

# Model learning: a survey of foundations, tools and applications

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# Problems & Ideas

1. The quality and correct functioning of software systems are of prime concern. In addition to classical testing techniques, formal techniques like model checking are used to reinforce the reliability of software systems. However, obtaining of behavior model, which is essential for model-based techniques, of unknown software systems is a challenging task. To mitigate this problem, an emerging black-box analysis technique, called Model Learning, can be applied. It complements existing model-based testing and verification approaches by providing behavior models of black-box systems fully automatically.
2. This paper surveys the model learning technique which recently has attracted much attention of researchers, especially from the domains of testing and verification.

# Main Contributions

First, We review the background of model learning which gives some overview of Model learning technique. It includes the model learning concepts like behavior models, active automata learning and its types, learning frameworks, etc.

Second, We cover the foundations of Model learning technique which form the basis of subsequent sections. The covered key concepts includes basic framework, basic learning algorithm, various kinds of modeling formalisms, learning and testing algorithms, model learning by abstraction technique, data structures, learning complexity and a comparison summary. In order to understand the working of model learning, we explained it with a running example.

# Main Contributions

Third, We surveyed some well-known model learning tools and libraries, and provide their merits and shortcomings in the form of a comparison table.

Fourth, In the final section of our survey, we described the successful applications of model learning in multidisciplinary fields, current challenges along with possible future works, and then concluded our study.