

DATA-DRIVEN FAULT DIAGNOSIS USING DEEP CANONICAL VARIATE ANALYSIS AND FISHER DISCRIMINANT ANALYSIS

ABSTRACT

In this project, a novel data-driven fault diagnosis method by combining deep canonical variate analysis and Fisher discriminant analysis (DCVA-FDA) is proposed for complex industrial processes. Inspired by the recently developed deep canonical correlation analysis, a new nonlinear canonical variate analysis (CVA) called DCVA is first developed by incorporating deep neural networks into CVA. Based on DCVA, a residual generator is designed for the fault diagnosis process. FDA is applied in the feature space spanned by residual vectors. Then, a Bayesian inference classifier is performed in the reduced dimensional space of FDA to label the class of process data. A continuous stirred-tank reactor and an industrial benchmark of the Tennessee Eastman process are carried out to test the performance of DCVA-FDA fault diagnosis.