



I2geo: a web-library for interactive geometry constructions

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Christian Mercat (U Montpellier)
Ulrich Kortenkamp (PH Karlsruhe)

Sharing Interactive Geometry

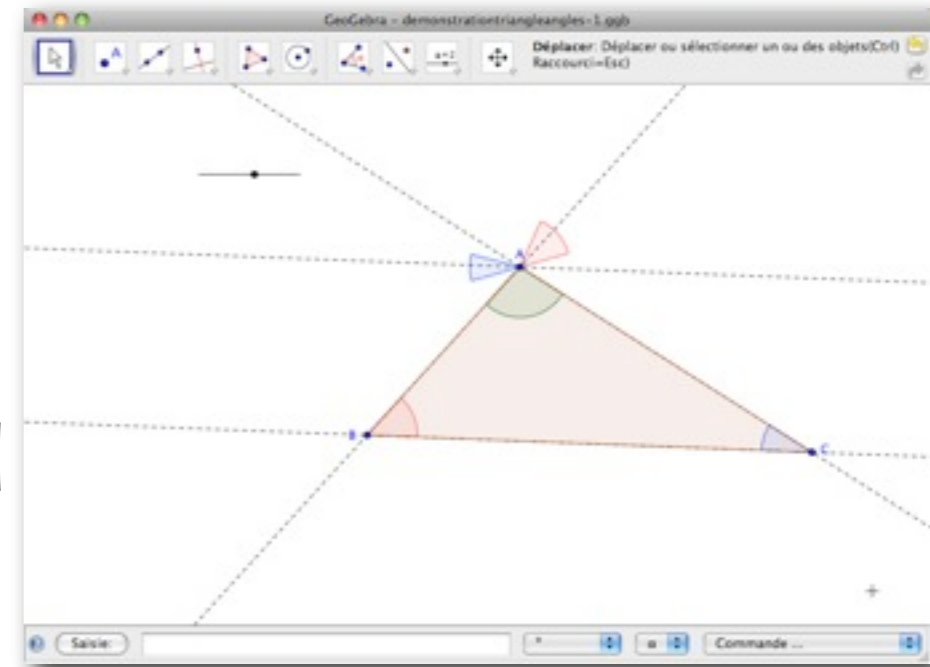
- interactive geometry tools are widespread
 - constructions are ready to be shared
 - much is on the web already... everywhere!
- undesirable boundaries:
 - 1 can't share **between systems**
 - 2 can't share **between countries and languages**
- missing boundaries:
 - 3 **acceptance** (limit what's good enough)
- intergeo addresses it all, our talk only 2 & 3

Plan

- the platform
 - typical workflow
 - design principles of an open-content library
- annotations and search
 - cross-cultural search
 - language of annotations
- building acceptance boundaries
 - public review system
- related work, conclusion, future

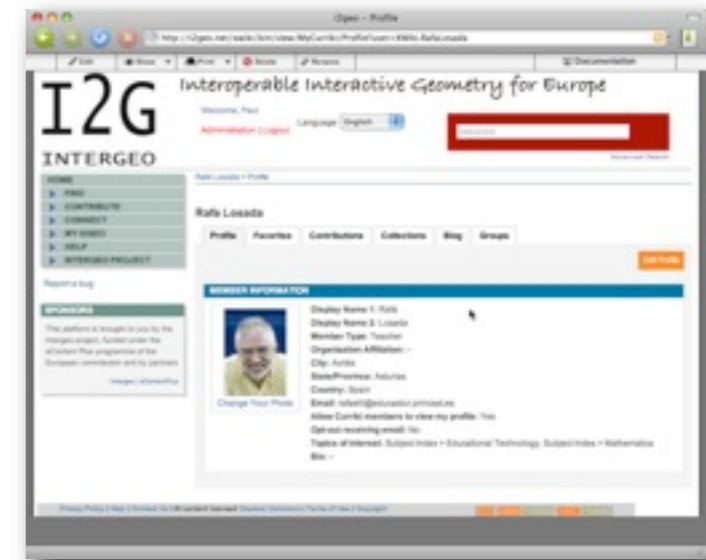
i2geo - a typical sharing workflow

- a Luxembourg teacher shares a construction
 - a GeoGebra file
 - with some explanations in French
 - with metadata: about sum-of-angles in triangles
- a Czech teacher searches
 - for use with Cabri
 - something about angles and triangles
 - wishes to know it has been successful
- needs: search tool, annotations, reviews, format



i2geo: principles

- ... of an open-content web platform: Curriki
- all resources are web-accessible
 - and their URL is used
 - bookmarks, copiable URLs, history
- but editing requires a true browser (and a human!)
- web-resources include:
 - user-profiles, quality reviews, groups
 - content items (assets)
 - list of recent contributions, search results
- *trackable, long-term-URLs, many resources*



i2geo Content Assets

- multiple data-types
 - URLs, uploaded files, videos, texts
 - particular services on each (edit, preview...)
- simple metadata
 - authorship, description, title...
 - licenses
 - topics & competencies & educational levels
 - encoded in GeoSkills: a cross-cultural language
- composable assets
 - collections, and metadata inheritance

An International Platform

- i2geo wishes to cover complete Europe
 - speak all languages (UIs, documents)
 - have encoded all curriculum standards
- contributors:
 - voluntary translators'
 - act directly on the live site
- cover thus far:
 - Czech, French, German, English, Dutch, Basque, Portugese
- hardest part: curriculum



Edit

Show

Print

Delete

Rename

Documentation

An I

I2G

Interoperable Interactive Geometry for Europe

Welcome, Paul

[Administration](#) | [Logout](#)

Language

Advanced Search

INTERGEO

HOME

- ▶ FIND
- ▶ CONTRIBUTE
- ▶ CONNECT
- ▶ MY I2GEO
- ▶ HELP
- ▶ INTERGEO PROJECT

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TRANSLATORS



This group is used to coordinate translation tasks within I2geo.

WELCOME

This group is used by the translators of i2geo to share information and documents. If you want to translate I2geo to your language, mail Santiago.Egido@mathsformore.com.

RECENT GROUP ACTIVITY

- Jun-05-2009 - 02:56 PM GMT+01:00 Member profile updated – [Christian Mercat I3M, LIRMM, UM2](#)
- Jun-05-2009 - 02:56 PM GMT+01:00 New member joined – [Christian Mercat I3M, LIRMM, UM2](#)
- May-20-2009 - 03:33 PM GMT+01:00 File updated – ["IntergeoTranslatorsManualversion5.pdf"](#) by [Santiago Egido](#)
- May-19-2009 - 08:35 PM GMT+01:00 Resource edited – ["translators' documentation collection"](#) by [Paul Libbrecht Ad](#)
- May-19-2009 - 08:34 PM GMT+01:00 Resource added – ["translators' documentation collection"](#) by [Paul Libbrecht Ad](#)

- i2geo
- sp
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- COV
- C
- hard

Cross-Cultural Search

- Annotations are in GeoSkills
 - Topical searches as well
 - GeoSkills is multilingual
 - nodes are designated
- demo: <http://i2geo.net/>

obtain_proportionality_constant_from_a_table

verb: obtain
(transversal competency)

fr: obtenir le coefficient de proportionnalité à partir d'un tableau

de: die Proportionalitätskonstante aus einer Wertetabelle erhalten

es: obtener de la constante de proporcionalidad a partir de su tabla de valores

has-topic: Table_of_values

has-topic: Constant_of_proportionality

COMPETENCY

- GeoSkills is an OWL ontology
- Curriculum-encoders edit it (web-tool)
- Users can browse and suggest

Cross-

obtain_proportionality_constant_from_a_table

- Annotations
 - Topic (transversal competency)
 - GeoS
 - node
- demo:
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- GeoSk
- Curric
- Users
 - has-topic: Table_of_values
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GeoSkills Search Highlights

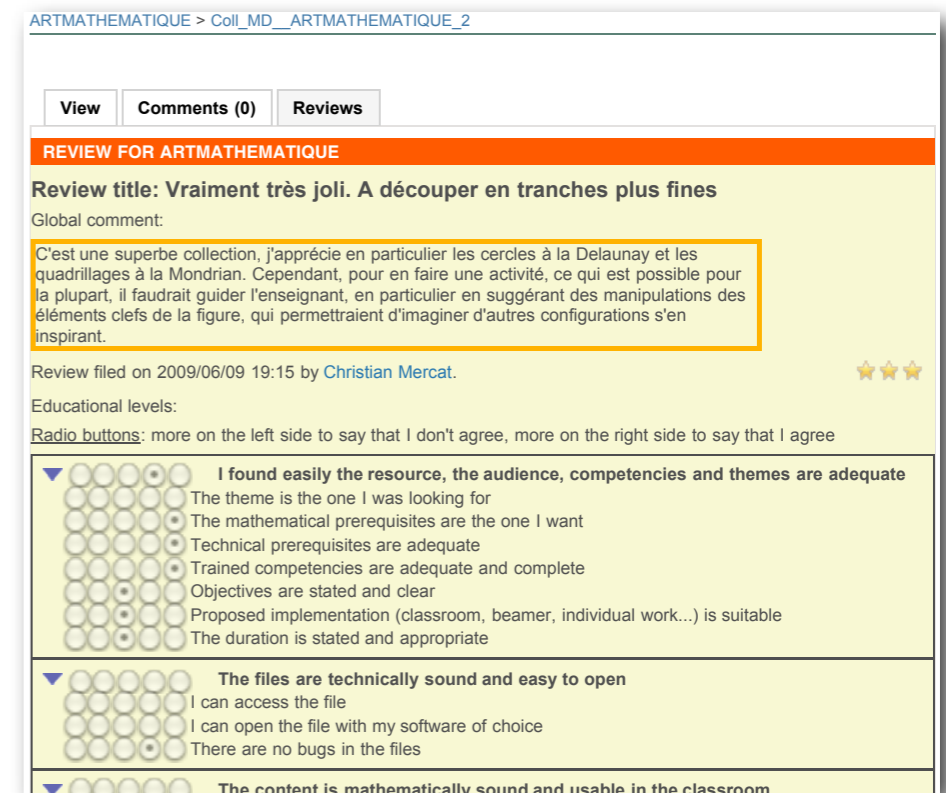
- multi-word semantic hook
 - *Riemann Sum vs Sum of Riemann Tensors*
 - *angle droit vs angles ... droites*
- generalization and specialization
 - search for *polygon* matches *triangle* (and...)
- search for fine-grained competencies
 - as curriculum standards request
 - but also match topics
- supports multilingual users and annotators

i2geo Search Ranking

- Crucial in search engine:
 - relevance ranking
 - often only the first page of results is looked at
- relevance to context:
 - prefer items in own language and own country
 - prefer direct GeoSkills' nodes queries
 - and less inferred nodes
 - prefer exact word matches
 - and less stemmed word matches
- prefer items with higher quality
- prefer items used several times

Building Acceptance: the Quality System

- idea:
 - let users' know (in)success of usage
 - stimulate quality development
- everyone is allowed to file a review
 - radio buttons (*I agree ... I disagree*)
 - 6 simple questions
 - many optional sub-questions
- is visibly attached to each resource



ARTMATHEMATIQUE > Coi_MD_ARTMATHEMATIQUE_2

View | Comments (0) | Reviews

REVIEW FOR ARTMATHEMATIQUE

Review title: **Vraiment très joli. A découper en tranches plus fines**

Global comment:

C'est une superbe collection, j'apprécie en particulier les cercles à la Delaunay et les quadrillages à la Mondrian. Cependant, pour en faire une activité, ce qui est possible pour la plupart, il faudrait guider l'enseignant, en particulier en suggérant des manipulations des éléments clefs de la figure, qui permettraient d'imaginer d'autres configurations s'en inspirant.

Review filed on 2009/06/09 19:15 by [Christian Mercat](#) ★★

Educational levels:

Radio buttons: more on the left side to say that I don't agree, more on the right side to say that I agree

▼ I found easily the resource, the audience, competencies and themes are adequate
The theme is the one I was looking for
The mathematical prerequisites are the one I want
Technical prerequisites are adequate
Trained competencies are adequate and complete
Objectives are stated and clear
Proposed implementation (classroom, beamer, individual work...) is suitable
The duration is stated and appropriate

▼ The files are technically sound and easy to open
I can access the file
I can open the file with my software of choice
There are no bugs in the files

▼ The content is mathematically sound and usable in the classroom

Bu

stem

ARTMATHEMATIQUE > Coll_MD__ARTMATHEMATIQUE_2

View

Comments (0)

Reviews

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My quality, your quality

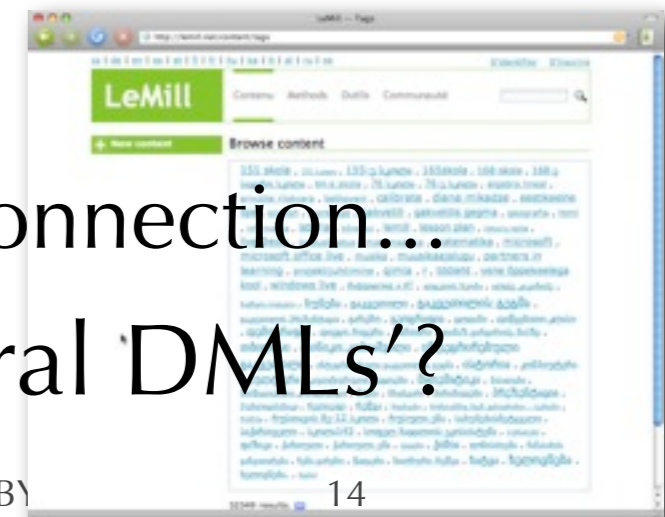
- I prefer simple things
 - He prefers documented things
 - She hates inconsistencies...
-
- various criteria of quality
 - various weights to responses
 - give adaptive quality displays
 - and search results

future

- search test-suite
 - calibrating boosting for a more sensible ranking
 - a set of documents, a set of queries
 - annotated matches
- collaboration within i2geo
 - re-use is part of content life
 - reviews as well
 - review may compensate impression of *being given*
 - usage of groups
 - social networks integration

Comparable approaches

- many learning-object-repositories
 - all are based on plain-text matching
- tagging does not work for this
 - multilinguality? inference?
- several curriculum-alignment works
 - manual work it seems
 - our approach is less curriculum-bound
- manual attachments die fast:
 - curriculum-online (UK), Microsoft Lesson Connection...
- other search UIs approaches?? more general 'DMLs'?





Key Curriculum Press

SKETCHPAD LessonLink



Welcome Jane Smith (not Jane?) | School: Montclare

Subscription Type: Site (8 Teachers) | Subscription Library: School Library
School Subscription Leader: Lori Bell | Subscription Term: 8/31/07 - 9/01/08

Activities by Level

All Activities (501) NEW

Alignments

- Content Strands
- Textbooks NEW
 - Discovering Algebra (85)
 - Chapter 4 (20)
 - Lesson 4.7 (4)
- Grade Level
 - Strictly Enforced
 - Relaxed

Cancel Get Activities
- Standards NEW

My Activity Folders

- My Classes (2)
 - Geometry (4)
 - Algebra (0)
- My Textbooks (7)
- My Favorites (4)

Publish Preferences

Colleagues' Shared Folders

- Ben Harper (Profile)
- Tom Schwartz (Profile)
- My Folders (6)
 - Geometry (7)
 - Algebra 1 (10)

Copy to: Search: Sort by: Title (A to Z) 1-4 of 4 View: Thumbnail

All Activities (501) >
Discovering Algebra: Chapter 4: Lesson 4.7 (4)

- Hikers: Solving Through Multiple Representations (Details)**
 Grade Level: 7 to 8 Setting: Pairs Duration: 45 minutes
 Students use tables, graphs, and equations to represent and solve a real-world problem about two hikers walking at different speeds in opposite directions along the same trail.
 My Notes: [Add Note](#)
 6 Comments [View/Edit](#)
[Open Student Sketch](#)
[Open Presentation Sketch](#)
- The Slope-Intercept Form of a Line (Details)**
 Grade Level: 8 to 10 Setting: Whole Class, Pairs Duration: 30 minutes
 Students explore the effects of intercept and slope on the position of a line in the form $y = mx + b$. They practice writing equations in slope-intercept form and visualizing the graph when given the equation in slope-intercept form. (The Alternate Slope-Intercept Form of a Line activity is similar, but uses $y = a + bx$.)
 My Notes: [Add Note](#)
 0 Comments [Add Comment](#)
[Open Student Sketch](#)
- The Slope Game (Details)**
 Grade Level: 7 to 10 Setting: Pairs Duration: 20 minutes
 Students construct and play a game in which one player rearranges lines on the screen and the other player tries to match each line with its slope measurement.
 My Notes: [Add Note](#)
 3 Comments [View/Edit](#)
[Open Student Sketch](#)
- Undoing Operations (Details)**
 Grade Level: 8 to 10 Setting: Whole Class, Pairs Duration: 45 minutes
 Students create algebraic operations using a model that shows an image of each step, use inverse operations to undo the original operations, and observe the symmetry of the resulting pattern.
 My Notes: [Add Note](#)
 4 Comments [View/Edit](#)
[Open Student Sketch](#)

Feedback | Preferences | Help | Logout

Welcome Jane Smith (not Jane?) | School: Montclare

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Communicate

1-4 of 4


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Conclusion

- we presented:
 - a web-platform for sharing interactive geometry
 - public and open-content
 - cross-culturally accessible
- our approach shows the way for DML search UI:
 - cross-language a requirement
 - across research-communities as well!
 - e.g. search for *knot* or search for $\setminus S^3$?
 - *K-theory* (Grothendieck, Atiyah) vs (differential) *K theory* (Rushton)
 - entity designation probably necessary
 - relevance ranking fundamental

<http://i2geo.net/>

thank you.

Implementation

- platform is live and available:
 - i2geo.net
 - following Curriki development
- search tool is there in simple form
- soon:
 - services for constructions
 - advanced search, highlight, facetting
- 1500 records
 - some very precisely annotated
 - some very coarsely