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基于弧度距离的时间序列相似度量

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Radian-distance Based Time Series Similarity Measurement

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摘要 时间序列的近似表示和相似度量是时间序列数据挖掘的重要任务之一，是进行相似匹配的关键。该文针对现有的各种基于分段线性表示(Piecewise Linear Representation，PLR)相似度量方法存在的序列长度依赖和多分辨率条件下的潜在识别误差等缺点，提出了一种序列分段线性弧度表示和基于弧度距离的相似度量方法，实现了序列的快速在线分割和相似度计算。该方法简洁直观，利用分段弧度对分段趋势进行细粒度划分来保留序列主要形态特征，有效地提高了度量结果的准确性和多分辨率条件下的稳定性。该方法具有序列分割算法独立性特点，可用于时间序列的相似查询、模式匹配、分类和聚类。

关键词： 时间序列 分段线性表示 分段趋势 弧度距离 相似性

Abstract： Time series approximation representation and similarity measurement is one of the fundamental tasks in time series data mining, and the key to similarity matching. In view of shortcomings of various existing PLR (Piecewise Linear Representation) based similarity measure approaches, like series-length dependent issue and potential recognition error under multi-resolution, a radian based time series piecewise linear representation and radian-distance based similarity measurement are presented to cater for the rapid online segmentation and similarity calculation in this paper. The proposed method is really simple but intuitive, it retains major shape features of the series by using segment radian for fine grained division, and effectively improves the accuracy and reliability of the measurement under multi-resolution. This method is segmentation algorithm independent and can be further applied to similarity query, pattern matching, classification and clustering for time series.

Keywords： Time series Piecewise Linear Representation (PLR) Segment trend Radian-distance Similarity

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