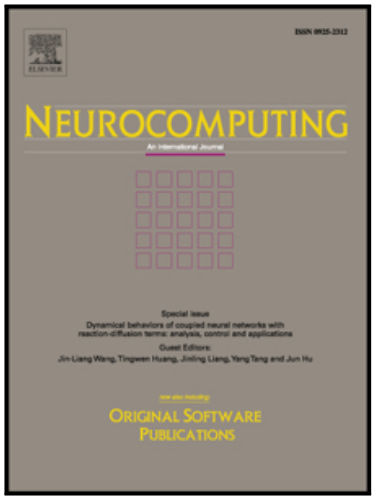
Communicated by Dr Hu Jun

Accepted Manuscript



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PII: S0925-2312(18)30996-2
DOI: https://doi.org/10.1016/j.neucom.2018.08.046
Reference: NEUCOM 19894

To appear in: *Neurocomputing*

Received date: 21 May 2018
Revised date: 9 August 2018
Accepted date: 18 August 2018

Please cite this article as: Dingfei Guo, Maiying Zhong, Hongquan Ji, Yang Liu, Rui Yang, A Hybrid Feature Model and Deep Learning Based Fault Diagnosis for Unmanned Aerial Vehicel Sensors, *Neurocomputing* (2018), doi: https://doi.org/10.1016/j.neucom.2018.08.046

A Hybrid Feature Model and Deep Learning Based Fault Diagnosis for Unmanned Aerial Vehicel Sensors

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Abstract

Fault diagnosis plays an important role in guaranteeing system safety and reliability for unmanned aerial vehicles (UAVs). In this study, a hybrid feature model and deep learning based fault diagnosis for UAV sensors is proposed. The residual signals of different sensor faults, including global positioning system (GPS), inertial measurement unit (IMU), air data system (ADS), were collected. This paper used short time fourier transform (STFT) to transform the residual signal to the corresponding time-frequency map. Then, a convolutional neural network (CNN) was used to extract the feature of the map and the fault diagnosis of the UAV sensors was implemented. Finally, the performance of the proposed methodology is evaluated through flight experiments of the UAV. From the visualization, the sensor faults information can be extracted by CNN and the fault diagnosis logic between the residuals and the health status can be constructed successfully.

Keywords: Model based fault diagnosis, deep learning, short-time fourier transform, convolutional neural network, UAV sensors

☆This work was supported in part by the National Natural Science Foundation of China under Grants (61333005, 61733009, 61673032, 61703244), and the Research Fund for the Taishan Scholar Project of Shandong Province of China.

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