

## Facility Anomaly Detection with Gaussian Mixture Model

**Authors :** Sunghoon Park, Hank Kim, Jinwon An, Sungzoon Cho

**Abstract :** Internet of Things allows one to collect data from facilities which are then used to monitor them and even predict malfunctions in advance. Conventional quality control methods focus on setting a normal range on a sensor value defined between a lower control limit and an upper control limit, and declaring as an anomaly anything falling outside it. However, interactions among sensor values are ignored, thus leading to suboptimal performance. We propose a multivariate approach which takes into account many sensor values at the same time. In particular Gaussian Mixture Model is used which is trained to maximize likelihood value using Expectation-Maximization algorithm. The number of Gaussian component distributions is determined by Bayesian Information Criterion. The negative Log likelihood value is used as an anomaly score. The actual usage scenario goes like a following. For each instance of sensor values from a facility, an anomaly score is computed. If it is larger than a threshold, an alarm will go off and a human expert intervenes and checks the system. A real world data from Building energy system was used to test the model.

**Keywords :** facility anomaly detection, gaussian mixture model, anomaly score, expectation maximization algorithm

**Conference Title :** ICIOT 2016 : International Conference on Internet of Things

**Conference Location :** New York, United States

**Conference Dates :** June 06-07, 2016