

A Viewer Applet for 1D Time Series Data

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Abstract

There are times when even simple tasks need a custom solution. This technical note describes a custom-built Java applet for viewing and animating 1-dimensional time series data, constructed as part of our work with the Inverse Ocean Modeling initiative.

Introduction

The Inverse Ocean Modeling (iom.asu.edu) project is an NSF-funded activity aimed at understanding how to assimilate data from ocean buoys into computer simulations of ocean and wave behavior. Understanding the computational techniques for data assimilation will, in the long term, improve predictions regarding ocean wave heights, which is of vital interest to agencies such as the U.S. Navy.

One goal of the project is to make data assimilation techniques and an inverse ocean modeling framework available and usable to the geosciences community. An extensive instructional Web site is in development to support self-paced learning and experimentation with data assimilation techniques. The VIS Lab authored and contributed a Java applet to view animated 1-dimensional graphs of numerical functions for use with that Web site. A screenshot of the applet is shown in Figure 1.

Design Goals

While one might think that a free, Web-based, 1-dimensional data viewer might already exist, we were unable to locate one that met the design goals needed for the instructional Web site. In addition to the criteria of being Web-based and cost-free, the product needed to provide the following features for the end users of the Web site:

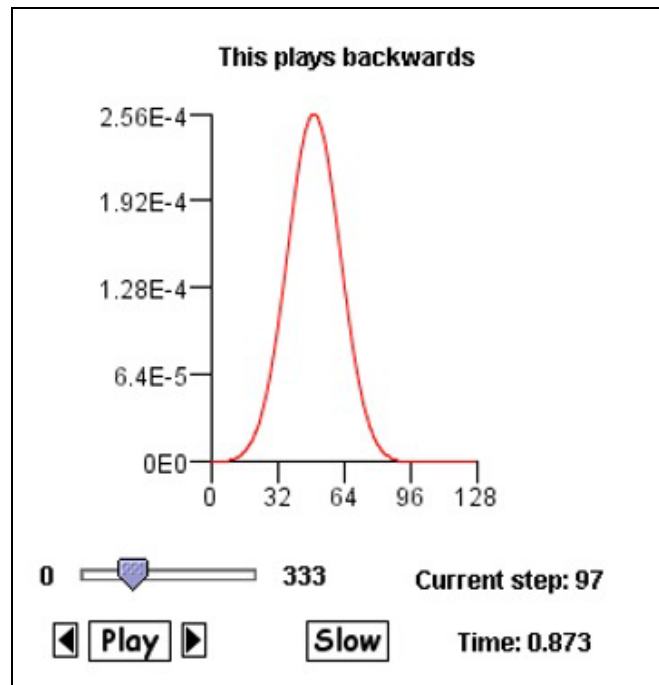
- User control over playing, stopping, and resuming play
- User control over the speed of play

The product also needed to provide these features to the authors of the Web site:

- Ability to reuse the viewer easily for multiple time series datasets
- Ability to specify that an animation run *backwards* through a time series
- Ability to label the overall plot, as well as the horizontal and vertical axes
- Tick marks on the horizontal and vertical axes

- Indicator to show which timestep is in view
- Indicator that maps timestep to real time

Figure 1. A screenshot of the 1D data viewer applet.



Usage

A Java applet was constructed to meet the design criteria listed above. Implementing the functionality as an applet makes it possible to use the product over the Web, with display on multiple platforms and operating systems. A number of parameters are defined for the applet, such that it is completely configurable by the Web site authors and data can be presented in the way that's appropriate for each time series.

In its simplest use, the Web author specifies the dataset file name, the number of data values on the horizontal axis, and the number of time steps in the time series, and the corresponding "real" time, as in:

```
<applet code="plot.Plotter" archive="plot.jar" width="300" height="300">
<param name=data value="http://vis.uits.iupui.edu/IOM/plot/fort.41">
<param name=dim value="128">
<param name=steps value="334">
<param name=timemin value="0.0">
<param name=timemax value="3.0">
</applet>
```

Additional parameters can be specified, to indicate an overall title, horizontal and vertical labels, and horizontal and vertical minimum and maximum values. For example, the HTML used to produce the screen shot in Figure 1 is the following:

```
<applet code="plot.Plotter.class" archive="plot.jar" width="325" height="325">
<param name=data value="http://vis.uits.iupui.edu/IOM/plot/fort.61">
<param name=dim value="128">
<param name=steps value="334">
<param name=title value="This plays backwards">
<param name=play value="backward">
<param name=timemin value="0.0">
<param name=timemax value="3.0">
</applet>
```

Particular values can be used to label the axes by specifying them in the HTML file. And time series values can be played in reverse order by specifying the “direction” parameter. The complete list of applet parameters is shown in the following table.

Parameter	Meaning	Default value
data	URL to the data	must be specified
dim	number of points per plot	must be specified
steps	number of time steps	must be specified
timemin	minimum time value	must be specified
timemax	maximum time value	must be specified
title	The label at the top of the plot	blank
hlabel	Label on the horizontal axis	blank
hmin	minimum value on the horizontal axis	0
hmax	maximum value on the horizontal axis	value of dim parameter
vmin	minimum value on the vertical axis	minimum value in dataset (calculated)
vmax	maximum value on the vertical axis	maximum value in dataset (calculated)
play	Must contain either "forward" or "backward"	"forward"
multiplier	Speed multiplier	1.0
htick0	horizontal tick label 0 (starting from the bottom)	calculated
htick1	horizontal tick label 1	calculated
htick2	horizontal tick label 2	calculated
htick3	horizontal tick label 3	calculated
htick4	horizontal tick label 4	calculated
vtick0	vertical tick label 0 (starting from the left)	calculated
vtick1	vertical tick label 1	calculated
vtick2	vertical tick label 2	calculated
vtick3	vertical tick label 3	calculated
vtick4	vertical tick label 4	calculated