

Machines that Assemble Signaling Pathways by Reading the Literature: Progress in DARPA's Big Mechanism Program

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DARPA'S BIG Mechanism program is developing technology to help humans build mechanistic models of very complicated systems. The test case for the program is Ras signaling, as Ras is implicated in roughly 30% of cancers and is the focus of the NCI's recent Ras Initiative. The idea of Big Mechanism is that computers will read journal articles and extract fragments of systems -- such as the Ras pathway -- and will assemble these fragments into executable models of the systems. A range of issues arise, from the challenges of machine reading, to the ways humans hedge their conclusions, to the diversity of model organisms and tissue types that are represented in articles, to the lack of essential information such as rate constants, to the difficulty of assembling results into models. And yet, a year into the Big Mechanism program, machines are reading large numbers of articles and the technologies for assembling models show promise.