"Single-channel compressive sampling of electrical data for non-intrusive load monitoring"

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Abstract

Non-intrusive load monitoring (NILM) extracts information about how energy is being used in a building from electricity measurements collected at a single location. Obtaining measurements at only one location is attractive because it is inexpensive and convenient, but it can result in large amounts of data from high frequency electrical measurements. Different ways to compress or selectively measure this data are therefore required for practical implementations of NILM. We explore the use of random filtering and random demodulation, techniques that are closely related to compressed sensing, to offer a computationally simple way of compressing the electrical data. We show how these techniques can allow one to reduce the sampling rate of the electricity measurements, while requiring only one sampling channel and allowing accurate NILM performance. Our tests are performed using real measurements of electrical signals from a public data set, thus demonstrating their effectiveness on real appliances and allowing for reproducibility and comparison with other data management strategies for NILM.

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