Formula explorer for Isabelle/HOL

Proof assistants such as Isabelle/HOL allow us to formalize mathematical proofs such that a computer can understand them. One of the limitations of such systems is that, when something does not work, it is very hard to understand why. Error messages may be as uninformative as “method failed”. Often, as a user, one needs to carefully compare formulas and manually find a mismatch between them (e.g., are “x+y+23*z^2-17z/34^2+1234*abs(z+e)” and “x+y+23*z^2-17z/3^42+1234*abs(z+e)” the same?) To remedy this, I would like to a graphical tool that allows users to interactively explore formulas (fold / unfold subterms, see differences at a glance, get extra information) to explore such a situation and find the error more easily. (A graphical debugger for proof steps, so to say.)

Programming language: Ideally Scala, but any other JVM-based language will do.

Features (ideally):

- Showing a formula
- Exploring/visualising the tree structure of the formula in a comfortable way (open/close subterms)
- Exploring pairs of formulas (showing corresponding subterms, linked opening/closing of terms, showing differences)
- Supporting pattern matching and unification (e.g., comparing “1+2=3+4” and “x=y” should allow us to check that the first formula matches the second)
- Showing useful metadata (e.g., type information of subterms) in side windows
- Interfacing with Isabelle/HOL (e.g., opening the term explorer directly from Isabelle from an error in a proof)

Not all features have to be implemented during the software project, of course.

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