

Computer Science Seminar

Provably Good Non-Sparse Covariance-Regularized Discriminant Analysis with Application to Early Detection of Diseases

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To improve the performance of Linear Discriminant Analysis (LDA) for early detection of diseases using Electronic Health Records (EHR) data, we propose E2D2 -- a novel framework for EHR based Early Detection of Diseases on top of Covariance-Regularized LDA models. Specifically, E2D2 employs a Non-Sparse inverse covariance matrix (or namely precision matrix) estimator derived from graphical lasso and incorporates the estimator into LDA classifiers to improve classification accuracy. Theoretical analysis on E2D2 shows that it can bound the expected error rate of LDA classification, under certain assumptions. Finally, we conducted extensive experiments using a large-scale real-world EHR dataset -- CHSN. We compared our solution with other regularized LDA and downstream classifiers. The result shows E2D2 outperforms all baselines and backups our theoretical analysis.

Bio: Dr. Xiong is currently a Tenure-Track Assistant Professor of Computer Science in Missouri University of Science and Technology at Rolla MO, where he leads the Cyber-Human Systems Group. His research interests include ubiquitous computing, cyber-human systems, and crowdsourced data analytics. Before joining Missouri S&T, he was a Postdoctoral Research Associate in Operations Research at University of Virginia, Charlottesville, VA. Prior to his academic career in United States, he received his PhD in Computer Science degree from Telecom SudParis and Pierre and Marie Curie University, Paris, France. He published extensively in top computer science journals and conferences, such as ACM UbiComp and IEEE Transactions on Mobile Computing. He received the Best Paper Award from IEEE UIC'12 Fukuoka, Japan, and the SAMOVAR Best PhD Thesis Runner-Up Award from the French National Scientific Research Center (CNRS), France.

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