

Department of Electrical and Computer Engineering

Title: «AdaM: an Adaptive Monitoring Framework for Sampling and Filtering on IoT Devices»

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Abstract:

Real-time data processing while the velocity and volume of data generated keep increasing, as well as, energy-efficiency are great challenges of big data streaming which have transitioned to the Internet of Things (IoT) realm. In this talk, we introduce AdaM, a lightweight adaptive monitoring framework capable of supporting data streaming engines running even on smart battery-powered IoT devices with limited processing capabilities. AdaM, inexpensively and in place dynamically adapts the monitoring intensity and the amount of data disseminated through the network based on the current metric evolution and variability of the metric stream. By accomplishing this, energy consumption and the amount of data generated is reduced, allowing the IoT device to preserve battery and ease processing at the base station or a central endpoint, while still preserving data accuracy. To achieve this, AdaM incorporates two algorithms, one for adaptive sampling and one for adaptive filtering. Both algorithms provide one-step ahead estimations, adjusting the sampling rate and the filter range based on the confidence of each algorithm to correctly estimate what will happen next in the metric stream. Specific consideration is taken such that our algorithms immediately identify abrupt transient changes in the metric evolution. Most importantly, AdaM runs on the source device without any additional communication to a central management endpoint and excessive profiling to determine framework parameters. In this paper, we present a thorough evaluation of AdaM by comparing it to other IoT adaptive techniques, with a testbed that utilizes publicly available real-world datasets. Results show, that AdaM is capable of reducing data volume by 74%, energy consumption by at least 71% while preserving a greater than 89% accuracy.

Biography:

George Pallis is assistant professor at the Computer Science Department, University of Cyprus. His research interests include Cloud Computing with focus on Cloud Elasticity and Monitoring, Content Delivery Networks and Online Social Networks. His publication record is now at more than 60 research papers which have appeared in journals, book chapters, and conferences. He is principal institutional investigator in research projects funded by EC and he is one of the contributing experts for the EU Roadmap for Advanced Cloud Technologies under H2020. He is Associate Editor in Chief in the IEEE Internet Computing magazine and he is also editing the "View from Cloud" department in this magazine.