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# Dynamic Time Warping Under Limited Warping Path Length

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## Abstract

Dynamic Time Warping (DTW) is probably the most popular distance measure for time series data, because it captures flexible similarities under time distortions. However, DTW has long been suffering from the pathological alignment problem, and most existing solutions, which essentially impose rigid constraints on the warping path, are likely to miss the correct alignments. A crucial observation on pathological alignment is that it always leads to an abnormally large number of links between two sequences. Based on this new observation, we propose a novel variant of DTW called LDTW, which limits the total number of links during the optimization process of DTW. LDTW not only oppresses the pathological alignment effectively, but also allows more flexibilities when measuring similarities. It is a softer constraint because we still let the optimization process of DTW decide how many links to allocate to each data point and where to put these links. In this paper, we introduce the motivation and algorithm of LDTW and we conduct a nearest neighbor classification experiment on UCR time series archive to show its performance.

*Keywords:*

Dynamic Time Warping (DTW), Time series, Distance measure, Warping path, Classification.

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