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Learning shared and discriminative information from multiview data

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ABSTRACT: With the advent of the internet-of-things and big data movements, the rate of gathering and accumulating information is growing dramatically. Enormous data that contain heterogeneous features representing different views of the same objectives are arisen in various scientific fields. For instance, audio and video signals can be seen as two different views of the same person. In signal processing, machine learning and data science, multiview learning is an emerging field with well-appreciated analytical tools and wide-range application domains, such as image processing, gene-expression measurement data analytics, natural language processing, etc. Numerous multiview learning approaches have been proposed in the literature. However, the existing methods are limited to either linear data models, two-view data analysis, (semi-)supervised setups, or unique machine learning task. Thus, my research is on designing new multiview learning models to break these limitations, and bringing new discoveries in both theory and application. In this talk, I will introduce my newly designed graph multiview canonical correlation analysis models to break these limitations, devise the generalization bound under mild conditions, and demonstrate the effectiveness of the new models via numerical real-world applications. My second topic in this talk will be concentrated on my novel models for discriminative analytics of multiple datasets, which extract the most discriminative information from one dataset (a.k.a. target data) of particular interest relative to the other(s) (a.k.a. background data). Albeit simple to comprehend and practically relevant, such discriminative data analytics has not been thoroughly addressed. Under certain conditions, this model is proved to be least-squares optimal in recovering the latent subspace vector unique to the target data relative to the background data. The performance of the proposed models is validated in substantial dimensionality reduction applications. Finally, I will conclude with some exciting preliminary results on ensemble graph embeddings, a novel application of multiview learning.

BIOGRAPHY: Dr. Jia Chen joined the Department of Electrical and Computer Engineering (ECE) at the University of Texas Rio Grande Valley as an Assistant Professor in 2019 September. Prior that she was a Postdoctoral Research Associate in the Dept. of ECE and Digital Technology Center at the University of Minnesota, under the supervision of Dr. George B. Giannakis. In 2016, she received the Ph.D. degree in Electrical Engineering from the University of Texas at Arlington, under the supervision of Ioannis D. Schizas. Her research interests span the multidisciplinary areas of signal processing, machine learning, and data analytics. Currently, she is serving in the Program Committee of the Data Mining Conference by the Society for Industrial and Applied Math (SIAM Data Mining – SDM)), one of the top data science conferences, and in the Program Committee for the International Joint Conference in AI (IJCAI) one of the top conferences in AI. In 2020, she got the Engaged Scholar and Artist Award from UTRGV, and she was granted the NSF Travel Award for 2020 NSF ENG CAREER Proposal Writing Workshop.

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