Control and learning of ambience by an intelligent building

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Modern approaches to the architecture of living and working environments emphasize the dynamic reconfiguration of space and function to meet the needs, comfort and preferences of its inhabitants. Although it is possible for a human operator to specify a configuration explicitly, the size, sophistication and dynamic requirements of modern buildings demands that they have autonomous intelligence that could satisfy the needs of its inhabitants without human intervention. We describe a multi-agent framework for such intelligent building control that is deployed in a commercial building equipped with sensors and effectors. Multiple agents control sub-parts of the environment using fuzzy rules that link sensors and effectors. The agents communicate with one another by asynchronous, interest based messaging. They implement a novel unsupervised online realtime learning algorithm that constructs a fuzzy rulebase derived from very sparse data in a non-stationary environment. We have developed methods for evaluating the performance of systems of this kind. Our results demonstrate that the framework and the learning algorithm significantly improve the performance of the building.

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