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Context-based unsupervised ensemble learning and feature ranking

Mort Naraghi-Pour and **Michel B Voorhies**
Louisiana State University, USA

In ensemble systems, several experts, who may have access to possibly different data, make decisions which are then fused by a combiner (meta-learner) to obtain a final result. Such ensemble-based systems are well-suited for processing Big-Data from sources such as social media, in-stream monitoring systems, networks, and markets, and provide more accurate results than single expert systems. However, most existing ensemble learning techniques have two limitations: They are supervised, and hence, they require access to the true label, which is often unknown in practice, and; they are not able to evaluate the impact of the various data features/contexts on the final decision, and hence, they do not learn which data is required. In this paper, we propose a joint estimation-detection method for evaluating the accuracy of each expert as a function of the data features/context and for fusing the experts' decisions. The proposed method is unsupervised: the true labels are not available and no prior information is assumed regarding the performance of each expert. Extensive simulation results show the improvement of the proposed method as compared to the state-of-the-art approaches. We also provide a systematic, unsupervised method for ranking the informativeness of each feature on the decision making process.

Biography

Mort Naraghi-Pour received his PhD degree in Electrical Engineering at University of Michigan, Ann Arbor, in 1987. Since August 1987, he has been at School of Electrical Engineering and Computer Science, Louisiana State University, Baton Rouge, where he is currently the Michel B Voorhies Distinguished Professor of Electrical Engineering. From June 2000 to January 2002, he was a senior member of technical staff at Celox Networks Inc., a network equipment manufacturer in St. Louis. His research and teaching interests include wireless communications, broadband networks, information theory, and coding. He has served as a Session Organizer, Session Chair, and member of the Technical Program Committee for numerous national and international conferences.

naraghi@lsu.edu

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