Combinatorial Testing and Its Applications

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Abstract

Studies have shown that combinatorial testing can help programs detect hard-to-find software bugs that may not be revealed by test cases generated using other testing techniques. The first part of this talk focuses on traditional black-box requirements-based combinatorial testing. In particular, I will discuss results and lessons learned from two real-life industry applications: a control panel of a rail-road system and a Linux system. The second part extends the concept of combinatorial testing to a white-box structure-based setting. I will present an advanced coverage criterion, *Combinatorial Decision Coverage*, in conjunction with symbolic execution to achieve high coverage cost-effectively without suffering from potential space exploration. Finally, I will explain how combinatorial testing can be applied to a graph-based methodology for testing IoT (Internet of Things).

Bio

W. Eric Wong received his M.S. and Ph.D. in Computer Science from Purdue University, West Lafayette, Indiana, USA. He is a Full Professor, the Director of International Outreach, and the Founding Director of Advanced Research Center for Software Testing and Quality Assurance (http://paris.utdallas.edu/stqa) in Computer Science at the University of Texas at Dallas (UTD). He also has an appointment as a guest researcher at the National Institute of Standards and Technology, an agency of the U.S. Department of Commerce. Prior to joining UTD, he was with Telcordia Technologies (formerly Bellcore) as a senior research scientist and the project manager in charge of Dependable Telecom Software Development.

Dr. Wong is the recipient of the 2014 IEEE Reliability Society Engineer of the Year. He is also the Edit-in-Chief of the IEEE Transactions on Reliability. His research focuses on helping practitioners improve software quality while reducing production cost. In particular, he is working on software testing, program debugging, risk analysis, safety, and reliability. Dr. Wong has published more than 180 papers and edited 2 books.

Dr. Wong is also the Founding Steering Committee Chair of the IEEE International Conference on Software Security and Reliability (SERE) and the IEEE International Workshop on Program Debugging. In 2015, the SERE conference and the QSIC conference (International Conference on Quality Software) merged into one large conference, QRS, with Q representing *Quality*, R for *Reliability*, and S for *Security*. Dr. Wong continues to be the Steering Committee Chair of this new conference (http://paris.utdallas.edu/qrs).