# **Dynamic Data Viewer** Easily Study Arbitrary Subsets of Data

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## **1. Introduction**

Have you ever made a plot of data in Excel or a similar program and wished the result wasn't so static? Static plots are great to convey information about a certain subset of the data, but to *thoroughly* study the data, a more versatile tool would be nice to have, and this is what I set out to create.

## 2. Objectives

- Dynamic manipulation of Cartesian coordinate system plots - initially 2D, eventually 3D
- Ability to load multiple data sets and create multiple plots
- Support of standard numeric and categorical data types
- Flexible movement from big picture to intricate detail easily with multiple degrees of freedom
  - special on-screen controls
  - key binding capability

### Two primary user level components:

| Main Window                               |                    | 2D Plot      |   | -Plot View 1-                             |   |             |                  |            |                         |  |
|---|--------------------|--------------|---|---|---|-------------|------------------|------------|-------------------------|--|
| mock-up                                   |                    | Viewer       |   | DropDown1                                 | DropDown1 DropDown2 DropDown3   |             |                  |            |                         |  |
| ' Window                                  |                    |              |   |   |   |             |                  |            |                         |  |
| , mocł                                    |                    |              | р | [PEG] vs. [P/E]                           |   |             |                  |            |                         |  |
|   |                    |              |   | 7   | 8.00  |             |                  |            |                         |  |
| -Main Window-                             |                    |              |   |   | 7.00  |             | •                |            |                         |  |
|   |                    | 6.00<br>E.00 |   |   |   |             |                  |            |                         |  |
| DropDown1 DropDown2 DropDown3             |                    |              |   |   | S.00  |             | •                |            |                         |  |
|   |                    |              |   |   | 3.00  |             | •                | ••         | _                       |  |
| Load new data                             |                    |              |   |   | 2.00  |             |                  | • •        |                         |  |
| Loaded Data Sets                          |                    |              |   |   | 1.00  | • • •       | . 's diave       | 1.549      |                         |  |
| Name Source File                          | # Attributes #Inst | tances       |   |   |   |             |                  |            |                         |  |
|   |                    |              |   | P/E                                       |   |             |                  |            |                         |  |
|   |                    |              |   |   |   |             |                  |            |                         |  |
|   |                    |              |   | Γ   | 0.5   |             | _                |            | 13                      |  |
|   |                    |              |   |   |   |             |                  |            |                         |  |
| Attribute to Dimension Mapping            |                    |              |   |   |   |             |                  |            |                         |  |
| Dim Attribute Assigned                    |                    |              |   |   |   |             |                  |            |                         |  |
| Current Plot View Windows                 |                    |              |   | 1 (x) P/E Note: 1 (x) P/E Note: 1 (x) P/E |   |             |                  |            |                         |  |
|   |                    |              |   |   | 2 (y) PEG Note: PEG |             |                  |            |                         |  |
| ID Dataset Nar                            | me Plot Type       |              |   | 3   | •• date 📘   | (current v  | alue: as in 2008 | 0416 here) | $\overline{\mathbf{v}}$ |  |
| 1   | 2D                 |              |   |   |   |             |                  |            |                         |  |
| 2   | 30                 |              |   |   |   | Attribute N | <u>Aetadata</u>  |            | H                       |  |
|   |                    |              |   | Name<br>P/E                               | Туре  | Units       |                  |            |                         |  |
| PEG III III III III III III III III III I |                    |              |   |   |   |             |                  |            |                         |  |
| date                                      |                    |              |   |   |   |             |                  |            |                         |  |
|   |                    |              |   |   |   |             |                  |            |                         |  |
|   |                    |              |   |   |   |             |                  |            |                         |  |

## 3. Methods

### • MVC design pattern

- Choice:
  - -1) 95% Java, 5% Mathematica (plot images) VS.
  - -2) 100% Mathematica
- Decided to try MVC using solely the Mathematica language

#### Model

- Plot data and related
- parameters
- "subset specification"

#### View

• Use rich array of Mathematica graphical functions

• i.e. Row/Column, Panel, Pane, Grid, Button, Slider, etc.

#### Controller

 Primarily use special function Dynamic[] - controller free? - not quite! some special modules

### Modules

- Attribute
- Dataset
- AttributeSubsetParameters
- DatasetSubsetSpecification
- 2DPlotModel

- MainWindow
- 2DPlotViewer
- Use Dynamic[]!
- SubsetManipulator
- More later...

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## **Plans to Reassess and Move Forward:**

## 4. Results

Hurdle: Mathematica Novice

- Eventually severely hindered continued development • Nevertheless, acceptable progress despite setbacks:

| *  |                        |                | test3.nb *         |                                     | - 🗆 🗙                    |
|--|------------------------|----------------|--------------------|-------------------------------------|--------------------------|
| Wolfra                                   | m Mathematica   номе е | EDITION        |                    | Learning Center   Wolfram Community | Demonstrations   Help    |
|  | File Plot              | t<br>color (-) | [color] vs. [id]   |                                     |                          |
| of 2D<br>Viewer<br>ently<br>'big<br>na") | dU 1<br>UB 5,          |                | · · · · · ·        | •                                   |                          |
|  | J=<br>LB 0<br>dL 1     |                |                    |                                     | Π.                       |
|  |                        | 0 20           | 40 60              | 80 id (-)                           | 1                        |
|  |                        |                | dL 0.1<br>LB -3.65 | du 0.1<br>UB 98.65                  |                          |
|  |                        |                |                    |                                     |                          |
|  | <                      |                |                    |                                     | >                        |
| <  |                        |                |                    |                                     | -<br>3⊐ ∨<br>><br>100% ▲ |

## **5.** Conclusion

### **Primary Causes of Problems:**

• Not enough time spent learning Mathematica prior to design/implementation

• Tried to mimic OO experience too much

 Incomplete understanding of proper usage of Dynamic[] Insufficient knowledge of best practices

• No worries, learned a lot; the project is a work in progress • Worthwhile to dig deeper into Mathematica

- Learn functional programming *thoroughly* 

- Learn pattern/rule-based programming *thoroughly* 

- Pick which is best for this tool, then revise/adapt

• Back-up plan is Java