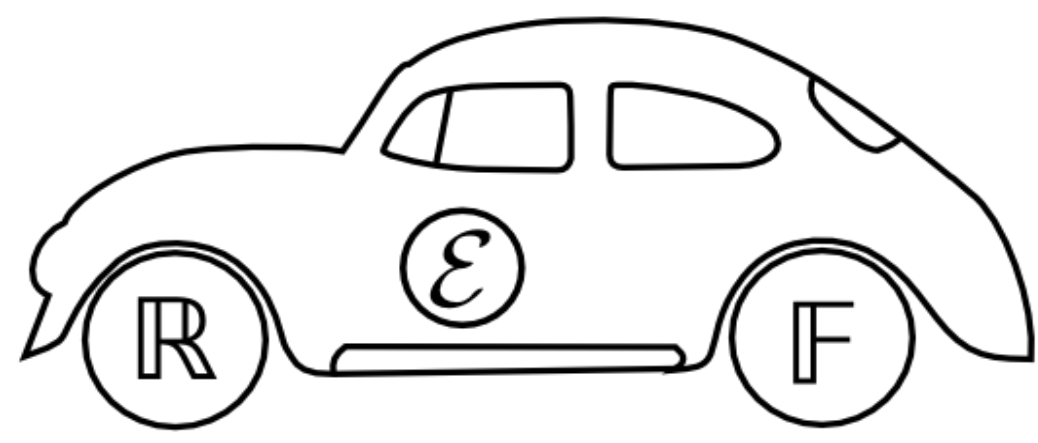


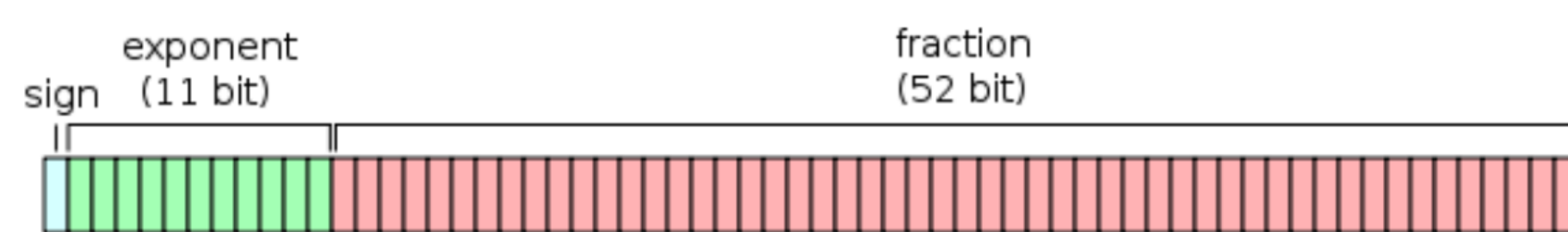
HERBIE



Pavel Panchekha
James Wilcox

Alex Sanchez-Stern
Zachary Tatlock

What the Float?

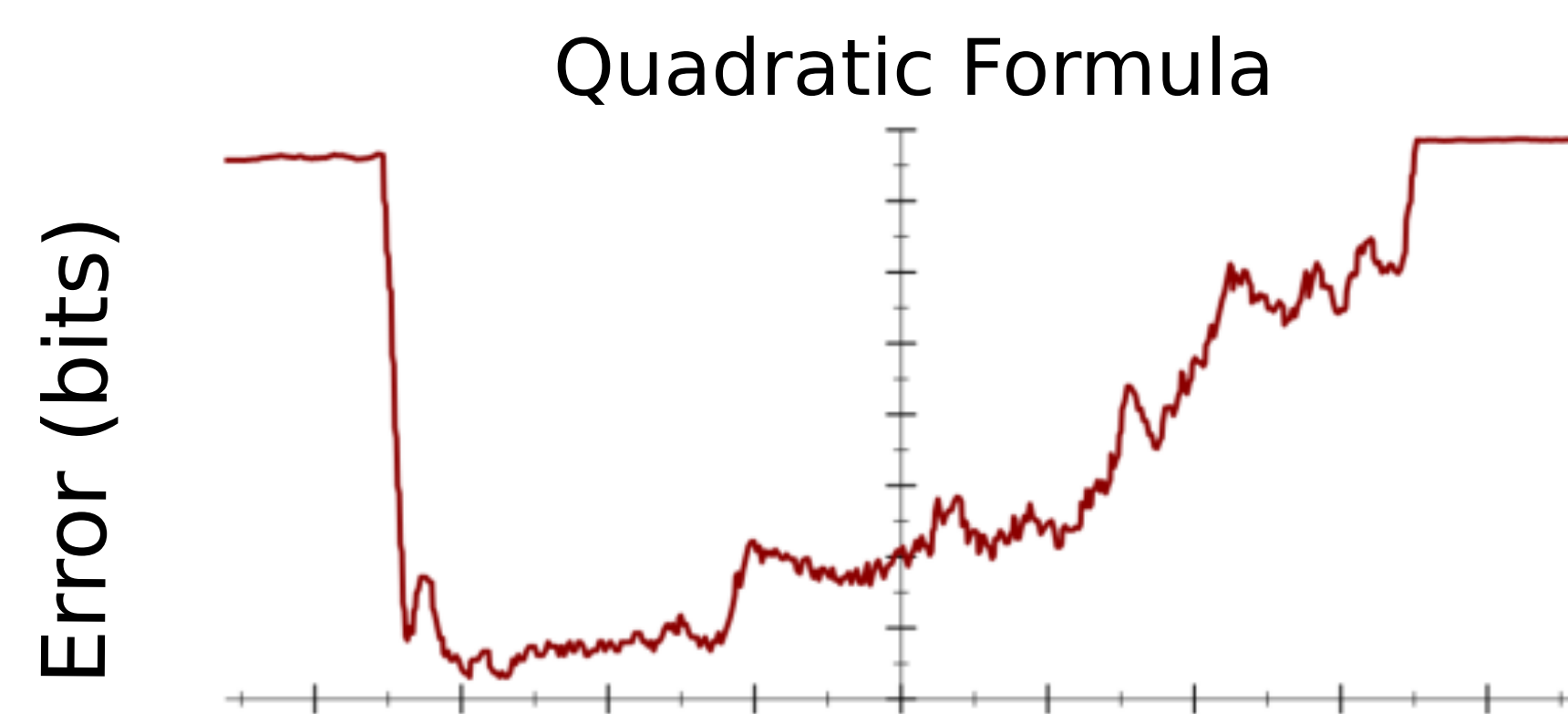


Computers approximate real numbers using floating point.

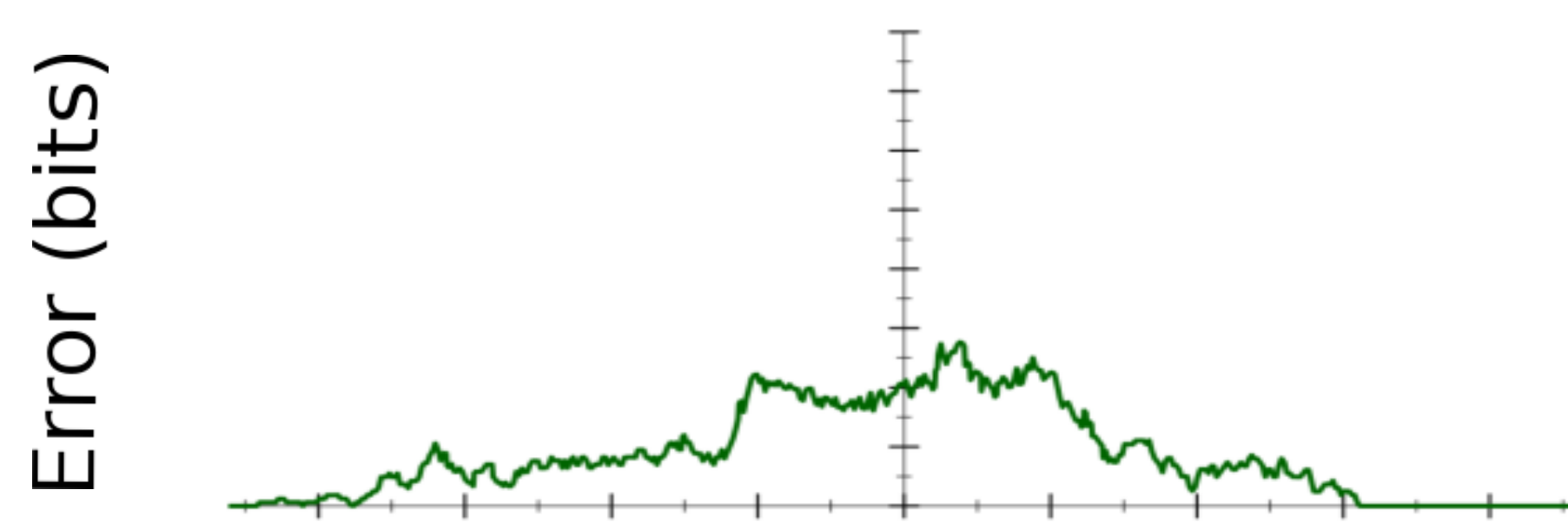


Floats are used everywhere.

Approximation leads to error:



Herbie automatically reduces error:



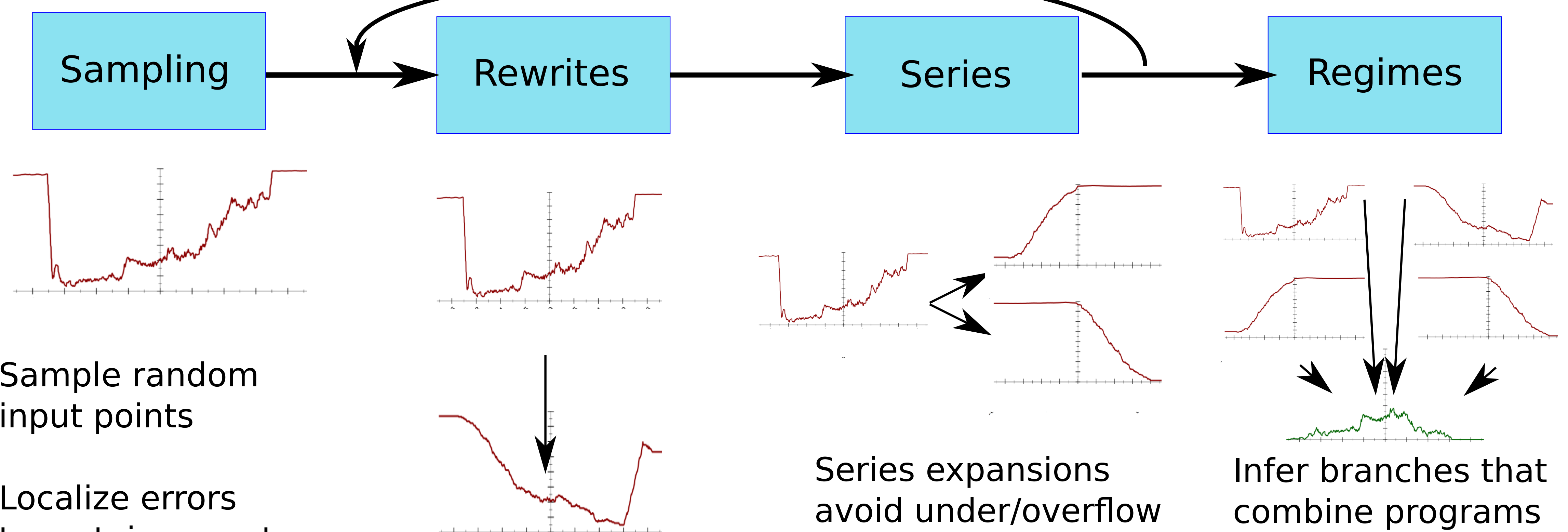
Find out more about Herbie at:

<http://herbie.uwplse.org>

How Herbie Works

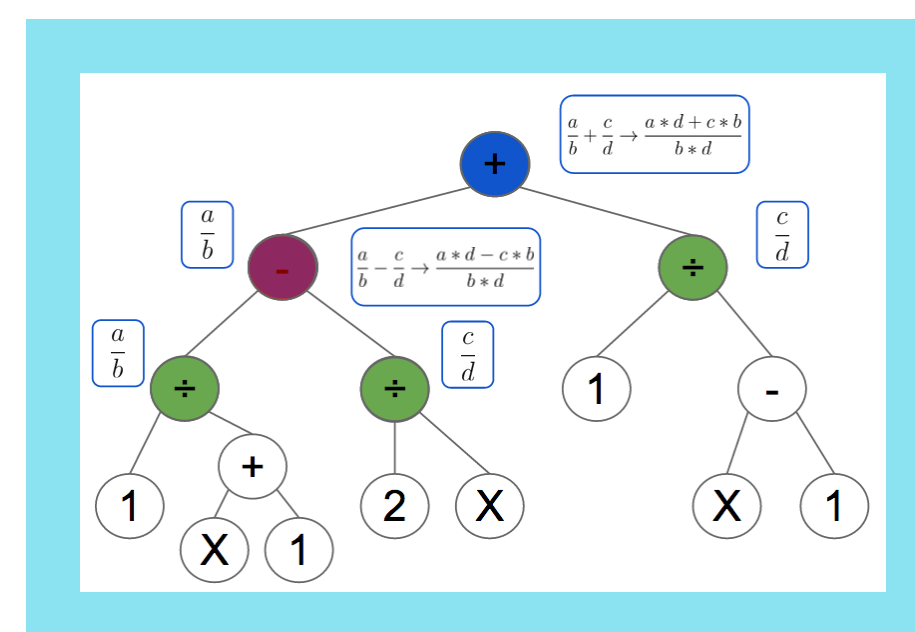
Go to our website for full details!

<http://herbie.uwplse.org>



Sample random input points

Localize errors to certain operators



Algebraic rewrites using a rewrite database

$$a - b \rightarrow \frac{a^2 - b^2}{a + b}$$

Series expansions avoid under/overflow

Infer branches that combine programs

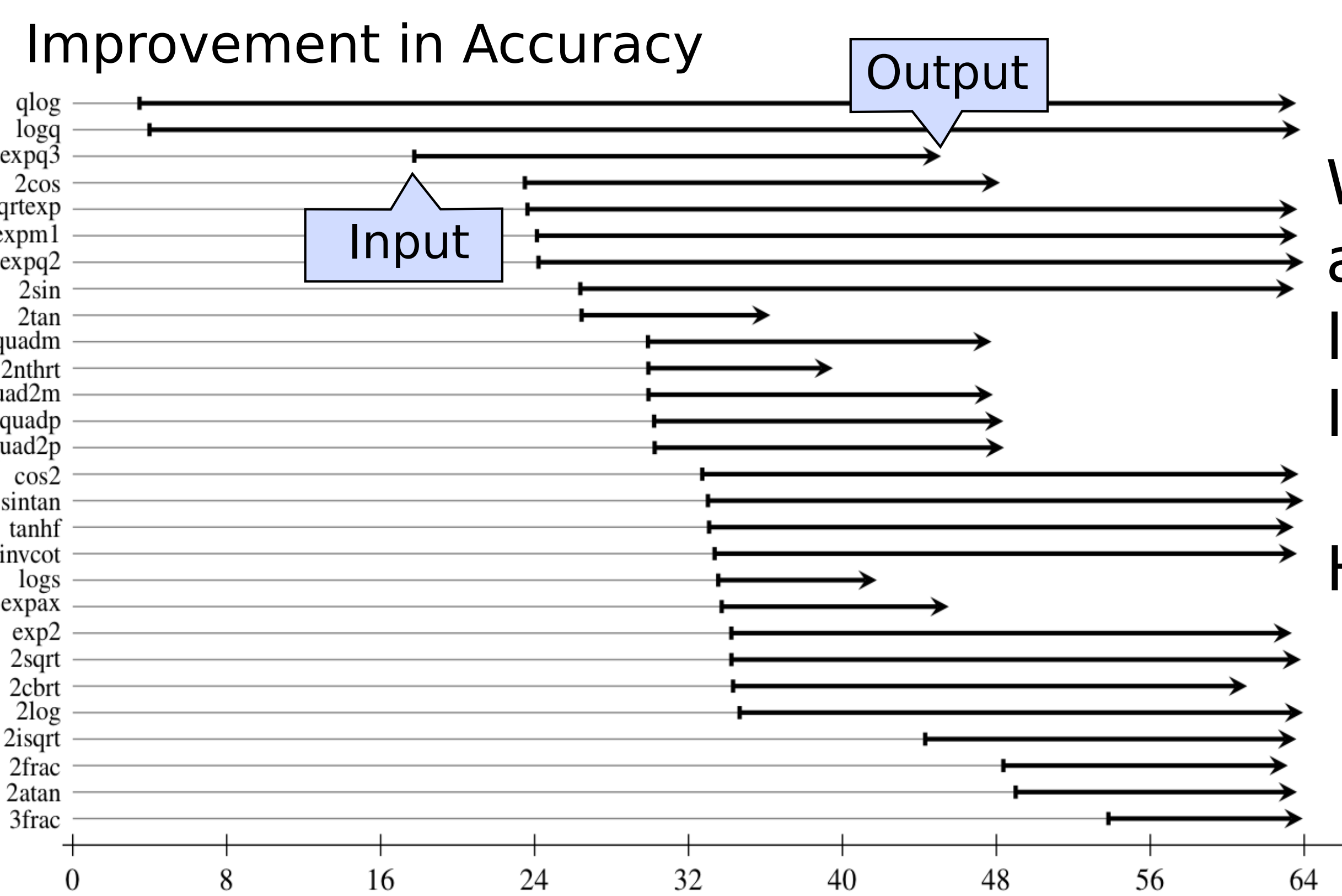
Herbie uses a heuristic search algorithm to find programs that compute the same expression more accurately.

The search works without human input.

Results

Try an online demo at our website!

<http://herbie.uwplse.org/demo>



We've tested Herbie on classic problems and real-world formulas from numerical libraries, scientific papers, and even from large-scale surveys of open-source code.

Herbie often finds and fixes inaccuracies.

Real World Impact

math.js Fix bugs in a math library

Compiler plugin for GHC Haskell

