

Accepted Manuscript

Title: Pattern Analysis of Computer Keystroke Time Series in Healthy Control and Early-Stage Parkinson's Disease Subjects using Fuzzy Recurrence and Scalable Recurrence Network Features

Author: Tuan D. Pham

PII: S0165-0270(18)30157-2
DOI: <https://doi.org/doi:10.1016/j.jneumeth.2018.05.019>
Reference: NSM 8015

To appear in: *Journal of Neuroscience Methods*

Received date: 19-4-2018
Revised date: 25-5-2018
Accepted date: 27-5-2018

Please cite this article as: Tuan D. Pham, Pattern Analysis of Computer Keystroke Time Series in Healthy Control and Early-Stage Parkinson's Disease Subjects using Fuzzy Recurrence and Scalable Recurrence Network Features, *Journal of Neuroscience Methods* (2018), <https://doi.org/10.1016/j.jneumeth.2018.05.019>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Pattern Analysis of Computer Keystroke Time Series in Healthy Control and Early-Stage Parkinson's Disease Subjects using Fuzzy Recurrence and Scalable Recurrence Network Features

Tuan D. Pham

Department of Biomedical Engineering

Linkoping University, Linkoping 58183, Sweden

Phone: +46-13-286778

E-mail: tuan.pham@liu.se

Abstract

Background: Identifying patients with early stages of Parkinson's disease (PD) in a home environment is an important area of neurological disorder research, because it is of therapeutic and economic benefits to optimal intervention and management of the disease. New Method: This paper presents a nonlinear dynamics approach, including recurrence plots, recurrence quantification analysis, fuzzy recurrence plots, and scalable recurrence networks for visualization, classification, and characterization of keystroke time series obtained from healthy control (HC) and early-stage PD subjects. Results: Several differentiative properties for characterizing early PD and HC subjects can be obtained from fuzzy recurrence plots (FRPs) and scalable recurrence networks. Comparison with Existing Methods: Cross-validation results obtained from FRP-based texture is highest among other methods. The method of fuzzy recurrence plots outperforms other existing methods for classification of HC and PD subjects. Conclusions: Features extracted from the nonlinear dynamics analysis of the keystroke time series are found to be very effective for machine learning and the prop-

Download English Version:

<https://daneshyari.com/en/article/8840244>

Download Persian Version:

<https://daneshyari.com/article/8840244>

[Daneshyari.com](https://daneshyari.com)