AAAI-18
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Reviews For Paper

Paper ID	4371
Title	Identifying Relations between Equipment in Commercial Buildings based on Correlated Events

Masked Reviewer ID: Assigned_Reviewer_1

Review:

Question	
[Summary] Please summarize the main claims/contributions of the paper in your own words.	This paper proposes a modeling technique based on the temporal sensor recordings to correlate equipment in buildings. This is the first step towards building analytics which is supposed to reduce the carbon footprint and energy consumption of the buildings, which is the primary cause of greenhouse gas emission in many developed countries.
[Relevance] Is this paper relevant to an AI audience?	Likely to be of interest to a large proportion of the community
[Significance] Are the results significant?	Significant
[Novelty] Are the problems or approaches novel?	Novel
[Soundness] Is the paper technically sound?	Technically sound
[Evaluation] Are claims well-supported by theoretical analysis or experimental results?	Sufficient
[Clarity] Is the paper well-organized and clearly written?	Good
[Detailed Comments] Please elaborate on your assessments and provide constructive feedback.	This is a very ingenious application paper and requires accolades. I really liked the problem formulation, the latent state-space modeling assumptions, and the inference mechanisms. The experiments look fine too. It's very rare to come up with papers like this that have concrete technical materials and extremely novel applications. The paper is also well-written and the presentation looks solid. The paper should be accepted as it is now. As a side note, there are many approaches in the literature of stochastic volatility modeling that can model the abrupt switching of some of the observations. For example, please a take a look at this paper: http://proceedings.mlr.press/v31/ho13b.html
[QUESTIONS FOR	Please see the comments above.

THE AUTHORS] Please provide questions for authors to address during the author feedback period.	
[OVERALL SCORE]	Accept
[CONFIDENCE]	Reviewer is knowledgeable but out of the area

Masked Reviewer ID: Assigned_Reviewer_2

Review:

Question	
[Summary] Please summarize the main claims/contributions of the paper in your own words.	This article addresses the task of unsupervised learning of correlated events for HVAC applications. The task is to look for correlated time-series processes in a building.
[Relevance] Is this paper relevant to an AI audience?	Relevant to researchers in subareas only
[Significance] Are the results significant?	Moderately significant
[Novelty] Are the problems or approaches novel?	Somewhat novel or somewhat incremental
[Soundness] Is the paper technically sound?	Has minor errors
[Evaluation] Are claims well-supported by theoretical analysis or experimental results?	Somewhat weak
[Clarity] Is the paper well-organized and clearly written?	Good
[Detailed Comments] Please elaborate on your assessments and provide constructive feedback.	The authors propose the overall task of automatically inferring how equipment in buildings is functionally connected with another. It is unclear what one will do with this. Typically building managers want to diagnose faults. So it's unclear what the real-world purpose of this paper is. Second, this approach is not really automated. It is also important to note that this ends up being a semi-automated task, as the authors use expert knowledge to identify a possible set of correlations, and then just learn which of these is actually correlated. This contradicts the claim in the introduction "In this paper, we solve the problem of relation inference among sensors and equipment from their time series, with no manual effort." The authors correctly note that identifying which data streams to try to correlate is

	a huge task, but in the article they never provide detail about how they solve this key task. For example, only data about the number of air handling units (AHU), variable air volume boxes (VAV), and floors is provided; there is no data concerning the number of sensors involved, which is the key issue. The authors say about this task is "Thus, the key to a solution is to search for correlations of events. As we search for more correlated events, the probability of two sensors being correlated by random chance drops exponentially." Just mentioning that "the typical number of sensing and control points attached to each equipment is between 6 and 13, and the smallest building in our set has over 1,300 points." is insufficient to convince a reader that one can solve this problem for real buildings. The authors later note that "some prior knowledge about what type of points in different equipment are mostly correlated and best capture the relation is required, and typically such knowledge is acquired from a building manager". In terms of baselines, there are many diagnostics algorithms that have been developed based on correlations, ranging from expert systems to other learning-based approaches. Diagnosing correlated faults is far more interesting than just defining correlations.
[QUESTIONS FOR THE AUTHORS] Please provide questions for authors to address during the author feedback period.	Authors need to clarify the inconsistency in what is promised and what is actually accomplished. They claim; "In this paper, we solve the problem of relation inference among sensors and equipment from their time series, with no manual effort."
[OVERALL SCORE]	Clear reject
[CONFIDENCE]	Reviewer is an expert in the area

Masked Reviewer ID: Assigned_Reviewer_3

Review:

Question	
[Summary] Please summarize the main claims/contributions of the paper in your own words.	The paper uses a hidden Markovian model to identify the dependent events. The model is consist of hidden states, latent true values, and observable samples.
[Relevance] Is this paper relevant to an AI audience?	Likely to be of interest to a large proportion of the community
[Significance] Are the results significant?	Moderately significant
[Novelty] Are the problems or approaches novel?	Somewhat novel or somewhat incremental
[Soundness] Is the paper technically sound?	Technically sound
[Evaluation] Are claims well-supported by theoretical analysis	Somewhat weak

or experimental results?	
[Clarity] Is the paper well-organized and clearly written?	Satisfactory
[Detailed Comments] Please elaborate on your assessments and provide constructive feedback.	The paper lacks review on event pattern identification, which includes a large body of literature to identify the event relations. Only the mean and velocity are used to model the status of signals at different states. If other patterns are possible, e.g., oscillating frequency, uncertainty, how is the performance of the method? The contribution over existing HMM models seems minor.
[QUESTIONS FOR THE AUTHORS] Please provide questions for authors to address during the author feedback period.	nil
[OVERALL SCORE]	Marginally below threshold
[CONFIDENCE]	Reviewer is knowledgeable in the area