of results between ML and KRR models, and handling the difference in processing time in the semantic domain (slow) and the ML algorithms (fast). This study demonstrates how collection of data-ontology-rules can be used to represent and reason with data from multiple domains and provide essential semantic knowledge to the learning algorithms.

Conclusion

This paper describes an approach to monitor building energy consumptions by integrating machine learning techniques with mechanisms for semantic knowledge representation and reasoning. This work implements a supervised learning algorithm, nearest neighbor, to predict the electricity consumption based on raw data such as solar radiation, outdoor temperature, and wind speed, as well as knowledge data such as occupancy inferred by semantic rules. We also integrated the semantic knowledge in weather conditions (i.e., frost, above room temperature, below room temperature) integrated to K-means clustering algorithm to identify the electricity consumption seasons (i.e., heating, shoulder, cooling). Our long-term vision is that this framework will be used to couple semantic and machine learning techniques for buildings-to-grid integration.

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Nomenclature

AI	Artificial Intelliegence
BAS	Building Automation Systems
OWL	Web Ontology Language
FDD	Fault Detection and Diagnostics
KRR	Knowledge Representation and Reasoning
ML	Machine Learning
WWW	World Wide Web
SWRL	Semantic Web Rule Language
TOU	Time of Use

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