

Implementation of the VAS algorithm in Reduce

Alkiviadis G. Akritas

In this talk we present our implementation of the VAS real root isolation method in the Computer Algebra System Reduce. This was a semester project in the Computer Algebra class of the Department of Electrical and Computer Engineering at the University of Thessaly.

The Reduce programming language is an old one and since it lacks certain features, such as *dynamic* lists and the statement `continue` it provided challenges / traps to the students. We describe the interfaces we used, namely TeXmacs and the standard Terminal, and state their weak points. The end-product is the file VAS.red that can be downloaded from the site

<http://inf-server.inf.uth.gr/~akritas/VAS.red>

VAS.red can be used both in batch and in compiled mode (instructions on the usage can be found inside VAS.red itself).

For the approximation of the roots we have two procedures: `vas_realroots` and `vas_realroots2`.

The first one, `vas_realroots`, uses the (algebraic) procedure `rfind` which serves as an interface to the Reduce (symbolic) procedure `rootfind`; in this case the user has to set the *desired* precision.

The second approximation procedure, `vas_realroots2`, uses the Reduce (algebraic) function `nearestroot`, which automatically adjusts the precision; however, in this case it was necessary to implement certain (time wasting) tricks to make it always converge to the desired root.

In both cases, the obtained results are exactly the same as those computed with Reduce's own `realroots` function.

Alkiviadis G. Akritas
University of Thessaly,
Department of Electrical and Computer Engineering
Volos, Greece
e-mail: akritas@uth.gr