134. Abnormal Data Detection Method of Power System Based on Attention Mechanism

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Introduction

Due to the loss of synchronization signal, transformer abnormality, failure of the communication channel, etc., the dispatching control system often occurs data quality problems, which may cause grid security and stability accidents. It is urgent to study abnormal data detection to ensure data quality in dispatching control system. This paper proposes an attention mechanism-based abnormal data detection method for power system abnormal data.

Method

In order to improve the detection accuracy, a long and short-term memory network (LSTM) method is adopted to learn and train the scheduled data in different states, and an attention mechanism based on the sequential feature space is introduced to realize the sequential interpretation of the model.

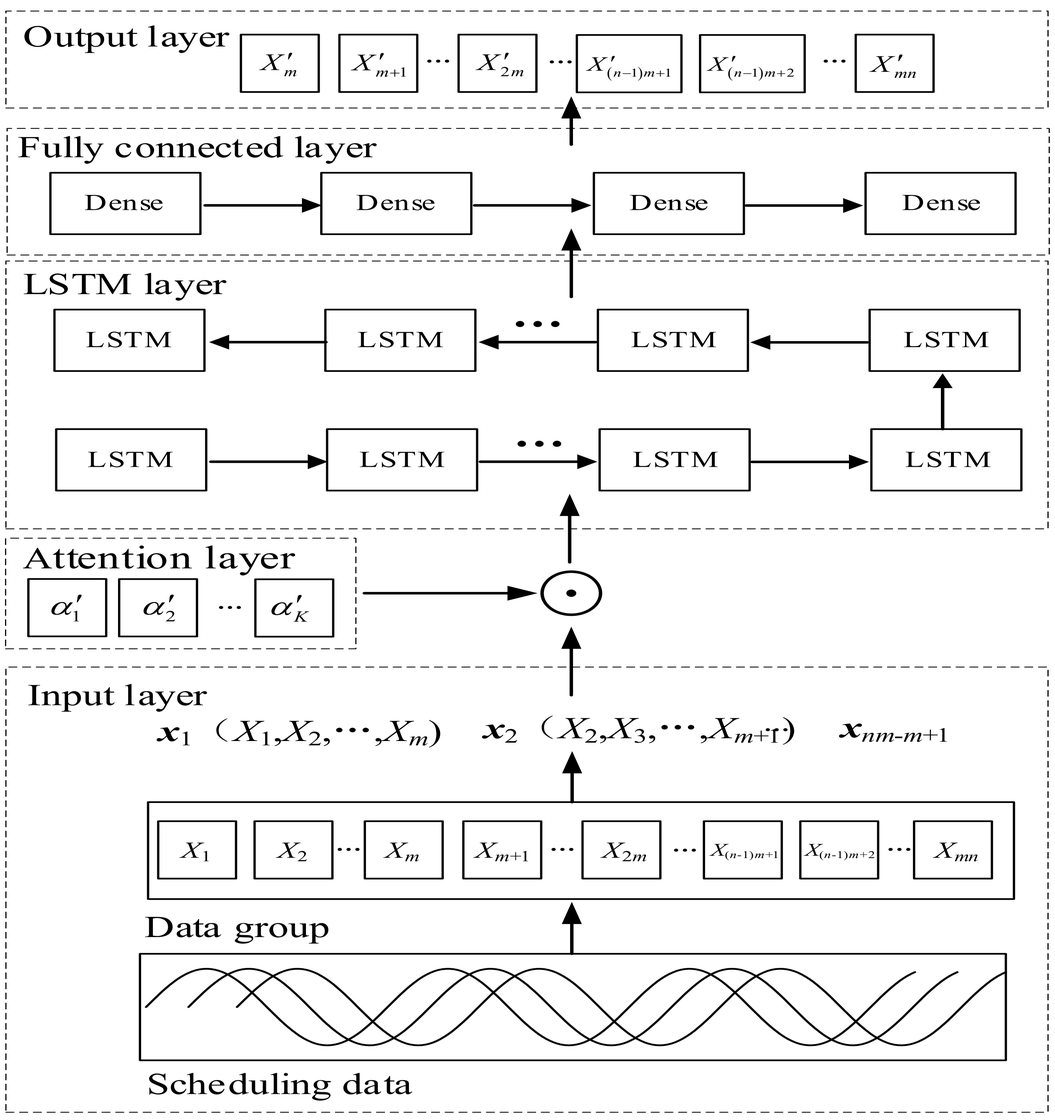

Fig.1 The abnormal data detection flow chart

Simulation Results

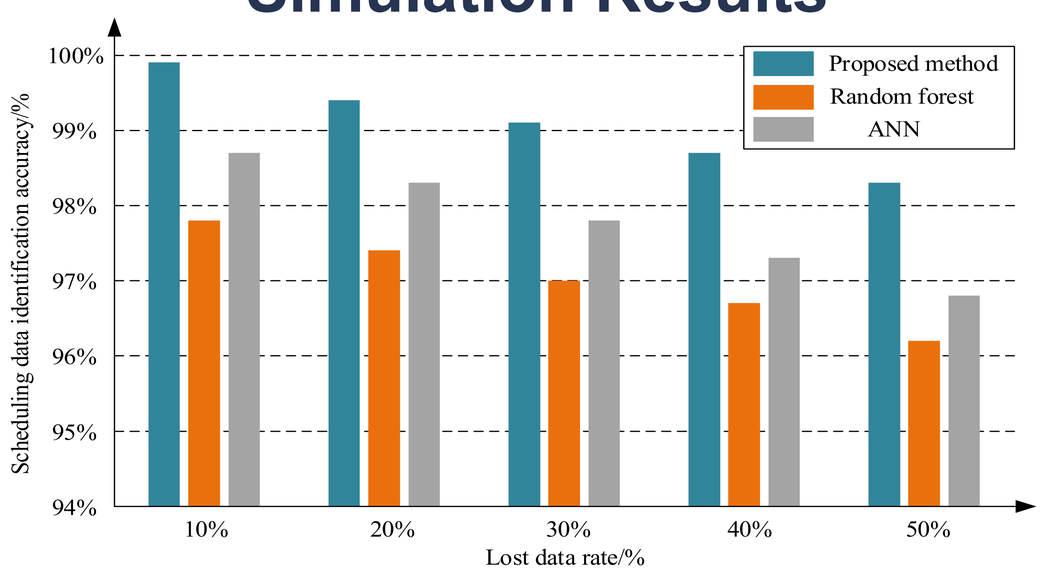

Fig.2 Data status identification results of different methods

Tab.1 Simulation data status identification results

Rate of abnormal data	Method	Detection accuracy (stable)	Detection accuracy (stable)
5%	Proposed method	99.96%	98.75%
	Cluster method	98.85%	93.24%
	Low rank method	99.32%	96.68%
10%	Proposed method	98.37%	96.10%
	Cluster method	95.71%	90.35%
	Low rank method	96.82%	93.58%
20%	Proposed method	97.84%	94.42%
	Cluster method	92.44%	85.92%
	Low rank method	95.52%	90.21%

Tab.2 Measured data status identification results

Detection accuracy	Bus A/%	Bus B/%	Bus C/%
Proposed method	99.9	99.8	99.4
Random forest	98.2	99.2	99.0
ANN	97.4	97.8	97.1

Conclusion

1) Based on the ensemble learning strategy, a identification method of data status is proposed. Three weak classifiers are combined into a strong classifier, which realizes the effective identification of scheduling data in different statuses.

2) Simulation and measured data tests show that the proposed method can effectively identify different data statuses and detect abnormal data in the scheduling system.