, regression, etc.
  - Dimensionality reduction
  - On-line learning (semi-supervised or active learning, streamed data, etc.)
  - Structural learning (time series, graphs)
  - Data imputation and disambiguation (uncertainty reduction)
  - Model evaluation in presence of uncertainty
- (2) Uncertainty models:
  - Non i.i.d. statistics
  - Choquet's capacities
  - Imprecise probabilities
  - Belief functions
  - Fuzzy/rough sets
  - Possibility theory

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