Automating End-User Programming for Smartphones

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Abstract

Program synthesis has shown recent promise in a few domain-specific settings. This paper identifies an emerging, important application domain for synthesis, *viz.*, end-user programming for smartphones. We propose a new end-user programming model inspired by the search engine metaphor: (1) the end user programs by entering a set of keywords, which are mapped to a set of programming components, and (2) the synthesis system enumerates and ranks all valid compositions of these components in our domain specific language (DSL). The design of our DSL is based on an extensive study of mobile applications from various online forums. Our algorithm exploits the components' *type information* and the *structural constraints* imposed by our DSL to reduce the search space, and *learns* the user's intent by using a *general ranking scheme*. The system works extremely effectively in practice; over all of our collected benchmark examples, it is able to rank, in real time, the desired application among the top two choices. We believe that our methodology is general enough to be applied to other end-user programming domains as well.