

# Runtime Quantitative Verification: Applications and Research Challenges

Radu Calinescu

Department of Computer Science  
University of York, UK  
`radu.calinescu AT york.ac.uk`

**Abstract.** A growing number of software and embedded systems are expected to adapt continually to changes in the environments they operate in. Many of these systems are deployed in safety-critical and business-critical applications from domains including healthcare, finance and defence, and must comply with strict dependability and performance requirements. To achieve such compliance, formal approaches traditionally employed in the design of critical systems must also be used during their operation. This talk will describe how a formal approach termed quantitative verification can be exploited in a runtime setting. Quantitative verification is a mathematically based technique for the modelling and analysis of the correctness, performance and reliability of systems that exhibit stochastic behaviour. The talk will present several successful runtime applications of the technique, and will discuss the research challenges that must be addressed in order to extend its applicability to additional runtime scenarios.