Public Abstract
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The purpose of the Fuzzy PIR Fall Detection Array is to keep the elderly safe by providing a means for an immediate response to falls while still allowing them to enjoy the same independence they felt before fall detection was necessary. To accomplish this goal, a vertical array of passive infrared (PIR) motion sensors can be positioned anywhere in the home near where a fall may occur. A fall is considered to be observed by the sensor array when the sensors, first, detect motion, then, stop detecting motion in order from top to bottom. To differentiate between a legitimate fall and normal motion, pattern recognition techniques were used to observe the signals from the sensing array and classify whether a window of data was observed during a fall or a non-fall. To accomplish this goal, a Gaussian Parzen Window (GPW) and a relevance vector machine (RVM) were used with some success. This research shows that, for this application, the RVM was able to detect falls with an accuracy of about 80% to the Parzen Window's about 75%. Besides being more accurate, the RVM algorithm has a faster run time for classifying the data. The sensing array explored in this research could be a viable option as a non-wearable means for protecting the elderly in the event that they should fall in their home.