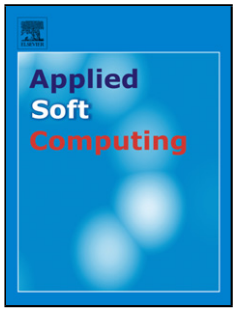


Title: A Methodology for Monitoring Smart Buildings with Incomplete Models

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1. This paper combines a model-based diagnosis approach that uses available models and a data driven approach that uses machine learning techniques to build more complete diagnosis systems for smart buildings with incomplete models.

2. First, we use a model-based diagnosis approach to generate the initial diagnosis reference model. We then apply an unsupervised learning approach to identify the undetected outlier groups. We extract the significant features that characterize each outlier group from the nominal and use these significant features to complete the diagnosis reference model.

3. To estimate the likelihood of each potential fault in the complex systems, the dependencies between components and, therefore, the sensor measurements need to be considered for accurate diagnosis. In this work, we employ the tree augmented naive Bayesian learning algorithm (TAN) to develop classifiers for fault detection and isolation. TAN structures can accommodate some dependencies between the measurements.

4. We demonstrate and validate the proposed approach using a data-set from an outdoor air unit (OAU) system in the Lentz public health center in Nashville.