

The Operators of Diagnostic Strategy

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NEOMYCIN is a computer program that models one physician's diagnostic reasoning within a limited area of medicine. NEOMYCIN'S diagnostic procedure is represented in a well-structured way, separately from the domain knowledge it operates upon. We are testing the hypothesis that such a procedure can be used to simulate both expert problem-solving behavior and a good teacher's explanations of reasoning.

The model is **acquired** by protocol analysis, using a framework that separates an expert's causal explanations of evidence from his descriptions of knowledge organization and strategies. The model is **represented** by a procedural network of goals and rules that are stated in terms of the effect the problem solver is trying to have on his evolving model of the world. The model is **evaluated for sufficiency** by testing it in different settings requiring expertise, such as providing advice and teaching. The model is **evaluated for plausibility** by arguing that the constraints implicit in the diagnostic procedure are imposed by the task domain and human computational capability.

This paper discusses NEOMYCIN'S diagnostic procedure in detail, viewing it as a memory aid, as a set of operators, as proceduralized constraints, and as a grammar. This study provides new perspectives on the nature of "knowledge compilation" and how an expert-teacher's explanations relate to a working program.