

Optimized Boolean Form (#4190)

A simple, linear cost algorithm for converting positive-form expressions to their Optimized Blist Form (OBF)

Georgia Tech inventors have created a simple, linear cost algorithm for converting positive-form expressions to their Optimized Blist Form (OBF). This invention transforms an arbitrary positive-form Boolean expression E of n literals into its OBF. The invention includes a direct CSG rendering, where a candidate surfel stored at a pixel is classified against an arbitrarily complex Boolean expression using only 6 stencil bits; the new Logic Matrix (LM); and the new Logic Pipe (LP), which uses n gates that are connected by a pipe. The process involved a preprocessing phase and a conversion phase that associates three integer labels with each literal in the expression. The OBF then may be used to compute the truth-value of E .

Benefits/Advantages

- Eliminates the possibility of causing exponential growth
- Simplified solution

Potential Commercial Applications

- Computer science

Background/Context for This Invention

Any Boolean expressions may be converted into positive-form, which has only union and intersection operators. Assuming that the truth-values of the literals are read one at a time. The numbers $s(n)$ of steps (operations) and $b(n)$ of working memory bits (footprint) needed to evaluate E depend on E and on the evaluation technique. A recursive evaluation performs $s(n)=n-1$ steps but requires $b(n)=\log(n)+1$ bits. Evaluating the disjunctive form of E uses only $b(n)=2$ bits, but may lead to an exponential growth of $s(n)$.

Jaroslav R. Rossignac

Professor – Georgia Tech College of Computing

More Information

U.S. Patent Issued - [8,370,115](#)

Publications

For more information about this technology, please visit:

<https://licensing.research.gatech.edu/technology/optimized-boolean-form>

Images: