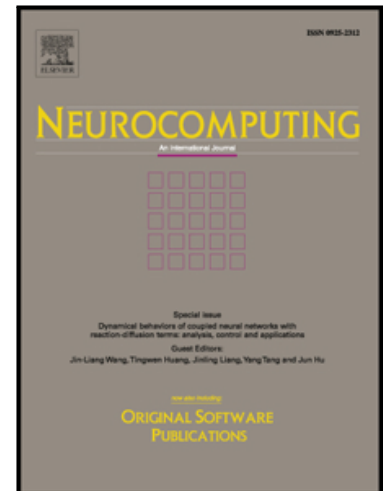


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A Hybrid Feature Model and Deep Learning Based Fault Diagnosis for Unmanned Aerial Vehicle Sensors

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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

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