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[54] SYSTEM AND METHOD FOR A DEVISED TRAINING PROCESS FOR IMBALANCED DATASET IN NON-INTRUSIVE ELEVATOR MONITORING
用於非侵入式電梯監測中的不平衡數據集的設計訓練過程的系統及方法

[57] The present invention discloses a devised training method for imbalanced dataset in non-intrusive elevator monitoring, comprising the steps of: obtaining multi-variant signal data from non-intrusive current sensors (102); pre-processing the signal data (104); integrating the pre-processed signal data into a deep learning model (106); training the deep learning model by adopting algorithm to balance the dataset (108); and monitoring condition and detecting anomaly of the elevator based on the deep learning model (110).
本發明公開了一種非侵入式電梯監測中的不平衡數據集的設計訓練方法，包括以下步驟：從非侵入式電流傳感器（102）獲取多變量信號數據；預處理信號數據（104）；將預處理後的信號數據整合到深度學習模型中（106）；通過採用演算法平衡數據集以訓練深度學習模型（108）；基於深度學習模型（110）監測電梯的狀態和檢測電梯的異常。

102 — Multi-variant Signal Data Acquisition from Non-intrusive Sensors

104 — *Pre-processing* of the Signal Data with Homogeneous Segmentation

106 — *Pre-processed* Signal Data Integration into Deep Learning Model

Big Data Cloud Management Portal *(Data Hub)*

Traction Motor

Drive Sheave
Deflector Sheave

Intercom
Control Panel
Safety Circuit

Overspeed
Governor
Brake System

Counterweight

Hoist
Ropes

Counterweight
Guide Rails

Lift Car

Car Door

Car Guide Rails

Car Buffer

Car Buffer

Sensor Parameters:
Traction Motor Current
Lift Brake Current
Safety Circuit Current
Lift Door Current
Lift Levelling Status

Data Acquisition
& Central Processing

IoT Sensors

4G/WIFI/
(NB-IOT)

108

Real-time
Transmission

Health Indicator &
Smart Warning

Deep Learning Model
(Training & Validation)

Devised Algorithm
and Loss Function
to Tackle
Imbalanced Dataset

A.I. Integration

Deep Learning
Model

Predictive Maintenance with
Prognostic Health
Management (PHM)

110

Condition Monitoring

Anomaly Detection

Lift Maintenance Crew
with Domain Knowledge