Java Extensions and Mathematica Link with Netlogo

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Java Extensions

- Netlogo API for writing Java interfaces (incomplete).

- (Most) extensions now work in applet mode!

- Import existing java capabilities into Netlogo.

- Use Netlogo interface for feedback of Java model.

- Provide access to advanced analytics.

Some Information about Java

- Very popular language: 9 million software developers, 1.1 billion desktops, 3 billion mobile phones.

- Java has been tested, refined, extended, and proven on all platforms and for web-based applications.

- You can learn java from university courses, free online tutorials, hundreds of books, and lots of time and effort.

- Huge database of libraries developed for just about every purpose you can think of, which are constantly being updated and expanded.

Java is an Object-Oriented Language

- Data structures are virtual things, that exist virtually, run their own procedures, and communicate with other objects.

- Programming techniques include data abstraction, encapsulation, messaging, modularity, polymorphism, and inheritance.

- Concepts released to the general public in 1981 with Smalltalk.

- Clearly well-suited to agent-based modeling.

- The foundation of Netlogo is written in Java, but Netlogo itself is only partially object oriented.

Using Java inside Netlogo

- Find a Java extension that does something useful to you.

- Get the .jar file for that extension and save it to either:
    1) the same folder holding the .nlogo file you're using, or
    2) the extension folder in the Netlogo directory.

- Each extension consists of a folder with the same name as the extension, entirely in lower case. This folder must contain a JAR file (the java code) with the same name as the folder.

- Some extensions depend on additional files. These files will be in the extension's folder along with the JAR file.

Using Java inside Netlogo

- Once you have all the JAR files and folders set up correctly, you initialize the extensions in Netlogo by writing: "`extensions` [extension1 extension2]" at the TOP of your nlogo file.

- Now you can use the commands from those extensions just like they were part of Netlogo.

- Typically the syntax is "`extension:command ...`"

- Look at the extension documentation for a list of commands, their functions, and usually some examples.

Using Java inside Netlogo

- Netlogo includes the collowing extensions: array, table, matrix, gogo, profiler, sound, gis, bitmap, and qtj (Quicktime).

- Other extensions can be found online (currently on GitHub, but search "Netlogo Extensions" to find them).

- Let's take a look at what's out there, and try using one.
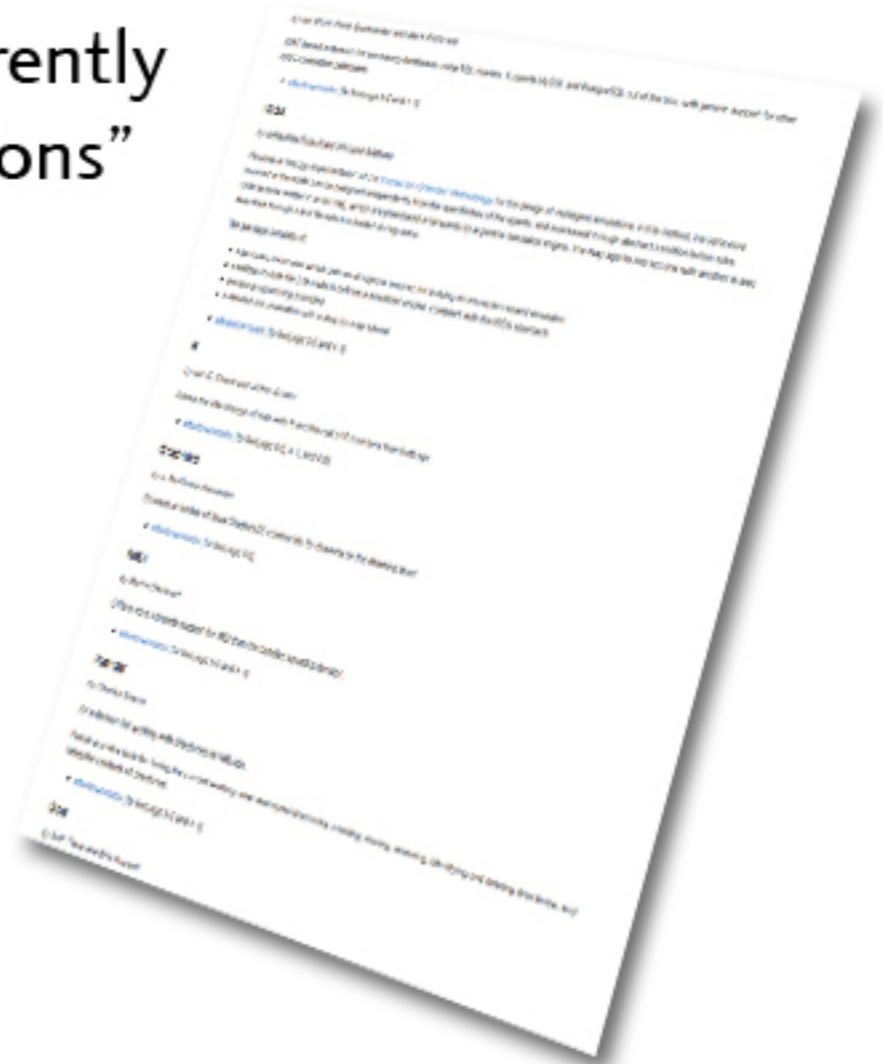
Writing Java Extensions for Netlogo

- API description includes all the information you need to write an extension in Java (or Scala or Python using wrappers).

- Includes a tutorial to get you started and it provides all the Java code that is special for the result to be an extension.

- Also has templates for all the other files you need to create to get your extensions to work (e.g. manifests, classmanagers, and special compression for applets).

- Now that the source code is openly available, you can instead augment the Netlogo code instead of writing an extension.

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Mathematica Link

- Real-time interaction between applications.
- Provides a highly interactive self-documenting workflow.
- Replace the Behavior Space with adaptive sweeping.
- Useful in model debugging.
- Utilize Mathematica for:
  - data importing
  - statistical functions
  - network analysis
  - document creation
  - visualization
  - and much, much more.

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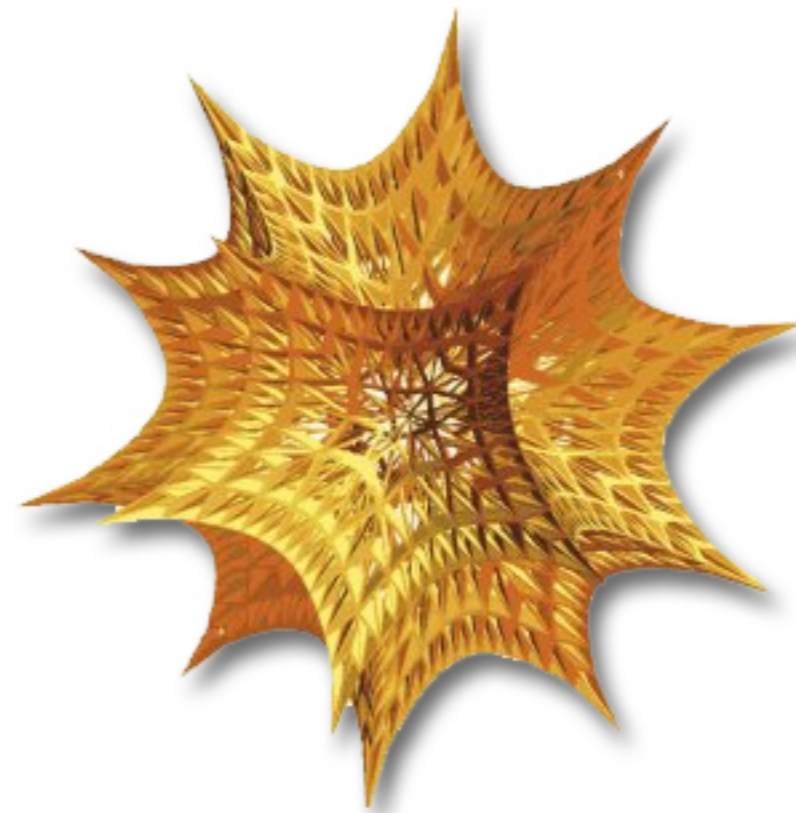
Installing the Mathematica Link

- First, you must have both Mathematica (v06 or later) and Netlogo 4.1.3 (or later) on your computer.

- Installation and running is done through Mathematica, which then opens and controls Netlogo.

- Step-by-step installation instructions are available in the Netlogo user guide.

- Furthermore, the Mathematica Link subfolder in your Netlogo directory includes a Mathematica file including a tutorial and several useful examples.

Running the Mathematica Link

- Use Mathematica to run an experiment on the Forest Fire model.

- Collect data from the model and plot the results.

- Collect data from a sweep of a parameter and plot the results.

- Be baffled that there is no way to close Netlogo from inside Mathematica except to sever the link.