TO PLAN OR NOT TO PLAN II

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Chapter TO PLAN OT NOT TO PLAN discussed aspects of action planning. During the infancy of artificial intelligence, it was "obvious" that intelligence is the ability to solve a problem by planning the required sequence of actions for this. Today it is clear that intellectual activity involves **operating with many tasks simultaneously** and that the **formulation of a task is also a task**. It is easy to see that the latter circumstance leads to recursion. Furthermore, for referred recursion to be implemented, it is necessary to have tasks that do not require formulation or do not require a solution in the described way, that is, the construction of a plan.

A plan is usually understood as a specific sequence of actions/steps leading to the desired result. For example, a tea preparation plan found on the Internet looks like this:

A Fill the infuser with the amount of tea **B** Bring cold water to a boiler**C** Boil water **D** Pour boiling water into the teapot**E** Lower the infuser into the teapot**F** Remove the tea infuser from the teapot

It is not difficult to find that the same result can be achieved by performing actions in a different order (for example, performing step **A** after **B** or **C**). After thinking longer, we find that we can not build a sequence of actions in advance at all but perform the following action, choosing it randomly from one of the many outstanding actions that satisfy a set of rules:

[**a**] To boil, water must be poured into the boiler.[**b**] To put the infuser into the teapot, you need to have tea poured into it.[**c**] To pour water into a teapot, it must be brought to a boil.[**d**] The infuser must be removed for the tea to be ready.

The essential aspect is that these rules are ***not directly related to the goal/task*** (to make tea); they reflect only the ***logical connections between the objects potentially involved in the process***. To achieve the desired result, it is sufficient to have a set of operations that must be performed, knowledge about the operated objects, and apply the described universal algorithm for solving the problem.

Thus, a side effect of the planless solution of the problem is the corresponding plan, the memorization of which is optional. In principle, the compilation of a set of necessary steps can be considered a kind of planning; however, it is clear that this does not fit the traditional planning definition.

Repeated application of the specified universal algorithm to the same task makes it possible to ***optimize the process*** in accordance with a specific ***criterion*** if each time this criterion is calculated, and the sequence that provided the best value of the criterion is remembered (if there are several criteria, the best sequences can be different, of course).

The apparent advantage of this approach is that it ***naturally extends to the parallel execution of several tasks***: it is enough to ***combine the sets of actions*** specific to each of these tasks. In addition, there is no need to remember from which step of the sequence to continue execution if the execution of the sequence is interrupted by some events.

In the previous chapter on planning, it was noted that the development of a plan of action in many cases (if not in most cases) is impossible due to insufficient information, the unpredictability of the actions of other agents, and insufficient computing resources to develop a plan in a reasonable time. The above considerations show how it is possible to achieve the desired result without first building an action sequence.

In general, the achievement of the goal is possible both with the use of a pre-planned action sequence and without it, and the goal/task itself can be the implementation of a specific action plan. AGI obviously should be able to use all the approaches described and apply them depending on the situation.

SUMMATION

- *Traditional planning has an alternative in the form of a set of actions and rules that ensure the usefulness/feasibility of actions.*

- *Planless achievement of results is based on a universal algorithm.*

- *The most successful of the implemented sequences of actions within the framework of the planless approach can then be converted into a "standard optimal plan", that is, planless problem solving is also a method of planning.*

- *A planless approach to implementing activities does not require adaptation to achieve many goals at once and activities in an environment with a short horizon for predicting the situation.*

- *Having the ability to act in the paradigm "building a plan - implementing a plan" is not an indispensable attribute of intelligence; instead, on the contrary, a sign of intelligence is the ability to act successfully without first drawing up a plan.*

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