Agents for flowchart parsing

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Abstract

This work shows the application of autonomous agents to parsing of a flowchart in the environment of learning Portugol IDE.

Portugol IDE

Portugol IDE is an environment of programming learning that uses the algorithmic language for the specification of instructions that are based on the Portuguese language. This system possesses two ways of functioning: the way of code writing and the way of Flowcharts designs.

Flowcharts

The Flowcharts are one of the forms of representation of algorithms. Those have the particularity to present graphically the computational operations and the flow between them. This form of representation is many times used for computer programming learning therefore allows the apprentice to inside visualize the flows of the algorithms

Parsing

In both the ways it is necessary to make parsing of the algorithm to indicate to the apprentice the errors that committed, or to congratulate it with the success. The main difficulty of parsing of the algorithm is the identification of the blocks. In the case of the code publisher the solution is trivial because the language definition provides a flag to beginning and end of blocks (eg. *SE* and *FIMSE*). In the case of the flowchart the situation is more complicated because the beginnings and the ends of the blocks are hidden in the flow and this is not linear as it happens with the code lines.
In the flowcharts two symbols exist that serve to signal the beginning and/or the end of a block. The first one is the decision symbol and the other is the connection symbol. The main block of the program starts and finishes for the special symbol Inicio/Fim

Agents

The general idea to make parsing for agent passes for the construction of autonomous agents, who are freed in the symbols that possibly make blocks and to give to them autonomy to it necessary to reorganize itself. The result will be a set of agents who signalize where blocks starts and finish.

Behaviour of the agents

The agents have two distinct behaviours: when they are in adaptation and when they are in competition:

Behaviour of adaptation:

When the agents are in adaptation runs the flow until find a beginning/end form. When they reach it, they stop and they generate childrens, one or two (agents) as the number of flows that leaves the form. These agents possess the same behaviour and make its proper adaptation. The process starts when an agent in created into the form "Inicio" and finishes when all the agents will be adapted.

Behavior of competition:

Of all the agents who populate the flowchart exist some that represent cycles. These agents are promoted the cycles and compel the neighbouring agents (parents and childrens) to reorganize. This reorganization could be the promotion or to elimination of the agents who cannot make cycles. The process finishes when all the agents will be promoted the cycles, and this means that the flowchart is correct, or not to exist more promotions to make and the flowchart is incorrectly defined.

Conclusion

The considered system runs well and is implemented in the "demo" that follows in annex. Some cases of exception exist that are to be studied and to be improved. More information can be gotten in:

- Portugol IDE : http://orion.ipt.pt/~manso/Portugol/index.html
- Demo : http://orion.ipt.pt/~manso/investiga/eumas2006/index.html