On Implementing the C++ Interval Library `libieeep1788`

Marco Nehmeier

Institute of Computer Science
University of Würzburg
Am Hubland
D 97074 Würzburg, Germany
nehmeier@informatik.uni-wuerzburg.de

Abstract

To enlarge the acceptance of interval arithmetic the IEEE interval standard working group P1788 has been founded in 2008. The presumable standard defines intervals as connected, closed, not necessarily bounded subsets of the reals. The basic arithmetic operations are defined as powerset operations. The interval operations compute the interval hull of these sets. Since a computer representation of an interval uses floating point numbers for the bounds, directed rounding toward $-\infty$ or $+\infty$ is necessary to compute a true enclosure.

Additionally, a so called *decoration* system is introduced by the working group to treat mathematical events like discontinuity or undefinedness of an expression for a given interval box.

In this talk we will present the key concepts of the tentative standard as well as a faithful C++ implementation which can serve as a reference model for other implementations.

References

[1] IEEE Interval Standard Working Group - P1788. http://grouper.ieee.org/groups/1788/.