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Short Truth Table Solver

This program is an automated theorem prover for short truth tables. It parses a given input file, translating the logical statements into something that the program can work with. It can handle all five logical operators: and, or, implication, biconditional, and not. After parsing the input file, it sets the premises (the first n-1 statements in the input file) to true and the conclusion (the last statement in the input file) to false.

Then, the program attempts to find a contradiction using the short truth table method. It does this by looping over the following steps. First, it checks to see if there is a contradiction somewhere in the set of statements. If not, the program looks for any known literals that have not been assigned a value. For example, if A is set to true in the first statement but has no value in the second statement, the program will set A to true I the second statement. Next, it tries to force a truth value. In the given order of the n statements, it looks to see if some literal or a statement must be set to true or false. An example of this would be A | B, where A is true. The entire statement, A | B, would be true if A is true.

If it cannot find a contradiction, assign known literals, or find any forced truth values, the program then looks to see if all possible truth values have been assigned. If so, then there is not a contradiction, meaning that the original set of statements is invalid. If there are some literals that have not been assigned a truth value, then the program is not able to determine whether or not the set of statements is valid. In order for the truth table solver to be fully functional, the next step in the program should be to attempt to assign true to one of the unassigned literals. Then, if after repeating the earlier steps, no contradiction is reached, it should then assign false to that same literal and try again. Attempting to implement this proved to be more difficult than initially anticipated. However, besides this one issue, the solver seems to be a fully functional automated theorem prover for truth tables.