Process Monitoring and Diagnosis using Autoencoder Self-Organization Map for an EVA production process

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Autoencoder with self-organization map (AE-SOM) was applied to detect faults of the reactor in the Ethylene Vinyl Acetate (EVA) production process. It is a combination of AE and SOM, which allows for better consideration of the nonlinear characteristics of the variables. The process data were compressed using the encoding of the autoencoder. Then, by using the SOM, each observation was projected onto the SOM plane and the SOM plane region was separated according to the operating conditions of the reactor. If the projected value was on the plane region that was not predetermined normal operating condition, it was considered to be abnormal. Furthermore, the contribution was calculated to diagnose the variables that affected the process anomaly. As a result of detecting shutdown of the actual operation data, we detected all three shutdowns and identified the variables that had the contribution to the process anomaly.