Models for Human-Machine Teaming for Shared Decision-Making under Uncertainty

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Abstract

There is growing uncertainty about the runtime environment of software systems. Therefore, how the system should behave under different contexts cannot be fully predicted at design time. It is considerations such as these that have led to the development of self-adaptive systems (SAS), which can dynamically and autonomously reconfigure their behavior to respond to changing external conditions. The use of Machine Learning (ML) and AI has exacerbated the issues by adding more uncertainty sources. The scope of the talk is in the areas of Model-driven Engineering (MDE), Requirements Engineering (RE), software engineering (SE), and the development of techniques to quantify uncertainty to improve decision-making. The explicit treatment of uncertainty by the running system improves its judgment to make decisions supported by evaluating evidence found during runtime, possibly including the human-in-the-loop. The speaker will discuss how quantification of uncertainty can improve requirement elicitation (using simulations, for example). The talk will also cover different approaches to quantifying uncertainty, models@run.time and their role in Human-Machine Teaming.

Short Biography

Nelly Bencomo is an Associate Professor in the CS Department at Durham University and leader of the Research Team SE@Durham. In 2019, Nelly was granted the Leverhulme Fellowship “QuantUn: quantification of uncertainty using Bayesian surprises.” Before, she was granted a Marie Curie Fellow at INRIA Paris — Roquencourt. Nelly exploits the interdisciplinary aspects of model-driven engineering (MDE), software engineering, comprising both technical and human concerns, while developing techniques for intelligent, autonomous and highly distributed systems. Nelly is an Associate Editor of IEEE Transactions on Software Engineering (TSE) and a member of the Editorial Board of the Journal of Software and Systems. She is also a member of the IEEE TCSE (Technical Council on Software Engineering) members-at-large (2020-24) and a member of the Steering Committee of MODELS. She has served as a PC member and organizing team member of multiple SE-related Conferences (e.g., ICSE, ASE, MODELS, RE, REFSQ, ICSA).

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