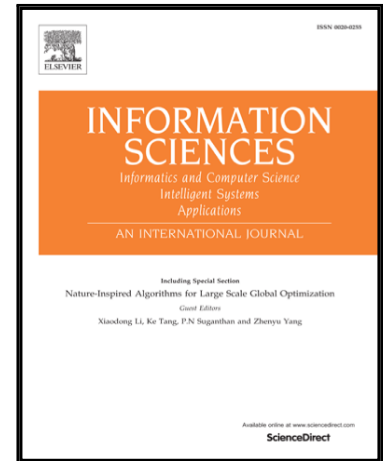


Accepted Manuscript

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PII: S0020-0255(18)30683-2  
DOI: <https://doi.org/10.1016/j.ins.2018.08.065>  
Reference: INS 13909



To appear in: *Information Sciences*

Received date: 3 April 2018  
Revised date: 24 August 2018  
Accepted date: 26 August 2018

Please cite this article as: Chunyu Xie, Ce Li, Baochang Zhang, Lili Pan, Qixiang Ye, Wei Chen, Hierarchical Residual Stochastic Networks for Time Series Recognition, *Information Sciences* (2018), doi: <https://doi.org/10.1016/j.ins.2018.08.065>

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## Hierarchical Residual Stochastic Networks for Time Series Recognition

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### Abstract

Due to the complex spatio-temporal variations of data, time series recognition remains a challenging problem for the present deep networks. In this paper, we propose end-to-end hierarchical residual stochastic (HRS) networks to effectively and efficiently describe spatio-temporal variations. Specifically, we design stochastic kernelized filters based on a hierarchical framework with a new correlation residual (CorrRes) block to align the spatio-temporal features of a sequence. We further encode complex sequence patterns with a stochastic convolution residual (SConvRes) block, which employs the stochastic kernelized filters and a dropout strategy to reconfigure the convolution filters for large-scale computing in deep networks. Experiments on large-scale datasets, namely NTU RGB+D, SYSU-3D, UT-Kinect and Radar Behavior show that HRS networks significantly boost the performance of time series recognition and improve the state-of-the-art of skeleton, action, and radar behavior recognition performance.

*Keywords:* stochastic networks, sequence recognition, hierarchical learning

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