An Energy-efficient Framework for Approximate Querying Answering and Detecting Similarities in sensor networks Based on Time Series Forecasting

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Abstract: In this talk I will analyze the problem of efficiently answering approximate queries over a sensor network at the sink. In particular, I will show how time series forecasting can be used to provide substantial reductions in the energy required to answer queries without significantly affecting answer quality.

Our approximate query framework, called SAF, comprises a suite of novel techniques for predicting values sensed at the nodes and for grouping together sensor nodes that produce similar data. It relies on a class of simple time series models, which are cheap to learn and dynamically adapt to variations in the data distribution to accurately predict sensor values and detect outliers and periods of data inconsistencies. SAF dramatically reduces energy consumption relative to previous query frameworks by allowing nodes to periodically turn off their radio and by remarkably reducing the amount of communication. Extensive experimental results performed on a trace of real data have confirmed the advantages above mentioned.

(joint work with Sam Madden)