

Scalable Assessment of Wiki-based Collaborative Assignments

Contents

- Introduction
- Wikis assignments
- Assessment of wiki assignments
 - Quantitative approach
 - Qualitative approach
- Conclusions
- Challenges
- References

Introduction

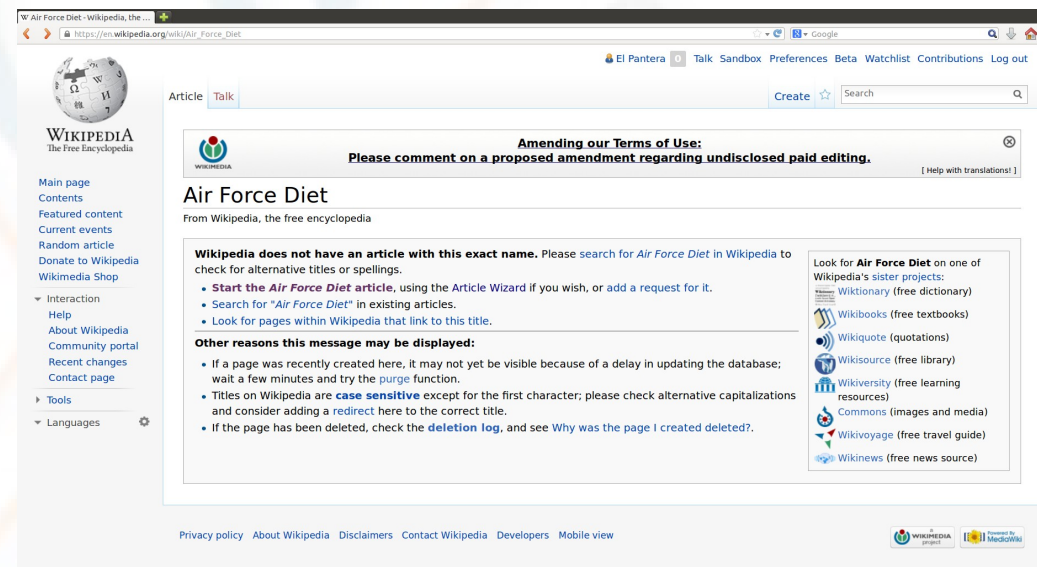
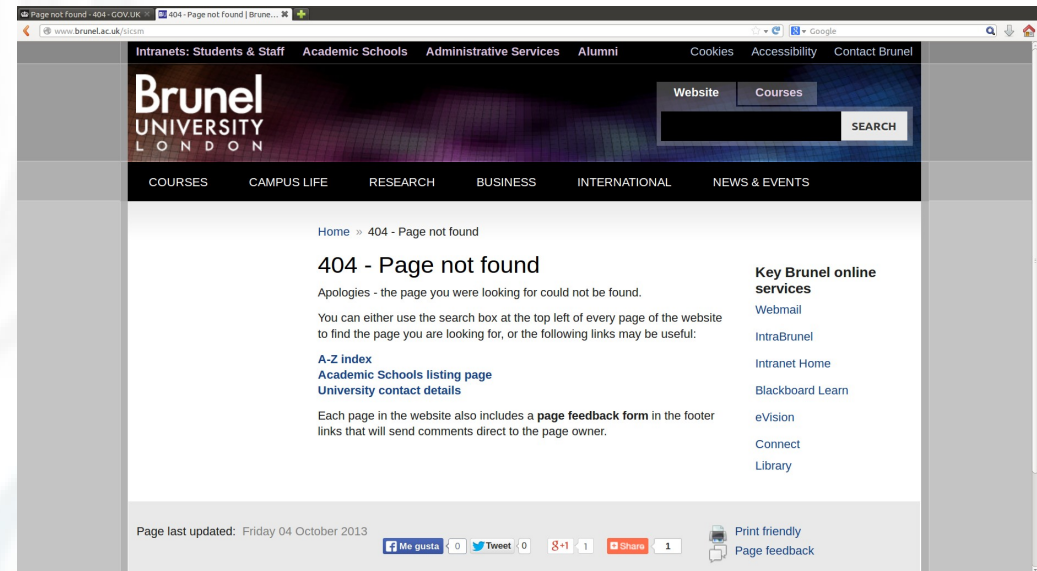
- In the web 1.0: user = consumer
- In the web 2.0: user = consumer + creator
- A wiki: group of web pages. Easy to edit and link using the browser. Open to collaboration
 - Wikipedia: the largest collaborative project in human history
 - Wikis used to keep companies know-how
 - Wikis can be integrated in software development system to document their processes and products

Introduction

- Wiki vs. Content Management System (CMS)
 - Usually, in a CMS:
 - The process of information creation is structured and controlled
 - There are hierarchic roles: content creators, information reviewers, user who allow publishing, etc
 - While in a wiki:
 - Few horizontal roles (loose permission system)
 - Visitors are encouraged to contribute

Introduction

- A broken links is treated in a CMS as an error
- In a wiki is a chance to improvement:
 - No information for the moment, will you add something?
 - Imperfect editions are welcome



Wiki assignments

Wiki assignments

- Wikis, as any general purpose (collaborative) writing distributed software allows for a great variety of educational assignments to be deployed:
 - Assignments
 - Shared knowledge base of experiments
 - Projects
 - Explaining concepts
 - Brainstorming
 - Lecture notes
 - ...

Wiki assignments

- We can get advantage of “wiki way” in assignments:
 - Asynchronous distributed collaboration
 - Monitorization: see their state at any moment
 - Supervisors can contribute too
 - Detect common mistakes for most of students
 - Comparison between peers:
 - Adopt the good ideas of colleagues
 - Work harder if you are not performing well
 - Change roles and responsibilities during the development of the task

Assessment of wiki assignments

Assessment of wiki assignments

- Can we know who wrote each part of a wiki?
- Imagine:
 - Anthony writes a paragraph
 - Philips interchanges two of the phrases in it
 - Mary writes a “not” in a phrase
 - Mark moves the paragraph to other section of the page
 - Christina makes a briefing of two phrases
 - Charles separates the paragraph into two, moving one of them to the end of the document
 - Frank rewrites the phrase where Mary wrote “not”

Assessment of wiki assignments

- Identifying who wrote each part of a wiki is a task that has to be made by a human
 - It is not scalable
- We have to think “the wiki way”:
 - Each page content is responsibility of a student, a group of them or the whole class and we have to act consequently
 - If they receive contributions from others, they have to decide whether to keep, adapt or simply remove them

Assessment of wiki assignments

- In the assessment, we have to consider the final result in the wiki. Each page has responsible student(s)
 - Similar to real world, stakeholders main interest is “the final product”
- The wiki keeps a log of the content, author and time of every edition
 - There is a lot of information to enrich this grading
 - But we have a limited time for assessment
 - Find a good balance and support of automatic tools

Assessment of wiki assignments

- Different aspects to be assessed:
 - Concerning the content:
 - Quantity
 - Quality
 - Presentation and respect to rules
 - ...
 - Concerning the process:
 - Contributions timeline
 - Work distribution
 - Coordination / conflict resolution
 - ...

Quantitative assessment case studies



Quantitative approach

- First case study: WikiHaskell
 - Elective course on Functional Programming
 - Computer Science degree, 5th year
 - The libraries of Haskell programming language are poorly documented
 - Each group of 3 students had to document a library in Spanish language



WikiHaskell



[página](#) [discusión](#) [ver código fuente](#) [historial](#)

 [Entrar](#)

Biblioteca astar

La biblioteca astar implementa en Haskell el famoso algoritmo de búsqueda heurística A*. Fue desarrollada por Cale Gibbard en 2008 y construida utilizando la [Biblioteca de empaquetamiento Cabal](#). Esta biblioteca funciona sobre GHC o GHCi, por lo tanto, para probar los ejemplos que se exponen a continuación se deberá usar este compilador de Haskell.

Contenido [\[ocultar\]](#)

- [1 Introducción al algoritmo A*](#)
- [2 Introducción a la biblioteca astar](#)
- [3 Instalación](#)
 - [3.1 Instalando GHC](#)
 - [3.2 Instalando Cabal](#)
 - [3.3 Instalando la biblioteca Astar](#)
- [4 Cómo cargar la biblioteca](#)
- [5 Qué debemos definir](#)
- [6 Ejemplos de uso](#)

Biblioteca astar

Biblioteca para el algoritmo de búsqueda A*

Lenguaje	Haskell
Biblioteca	astar
Autores	Cale Gibbard David Thibault Ralf W. S. Oliveira

navegación

- [Página Principal](#)
- [Portal de la comunidad](#)
- [Actualidad](#)
- [Cambios recientes](#)
- [Página aleatoria](#)
- [Ayuda](#)

buscar

[Ir](#) [Buscar](#)

herramientas

StatMediaWiki

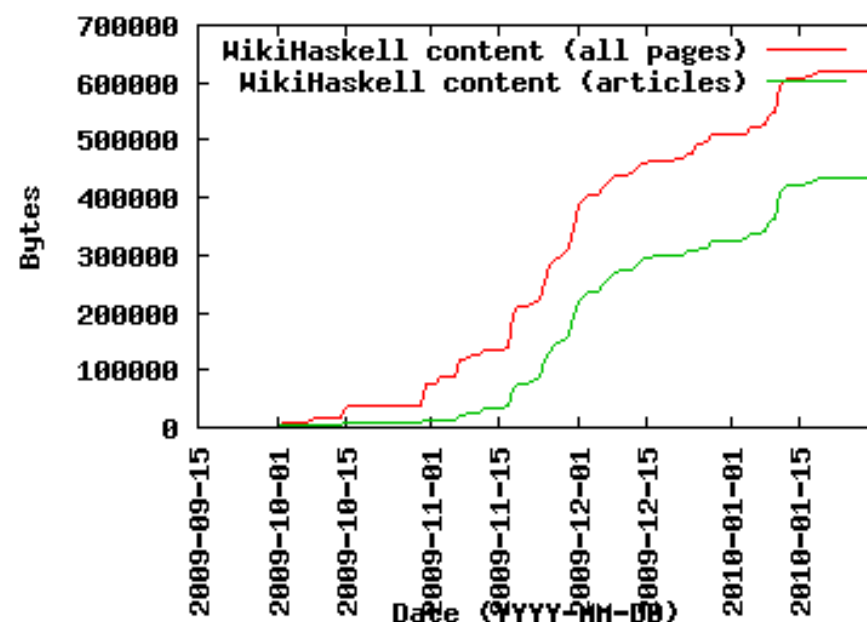
- Information provided:
 - Global wiki evolution
 - Rankings of edits and bytes contributed for every:
 - User
 - Page
 - Category
 - Cloud of tags
 - Activity every hour of the day, every day of the week and every week in the semester

StatMediaWiki



#	Page	Namespace	Edits	%	Bytes	%	Visits	%
1	Clash	Main	107	11.5	25770	7.6%	469	0.9%
2	Data.Time	Main	101	10.9	31289	9.2%	378	0.7%
3	Biblioteca Happstack	Main	85	9.1	28239	8.3%	314	0.6%
4	Data.List	Main	81	8.7	34488	10.2%	404	0.8%
5	Data.Vector	Main	78	8.4	26965	8.0%	477	0.9%
6	Biblioteca Yesod	Main	71	7.6	21653	6.4%	326	0.6%
7	Biblioteca QtHaskell	Main	55	5.9	109765	32.4%	473	0.9%
8	Biblioteca WxHaskell	Main	39	4.2	16313	4.8%	350	0.7%

Content evolution in WikiHaskell

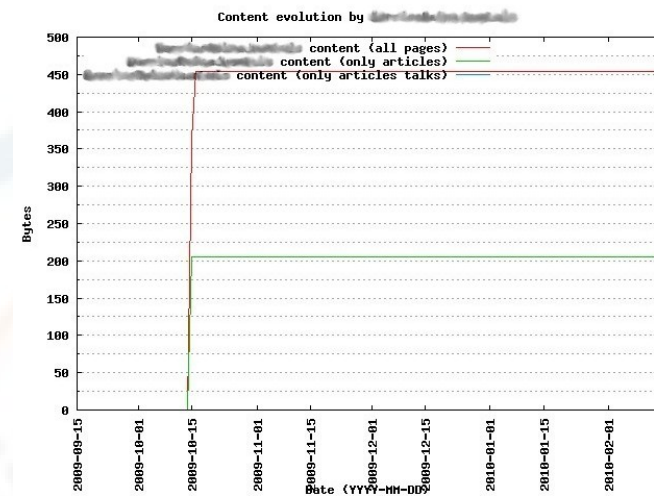
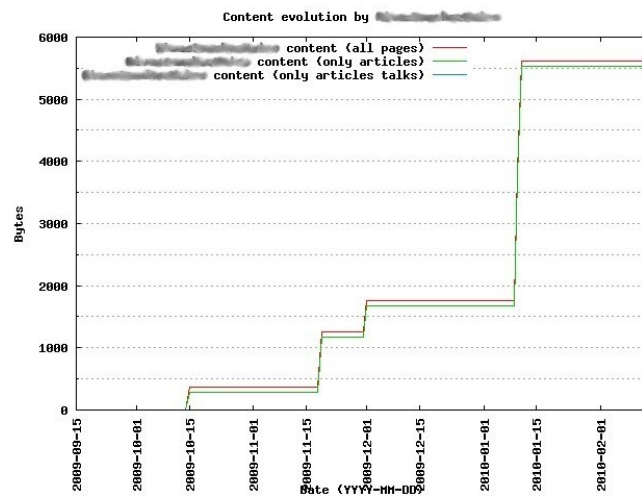
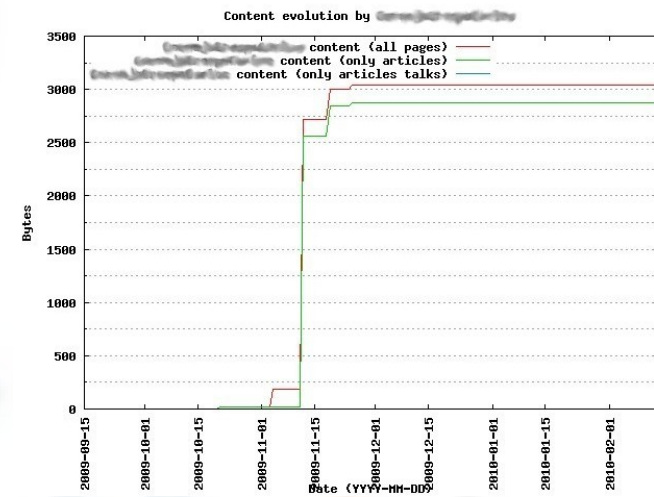
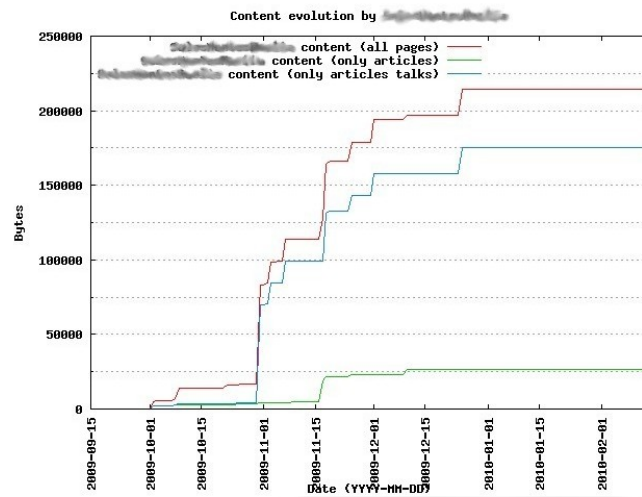


#	User	Total edits	Edits in articles	Total bytes added
1	[User]	175 (11.78%)	87 (7.75%)	209882 (30.31%)
2	[User]	129 (8.68%)	54 (4.81%)	12668 (1.83%)
3	[User]	75 (5.05%)	49 (4.37%)	39309 (5.68%)
4	[User]	63 (4.24%)	54 (4.81%)	28478 (4.11%)
5	[User]	62 (4.17%)	61 (5.44%)	15185 (2.19%)
6	[User]	54 (3.63%)	27 (2.41%)	31382 (4.53%)
7	[User]	51 (3.43%)	41 (3.65%)	19058 (2.75%)
8	[User]	50 (3.36%)	49 (4.37%)	23145 (3.34%)
9	[User]	49 (3.30%)	47 (4.19%)	5614 (0.81%)
10	[User]	38 (2.56%)	37 (3.30%)	11854 (1.71%)
	Subtotal	746.0 (50.20%)	506.0 (45.10%)	396575.0 (57.27%)

WikiHaskell

- We identified 5 students profiles:
 - *Continuous*: works on a regular basis, 3 studs.
 - *Step-wise*: works near deadlines, 16 studs.
 - *Early peak*: abandons: 4 studs.
 - *Middle peak*: decides to do all work at once and forget about the wiki, 17 studs.
 - *Late peak*: try to do everything when its too late, 6 studs.

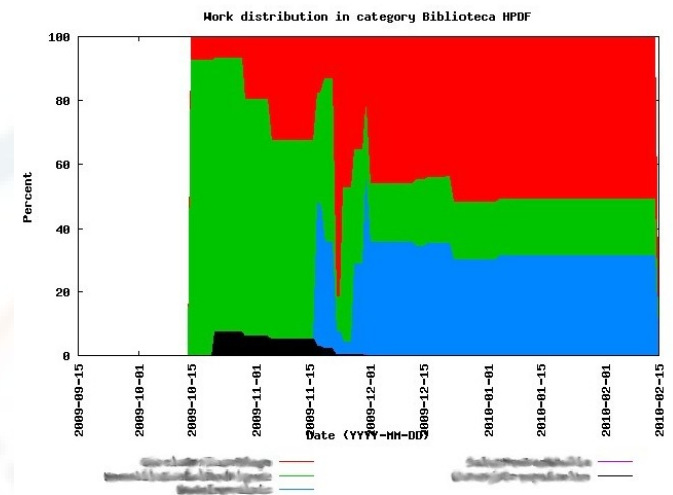
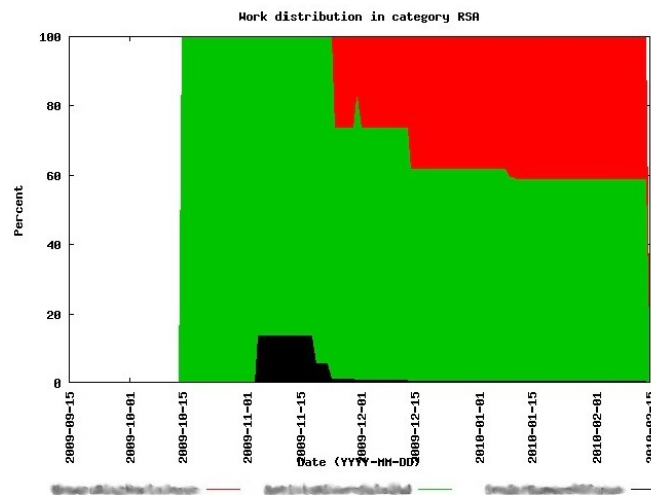
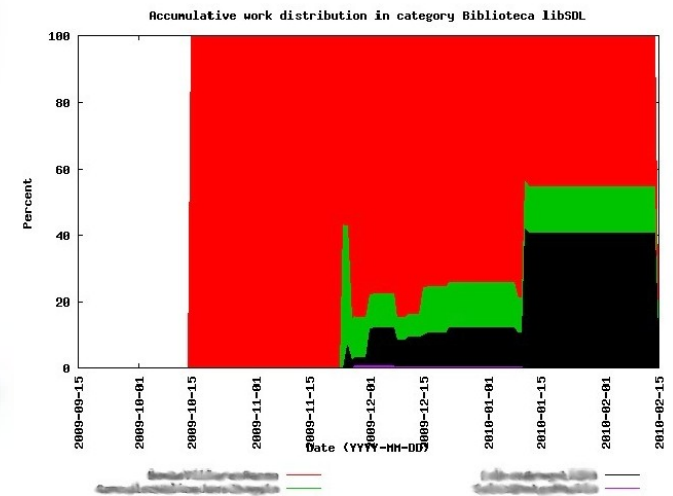
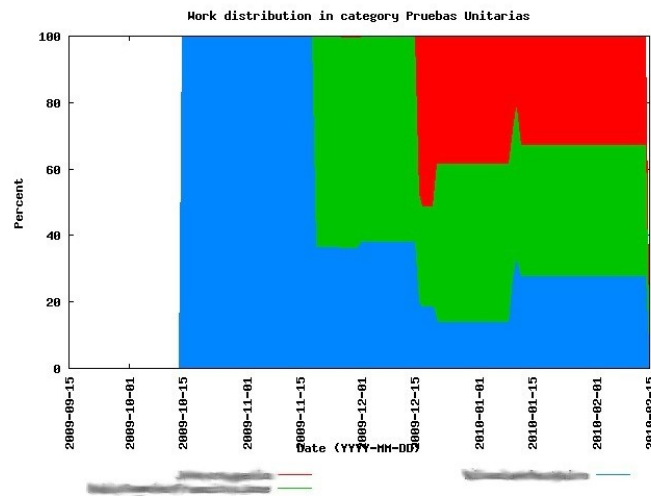
StatMediaWiki



WikiHaskell

- Is a bad thing a “step-wise” profile?
 - We do it quite often in daily life
 - Do it does not allow for collaboration: if I do my part the last day, I can do it according to what we agreed, but not collaborating
 - The same applies for peaks
- But how can we see “the group picture”?
 - Work distributions diagrams, showing percentage of total wiki content contributed by each student

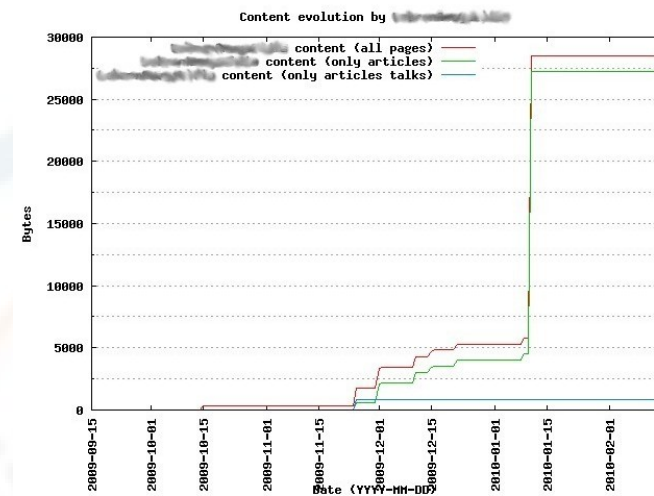
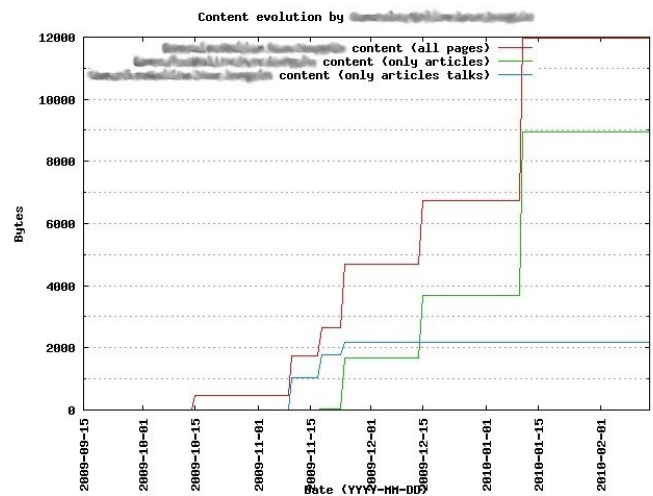
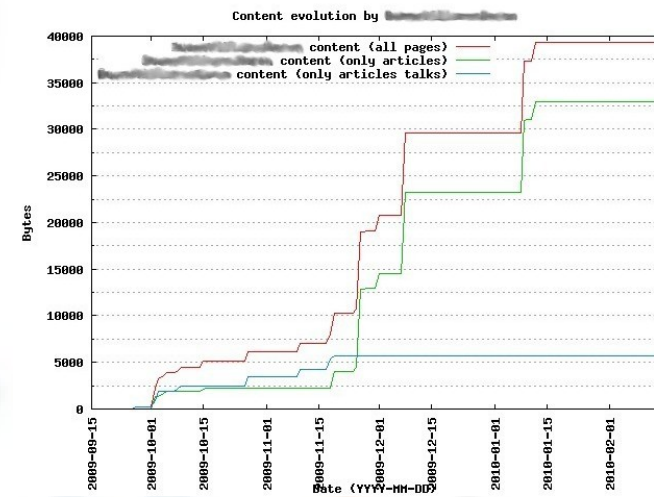
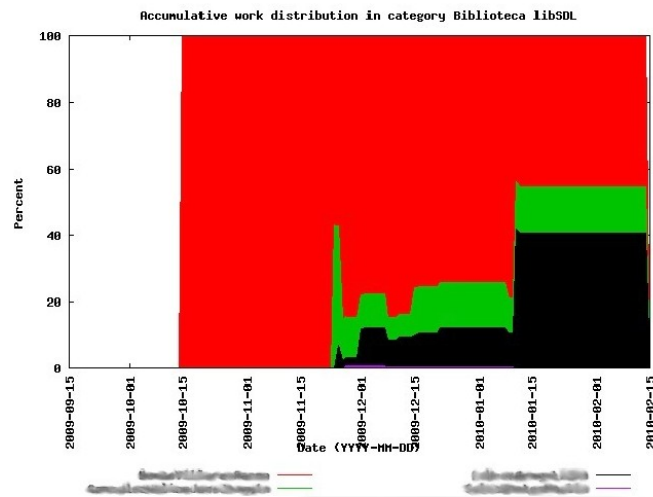
WikiHaskell



WikiHaskell

- What is the project grade for a student who only contributed at the end of the semester?
 - The same than that of the rest of the members: they separated task, and no one complained
- Work distribution inside each category
 - Each group was responsible for a set of pages
 - We draw percentages in a chart
 - We detected other interesting findings
 - Leadership skill

WikiHaskell: leadership



WikiHaskell

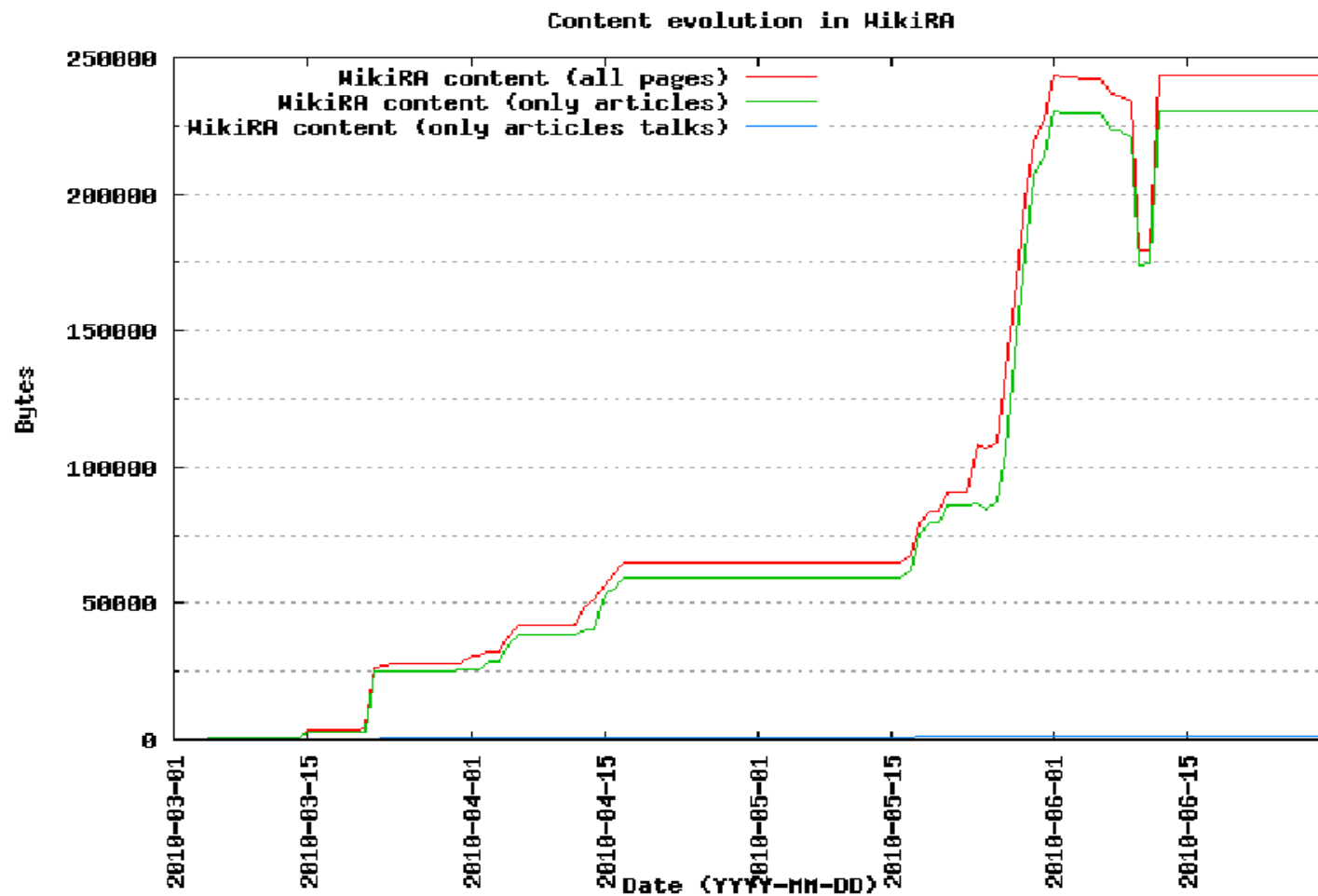
- Collaboration among groups
- User talk pages for coordination
- Regular article talk pages for conflict resolution

#	Page	Namespace	Edits
1	Biblioteca ... Cabal	Main	14
...
N	Biblioteca ... HPDF	Main	2

#	Page	Namespace	Edits
...
42	User talk:...Jose	User talk	1
43	Talk:Biblioteca ... Cabal	Talk	1

Quantitative approach

- Second case study: WikiRA



Quantitative approach

- Third case study: WikiIW
 - Course of Web Engineering
 - Students developed a web application in groups
 - Code kept in a public forge (Assembla)
 - Each project documentation in just one wiki page
 - It was analysed using HistoryFlow
 - Each author has one color
 - Draws contributions and new text
 - Highlights text that remains between versions
 - Recently released as open-source

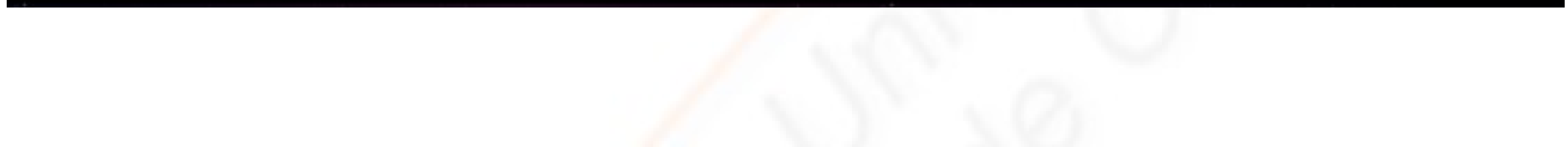
WikiIW

- Overall effort
 - amount of contributions throughout time as the growth of vertical lines on the timeline
- Distribution of effort
 - each learner's contribution is coloured differently
 - distribution of individual contributions in the top left
- Work organization
 - reorganizations and moves as slashed line patterns

WikiIW

- Conflict resolution (not detected in our case)
 - editions and undoing as zig-zag line patterns
- Other transferable skills
 - e.g. leadership as first-mover events
 - early text parts persists across page versions

Unit 10 C



Quantitative approach

- Is it ok to give part of the grade for continuously committing to the wiki?
 - Perhaps the students just wrote a word
- If he writes “a word” quite often, his chart will be almost flat
- Anyway, is an indicator of activity
 - Surely he visited the wiki page to do it.
 - Probably he checked its content (and changes)

Qualitative assessment test case

Qualitative approach

- Fourth case study: wikiASO
 - Compulsory 3rd year course on Operating System Administration (Computer Science low degree)
 - Fictional migration plan for IT infrastructure of a company: data center, desktop computers, gantt planning, software updates, etc
 - We used StatMediaWiki to measured previously commented skills
 - We complemented it with a qualitative approach
 - Just assessing the final wiki version is a poor approach
 - Assessing every single wiki edition in not scalable

WikiASO



- We used AssessMediaWiki:
 - Supports assessing “the wiki way”: self-assessment, peer-assessment and hetero-assessment
 - Each student assesses 10 random “significant” wiki contributions
 - He/she has to assess it according to a rubric
 - It considers different specific skills
 - Also other transferable, like wiki syntax, references, writing, etc
 - Grades are anonymously received by author

WikiASO

The top window displays the 'Difference between revisions of "Crypto"' page. The URL is `osl2.uca.es/wikihaskell/index.php?title=Crypto&diff=3138&oldid=3137`. It compares two revisions from April 24, 2013. The left revision (15:49) is by Codec.Encryption.TEA, and the right revision (16:04) is by a user with the same name. The difference highlights changes in the text of Line 150, which describes the RSA algorithm's security based on prime factorization.

The bottom window shows the 'AssessMediaWiki' interface. The URL is `wikis.uca.es/evalmediawiki/amwhaskell-2013/index.php/evaluar`. It features a navigation bar with 'Assess', 'My assessments', 'Students', 'Parameters', and 'Logout'. A message states: 'Hi Abalderas, there are 10 revisions pending for an assessment. You may grade the revision here below. This is the url to assess.' Below this is a table for grading revisions:

Revision	Grade	Description
<input type="checkbox"/> Wiki syntax Appropriate use of MediaWiki functions	0	
<input type="checkbox"/> References	0	

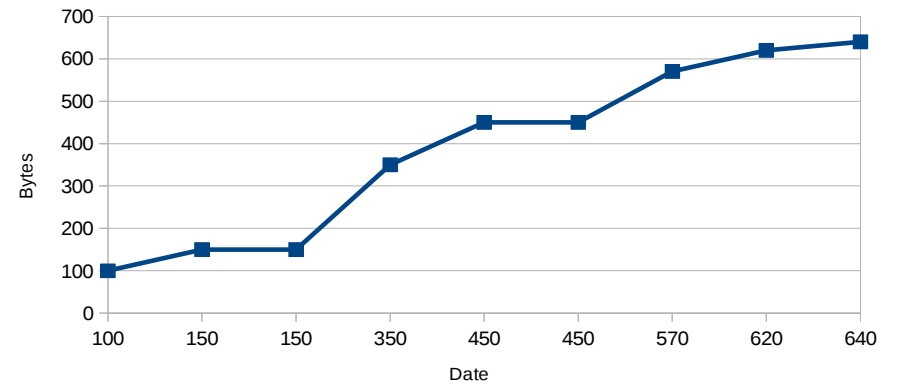
WikiASO

- Self- and peer-assessment have proven to be formative
- The process scales: the more students contribute, the more assessments they make
- They provide “prospective retroevaluation”
 - Each student can see exactly for what editions he received his grade
- If students are not satisfied with assessment received can ask to supervisor to review

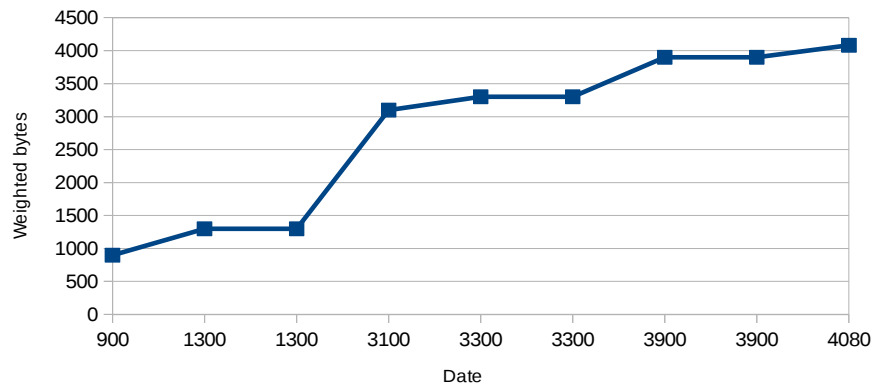
WikiASO

	feb		mar		apr		may		jun
Chr	100	150	0	200	100	0	120	50	20
Grd	9	8	0	9	2	0	5	0	9

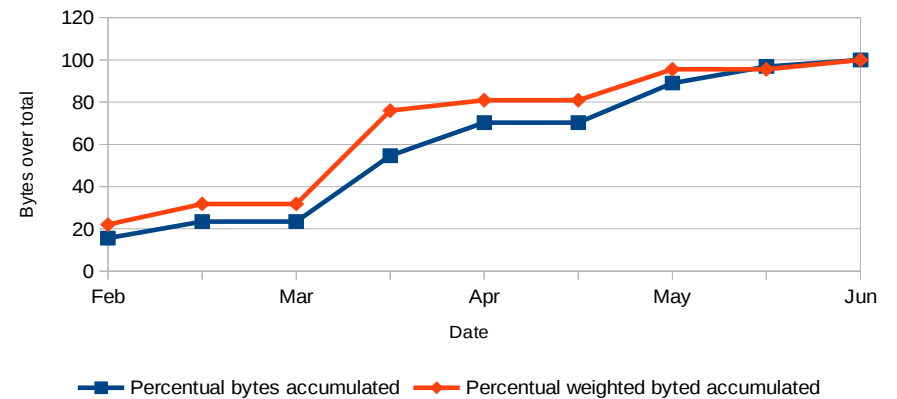
Byte committed, accumulated



Bytes committed weighted, accumulated



Percentual comparisson



WikiASO

- Assessment:
 - Ability to be critical: % of assessment made by students that had to be corrected by supervisor
 - Fine-grain collaboration: different students contributed to a same technical dimension of the rubric, no matter in which wiki page
 - Constant wiki contribution: number of assessed contributions each week/month
 - We checked it skills were worked in right order:
 - Early contributions should work on competences needed for later ones (e.g. first requirements, then architecture).

Conclusions and future lines of work

Conclusions

- Wikis offer different ways for collaborative assignment
- Both the assignment definition and its assessment have to be done “the wiki way”
- Different (transferable) skills can be objectively assessed:
 - Leadership
 - Collaboration inside a group and between groups
 - Communication and conflict resolution
 - Ability to be critical
 - ...

Challenges

- Different challenges lie ahead:
 - Fine-grained mixture of quantitative and qualitative assessment approaches
 - Reinforce assessment with automatic NLP tools
 - Semantic integration
 - Privacy
 - The information stored in a wiki database is similar to that stored in an usual LMS. Anyway, the information stored and shown can be limited
 - Wikipedia assignments? Students will be “in the wild”
 - WikiMedia Chapters can help

References

- Papers in indexed journals:
 - Manuel Palomo-Duarte, Juan Manuel Doderó, Inmaculada Medina-Bulo, Emilio J. Rodríguez-Posada, Iván Ruiz-Rube. *Assessment of Collaborative Learning Experiences by Graphical Analysis of Wiki Contributions*. Interactive Learning Environments. 2014
 - Manuel Palomo-Duarte, Juan Manuel Doderó, Antonio García-Domínguez, Pablo Neira-Ayuso, Noelia Sales-Montes, Inmaculada Medina-Bulo, Francisco Palomo-Lozano, Carmen Castro-Cabrera, Emilio J. Rodríguez-Posada, Antonio Balderas. *Scalability of Assessments of Wiki-based Learning Experiences in Higher Education*. Computers in Human Behaviour. 2014
- Other papers/reposts:
 - <http://wikipapers.referata.com/>
- Open Source tools:
 - <http://statmediawiki.forja.rediris.es/>
 - <http://assessmediawiki.forja.rediris.es/>
 - <https://github.com/rdmpage/wikihistoryflow>

Thank you for your attention
Questions?

*Acknowledgements:
Educational Innovation programme,
University of Cadiz*

