

Comparing three Lower Bounding Techniques for DTW in Time Series Classification

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Abstract: The problem of time series similarity search has attracted much interest. Most algorithms used to index time series utilize some distance measure. In comparison to Euclidean distance, Dynamic Time Warping (DTW) is a much more robust distance measure for time series data. For the exact indexing of DTW, a few lower bounding techniques have been proposed in literature to guarantee no false dismissals in time series similarity search. In this work, we empirically compare three typical lower bounding techniques for DTW: LB_Keogh, FTW and LB_Improved in time series classification task. In the training phase of a K-nearest-neighbor classification, for each time series one needs to find its nearest neighbor, therefore, the number of distance computations is very large. Experimental results show that LB_Keogh and LB_Improved perform well with small warping windows while FTW is only suitable with large warping windows or without any constraint on warping windows. Besides, runtime efficiency of LB_Improved is quite poor due to its high complexity in lower bound computation despite of its better pruning power.

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