Introduction to the Internet of Things and Big Data Analytics Mini-track

Frederick J. Riggins  
College of Business  
North Dakota State University  
fred.riggins@ndsu.edu

Samuel Fosso Wamba  
Information Systems Dept  
NEOMA Business School  
UNISA, South Africa  
samuel.fosso.wamba@neoma-bs.fr

Matthias Dehmer  
UMIT – The Health & Life  
Sciences University  
Austria Bundeswehr University  
München, Germany  
matthias.dehmer@umit.at

HICSS-48 marks the beginning of a new mini-track on topics at the intersection of the Internet of Things and Big Data Analytics. The mini-track addresses issues organizations face as they seek to make use of data collected from mobile tracking devices such as RFID and other tracking and sensor technologies. Big data analytics is an increasingly important activity that is driven by the pervasive diffusion and adoption of RFID, mobile devices, social media tools, and the Internet of Things (IoT). The IoT allows for the connection and interaction of smart devices as they move and exist within today’s value chain. This allows for unprecedented process visibility that creates tremendous opportunities for operational and strategic benefits. However, the effective management of this visibility for improved decision making requires the combination and analysis of data from item-level identification using RFID, sensors, social media feeds, and cell phone GPS signals; in short, big data analytics.

While the IoT and big data analytics have tremendous potential for transforming various industries, many scholars and practitioners are struggling to capture the business value from combining the IoT and big data analytics. In addition, little research has been conducted to assess the potential of the IoT using big data analytics. In this mini-track, we hope to develop a stream of research where researchers will share new and interesting theoretical and methodological perspectives on this topic. We believe the papers represented in this inaugural mini-track are a good kickoff to what we hope will be more exciting and enlightening each year.

We open the mini-track with a paper entitled “Research Directions on the Adoption, Usage and Impact of the Internet of Things through the Use of Big Data Analytics” where Fred Riggins and Samuel Fosso Wamba bring into focus several of the important research questions this mini-track will address. The paper begins by defining current perspectives on the IoT and highlights current research in this area. It then proposes a framework for analyzing the adoption, usage and impact of the IoT enabled through big data analytics. The framework is applied to several research questions that need to be examined if researchers are to understand the non-technical issues related to the emergence of the IoT. Specifically, research questions are posed at four levels of analysis: the individual, organizational, industry, and societal levels.

The second paper by Robert Minch is entitled “Location Privacy in the Era of the Internet of Things and Big Data Analytics.” As the IoT emerges there is concern that loss of privacy may occur that could impact individuals’ incentives to belong to online networks, interact using online social media, and engage in activities associated with being digital citizens. These privacy issues involve sensing activities, identification and authentication of identities, storage of personal information, processing of this information, incentives to share information, and the range of activities available to use this information. These six phases of information flow all take place within three different contexts: technical, social, and legal contexts. This paper examines these issues across these six phases of information flow and identifies example privacy measures that are being used, and can be used, for each phase. A literature review of existing research on the technical, social, and legal measures is provided.

The third paper, “Dynamic Price Prediction for Amazon Spot Instances” by Vivek Kumar Singh and Kaushik Dutta illustrates the importance of being able to dynamically and efficiently price services in contexts such as the IoT. In the case examined in this paper, cloud vendors, such as Amazon Web Services, provide “spot instances” of cloud-based resources that are dynamically priced through an auction mechanism. This paper develops a novel algorithm for spot price prediction that shows high accuracy of 9.4% Mean Absolute Percent Error (MAPE) for short term forecasting (one day ahead) and less than 20% MAPE for long term forecasting (five days ahead). Such novel pricing algorithms will find a place within the context of the IoT as spot services will need to be negotiated, priced, and provided with a short lead time.