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Automatic Model Generation with Symbolic Deep Learning

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Abstract

Automatic model generation based on user-task interactions is of great use for behavioral predictions and understanding of cognition. Mapping which environment features cause which actions seems like a classification problem suited for Deep Learning (DL). Unfortunately, DL does not create an observable model, and is more suitable to making predictions from billions of examples than from limited observations. There are, however, many tasks that lend themselves to symbolic input, allowing an alternative approach - Symbolic Deep Learning (SDL). Symbolic hierarchical representations have a long history in Psychological literature, though some of these were integrated as models of memory without action-selection (e.g. EPAM/CHREST), and some have run into computational limitations (e.g. configural-cue). SDL stands to benefit from better model integration and modern growth in computational power and algorithmic efficiency, and promises to be the right paradigm for automatic model generation from limited user observations.