

This thesis is mainly about classical planning for artificial intelligence (AI). In planning, we deal with searching for a sequence of actions that changes the environment from a given initial state to a goal state. Planning problems in general are ones of the hardest problems not only in the area of AI, but in the whole computer science. Even though classical planning problems do not consider many aspects from the real world, their complexity reaches EXPSPACE-completeness. Nevertheless, there exist many planning systems (not only for classical planning) that were developed in the past, mainly thanks to the International Planning Competitions (IPC). Despite the current planning systems are very advanced, we have to boost these systems with additional knowledge provided by learning. In this thesis, we focused on developing learning techniques which produce additional knowledge from the training plans and transform it back into planning domains and problems. We do not have to modify the planners. The contribution of this thesis is included in three areas. First, we provided theoretical background for plan analysis by investigating action dependencies or independencies. Second, we provided a method for generating macro-operators and removing unnecessary primitive operators. Experimental evaluation of this method brought promising results, because we were able in many cases to boost planners' performance at the cost of the little time spent on learning. Third, we provided a method for eliminating unnecessary actions. Like the previous method, this method gathered also very promising results, because we were also able to boost planners' performance at the cost of the little time spent on learning.