Changes to JFLAP to Increase its Use in Courses *

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ABSTRACT

JFLAP is software for experimenting with formal languages and automata theory. In this Tips and Techniques session we describe the recent changes to JFLAP to make it more usable in an automata theory course.

Categories and Subject Descriptors

F.4.3 [**Theory of Computation**]: Mathematical Logic and Formal Languages Formal Languages; D.1.7 [**Software**]: Programming Techniques Visual Programming

General Terms

Theory

Keywords

JFLAP, automata, formal languages, pumping lemma, CYK parser

1. DESCRIPTION OF JFLAP

JFLAP[2, 3] is software for creating and experimenting with several types of automata and grammars, and for experimenting with related construction-type proofs. With JFLAP one can build an NFA, then go through the steps in converting it to a DFA, then convert it to a minimal state DFA, then convert it to a regular grammar or a regular expression. With JFLAP one can also experiment with l-systems, the simulation of the growth of plants and fractals, and parsing, such as brute force parsing, LL(1) and SLR(1) parsing. JFLAP is available for free on www.jflap.org[1].

2. ADDITIONS TO JFLAP

In this session we will demo new features of JFLAP to make it easier to use in lecture and to make it fit more definitions of automata. Probably the most useful feature added in the editing panes are UNDO and REDO buttons.

After creating an automaton in JFLAP, one can now save it in an image file in the formats: png, jpg, gif or bmp, or export to svg format. These images could then be placed easily into a PowerPoint presentation for a lecture.

When using JFLAP in a large lecture hall, it would be useful to make the tool display in a larger size. We have added a zoom functionality with slider bars to many of the panes such as the editor pane for finite state machines, and to many of the panes in the construction proofs.

In displaying an automaton, previously we allow users to move states around, but arcs would be set. If there were two arcs between two states in different directions the arcs would automatically curve. We have extended the arc capability by allowing one to change the shape of an arc by forcing it to curve.

To allow for more real life examples, we have extended the label capability for finite automata to accept a regular expression form. We define [1-9] on an arc to define 1+2+3+4+5+6+7+8+9 (1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9) and similar notation for [a-z] and [A-Z].

The acceptance of pushdown automata have been extended to include accepting by empty stack. Before acceptance was always by final state. Now when you enter an input string you must select the type of acceptance.

Several additions were added to JFLAP to allow users to match an automaton more formally. For example in the DFA, you can add or take away a trap state by a selection item to make the automaton complete. When creating an NPDA, one can now select the definition of the NPDA. The default definition is to make the NPDA more general, so multiple symbols can be popped from the stack in one step. To restrict this the user can select "single character input" to restrict that only a single character at a time can be popped from the stack.

3. REFERENCES

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[3] S. H. Rodger, E. Wiebe, K. M. Lee, C. Morgan, K. Omar, and J. Su. Increasing engagement in automata theory with jflap. In *Fourtieth SIGCSE Technical Symposium on Computer Science Education*, pages 403–407. SIGCSE, March 2009.

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