

Decision Systems Seminar Series

“A Time Series Representation Framework Based on Learned Patterns”

FEATURING



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Abstract:

Time series data mining has received great interest as temporal datasets are generated in different domains such as medicine, finance, multimedia, etc. Many of the research efforts in this context have focused on finding new representation methods to reduce dimensionality or to find a similarity measure. Earlier, many high-level representations such as Fourier transforms, wavelets, piecewise polynomial models etc. have been proposed for time series data mining. In this study, we introduce a novel high-level representation for time series based on learned patterns along with a similarity measure called Learned Pattern Similarity (LPS). Firstly, a new ensemble learning strategy is introduced to discover the patterns of the time series. Then, a robust similarity measure based on the matching patterns of the time series is presented. The effectiveness of LPS is evaluated on time series classification problems from various domains. We compare LPS to well-known similarity measures such as spatial assembly distance (SpADe), Euclidean and dynamic-time-warping (DTW) distance measures etc. Our experimental results show that the proposed similarity measure provides fast and accurate results on benchmark data sets from the UCR time series database.

Key words: time series, pattern discovery, similarity

Bio:

Mustafa Gökçe Baydoğan is an assistant professor in Department of Industrial Engineering at Boğaziçi University, Istanbul, Turkey. He was a postdoctoral research assistant in the Security and Defense Systems Initiative at Arizona State University (ASU) between 2012-2013. He received his Ph.D. degree in Industrial Engineering from ASU in 2012. His B.S. and M.S. degrees are in Industrial Engineering both from Department of Industrial Engineering at Middle East Technical University, Ankara, Turkey in 2006 and 2008 respectively. His current research interests focus on statistical learning, with applications in temporal data mining (time series and images) and feature selection. Details about him and his work can be reached through: www.mustafabaydogan.com.