GeometryEditor & GeoSite

(1st test version to be released 01/01/2008)

Nov. 14, 2007
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GeometryEditor Overview

- A Dynamic Geometry System to explore mathematical concepts
  - Manipulative authoring
- A Web-based system
  - No software installation required
- (for developers) A package for building more sophisticated Web applications that need mathematical drawing support
  - GeoSite, BBS, DMAD and so on...
GeoSite Overview

- A Web-based application
  - Manipulative authoring
    - GeometryEditor
    - Other authoring tools following some standards
  - Educational page authoring
    - More than normal WYSIWYG HTML editing
    - Interaction between manipulatives and surrounding HTML
- Repository of manipulatives and educational pages
  - Can be embedded/reused elsewhere
Status of GeometryEditor

- **Progress, goals and implemented features**

- **Need to prioritize unfinished requirements**
  - Before or after the release of the first test version

- **First test version to be released** (01/01/08)
GeometryEditor Modules Composition

- Graphical core (jsmin-ed)
  - 260KB, 18,000 lines of codes, 110 classes
- GeometryEditor.js: a layer between the graphical core and a client Web application
  - 50KB, 2,000 lines of codes
- Around 40 types of dialogs and their related Javascript files
- Open source libraries used:
  - [Dynarch.com DHTML menus](http://Dynarch.com) (50KB integrated into GeometryEditor.js)
An authoring tool
A package for building Web-applications

- Documentation:

- Selected examples:
  - Function plotting
  - Cutting a circle
Calculator in GeometryEditor

- Infix input and MathML display
  - has nothing to do with SVG
- Real-time calculation
- Real-time error message feedback
- Operands can be objects from the canvas
- Can handle numeric, boolean and color expressions
- Can convert different units in distance and angle
\[ \frac{4^2 + \sqrt{5}}{3} = 6.08 \]
Technology detail: algorithms for authoring supports

- Skipped....
  - Who is interested???
Technology detail: GeometryEditor.js

- A layer between the graphical core and a client Web application
- Most problems I encountered and solved may be helpful to your projects
- Relates to the Manipulative Architecture Dr. Wang has defined
- Will come back to this if time allows
Status of GeoSite

- GeoSite is just a Web-application built upon GeometryEditor
  - GeometryEditor does NOT provide any special codes for GeoSite
- Features that can demonstrate the capability of GeometryEditor are being developed first
- AJAX is extensively used
- First test site will be released with GeometryEditor (01/01/08)
### GeoSite v0.1 demonstrating GeometryEditor v0.1

<table>
<thead>
<tr>
<th>Name</th>
<th>Author</th>
<th>Date Modified</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>geometry</td>
<td>tester1</td>
<td>November 08 2007 23:43:04</td>
<td>1K</td>
</tr>
<tr>
<td>mma</td>
<td>tester1</td>
<td>November 04 2007 17:02:03</td>
<td>2K</td>
</tr>
<tr>
<td>mma graph</td>
<td>tester1</td>
<td>November 08 2007 16:20:03</td>
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<tr>
<td>Pythagoras</td>
<td>tester1</td>
<td>November 08 2007 16:16:57</td>
<td>10K</td>
</tr>
<tr>
<td>Pythagoras2</td>
<td>tester1</td>
<td>November 08 2007 16:16:55</td>
<td>9K</td>
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<tr>
<td>test</td>
<td>tester1</td>
<td>November 04 2007 17:52:32</td>
<td>3K</td>
</tr>
<tr>
<td>Triangle</td>
<td>tester1</td>
<td>November 04 2007 21:39:03</td>
<td>6K</td>
</tr>
<tr>
<td>Two proofs of Pythagoras</td>
<td>tester1</td>
<td>November 11 2007 16:16:57</td>
<td>3K</td>
</tr>
</tbody>
</table>

**About this manipulative:**

Author: tester  
ID: mma
Absolute ID: mma
URL: http://localhost/geomath/views/main.html  
Embed: `<iframe src='http://localhost/geomath'`  
Data URL: http://localhost/geomath/GeometryX

![Diagram](image)

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Restart

---

Done
In mathematics, the Pythagorean theorem (also known as Pythagoras' theorem) is a relation in Euclidean geometry among the three sides of a right triangle. The theorem is named after the Greek mathematician Pythagoras, who by tradition is credited with its discovery and proof, although knowledge of the theorem almost certainly predates him. The first recorded use is in China, known as the "Gougu theorem".

The theorem is as follows:

In any right triangle, the area of the square whose side is the hypotenuse (the side opposite the right angle) is equal to the sum of the areas of the squares whose sides are the two legs (the two sides that meet at a right angle).

This is usually summarized as:

The square on the hypotenuse is equal to the sum of the squares on the other two sides.

If we let $c$ be the length of the hypotenuse and $a$ and $b$ be the lengths of the other two sides, the theorem can be expressed as the equation

$$a^2 + b^2 = c^2$$
Embedding in your page a manipulative from GeoSite

- Experience with embedding Youtube videos in your Web pages?
- GeoSite provides the html codes for you to embed a manipulative correctly

Example:
- http://totemmath.blogspot.com/
Again technology detail in GeometryEditor: GeometryEditor.js

- is the only javascript file you need to include:
  - class GeometryEditor is in this file
  - its constructor creates instances
- set up correct connection among
  - the container element
  - embed element
  - window object of the embedded svg document
  - pop-up dialogs
  - data from an URL
Dialog management

- simulate modal dialog (checkFocus)
- disable dialog/window below
- cascading closing of dialogs: closing an opener will close its descendent dialogs
- cooperate with the graphical core to determine what objects can be selected as an input to the dialog
- onload/onunload/onOK/onCancel/onFinish/onStart/onApply
- communications among dialogs
GeometryEditor.js (cont.)

- **Data retrieving**
  - able to load data string
  - able to load a data URL from anywhere

- **Menu/toolbar customization and setting-up**
  - customization of system provided menu/toolbar
  - adding application-defined menu/toolbar
  - enable/disable menu items and toolbar buttons depending on system status
  - setup menu items or toolbar buttons for macros
GeometryEditor.js (cont.)

- Serialization of data
  - macro
  - data from graphical core
  - menu/toolbar
GeometryEditor.js (cont.)

- **Callback APIs**
  - Must handle asynchronization correctly
    - svg file loading
    - data update invoked by API (either set dataURL or dataValue)
      - from dataURL: asynchronization inavoidable
      - from dataValue: avoid spending too much time interpreting the dataStr
  - `GeometryEditor_OnCreateDone`
  - `GeometryEditor_onUpdateDone`
  - `onObjectChangeListener`
  - `onSaveListener`
Non-callback APIs

- addMenuSet()
- addToolbarset()
- getDataValue()
- getInitDataValue()
- getDataURL()
- addMacro()
- getMacro()
- get()
- addObjectChangeListener()
More APIs??

- It’s possible to provide APIs like
  - `newCS( x, y, ... )` // coordinate system
  - `newPoint( x, y )`
  - `newLine( point1, point2 )`
  - `newLine( equation )`

- Are they needed?
- Need to see more requirements
Future work

- Release the first test version 01/01/2008
  - Where to announce it?
    - Mathforum
      - geometry-software-dynamic@support1.mathforum.org
    - SVG group
      - http://www.svg.org/
      - svg-developers@yahoogroups.com
    - More ??

- Collect feedbacks
- Finish features listed in that shorttermTasks.txt file