

A new surrogate based deep learning method for process fault prognosis

Qi Meng, 장교진, 문일†
연세대학교
(ilmoon@yonsei.ac.kr†)

The early detection and prognosis of process faults are core technologies to enable the safe and reliable operation of process systems. In particular, fault prognosis has emerged as a powerful tool that can detect and isolate early developing faults as well as predict fault propagation. To actively detect early potential faults, it is thus necessary to examine the fault and the associated consequences prior to its occurrence. In this work, we propose a new surrogate based deep learning method for process fault prognosis. The method integrates dynamic process simulations with long short-term memory (LSTM) based surrogate models to forecast the future trends of process parameters. The real-time process data is used to compare the normal process parameters predicted from the LSTM model to examine the residue between two values. A second model is set to observe the residue change over time, and it is used to detect the future fault of the process using the forecasted data window. To demonstrate the feasibility of the proposed method, a case study using an industrial process combined with data from Aspen software simulations is performed.