中央研究院 資訊科學研究所
Institute of Information Science, Academia Sinica

Distinguished Lecture Series

Learning to Match Decision Making: A Decision-Feedback Learning Paradigm

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Auditorium 106 at new IIS Building

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Abstract

Machine learning is now becoming a general practice referring to data-driven methods attempting to estimate decision model parameters based on an extensive collection of labeled training data. It has been applied to many large-scale problems, including automatic speech recognition, machine translation, automatic image annotation, text categorization and bioinformatics, just to name a few. Conventional learning criteria, such as maximum likelihood and least squares, are often not designed to optimize performance of the intended decision operations to be executed by the learned models.

In order to improve learning effectiveness a potential paradigm shift is to design the objective function to match the expected performance of the desired decision making process so that feedbacks can be collected with the current model to improve parameter learning in an iterative manner. This is called a decision-feedback learning paradigm. Approximating errors with smooth 0-1 functions and embedding discrete error counting into the objection function are two critical components in decision-feedback learning. The sample objectives can now be expressed as continuous and differentiable functions of the model parameters and optimized for any choice of decision models and input feature vectors.

Finally we present a few choices of learning criteria for speech and language processing, such as minimum classification error (MCE), minimum verification error (MVE), maximal figure-of-merit (MFoM), and maximum or minimum area under the receiver operating characteristic curve (MAUC).

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