Chapter II

Assistance and Induction: The Therapy Planning Case

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Abstract

Software systems on their way from tools to assistants have to be equipped with learnability. This does apply in complex problem solving environments, in particular. Planning in complex and dynamic environments is learning. Plans are hypotheses proposed for execution. How is the system’s assistance to the human user related to the system’s ability to understand the user’s needs and desires? Inductive learning is identified as a crucial task of an intelligent computer assistant. In the area of therapy plan generation, inductive learning plays a particularly important role. Therapy actions planned have to be based on reasoning about executability conditions in the future. Estimates of several future parameter values are driving the inductive planning process. The issue of induction is only one among a variety of assistance features. The present approach has to be seen as a contribution to a larger concerted endeavor towards intelligent systems’ assistance.
“It is difficult to predict, especially the future” is attributed to Niels Bohr in the one or in the other formulation. The words quite naturally call forth ideas about the complexity of the natural sciences and of physics, in particular. Beyond it, these words may nicely serve as a motto for all work on planning in complex, dynamic environments.

By their very nature, plans are intended to specify actions to be performed in the future. If the environment in which plans are to be executed is not trivial, executability of particular actions cannot be guaranteed under all circumstances at planning time.

Consequently, the generation of plans that are likely to be executable requires reasoning about the future. This is a quite ambitious task.

Advanced computerized planning tools support the human user in thinking about the future—they are reasoning instruments. The present chapter addresses the step from planning tools to planning assistants. Planning assistants relieve their human partners from some of the difficult tasks of pondering about the future.

We should not expect planning assistants to transform unsolvable problems into solvable ones. If the future is difficult to foresee, this does apply to planning assistants as well. It would be a misconception to expect planning assistants to forecast executability conditions which cannot be determined on the basis of incomplete and vague information available in dynamic environments. Instead, we expect them to deal with the high complexity of reasoning based on only incomplete information.

Humans have severe difficulties in reasoning based on incomplete information, because human thinking is usually strongly biased. Humans unconsciously take a large amount of facts for granted. It is rather difficult to find the borderline between justified belief and unjustified wishes.

In a recent report to the European Commission, Bibel, Andler, da Costa, Küppers, and Pearson (2004), the authors stress the point that humans have a tendency towards thinking in local terms and thus are unable to oversee various consequences of their actions (pp. 52, 53). The ultimate recommendation derived in this report reads as follows: