Idea Relationship Analysis in Open Innovation CrowdSourcing systems

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http://www.gsi.dit.upm.es
Idea Management Systems

The problem
  - too many similar ideas

Our solution
  - idea relationship hierarchy

Evaluation
  - Ubuntu brainstorm

Conclusions
Idea Management Systems

- Evolution of suggestion boxes...
- for open innovation purposes
  - Collect ideas, suggestions, from customers, employees, ...
Innovation through Idea Management Systems

- Idea Generation
- Idea Improvement
- Idea Selection
- Idea Implementation

1. Idea Generation: Clients share their ideas and comments about products.
2. Idea Improvement: Ideas are submitted and commented via a web 2.0 portal.
3. Idea Selection: Ideas are analyzed by experts to select the best.
4. Idea Implementation: Ideas are implemented and turned into products.
5. Idea Deployment: Products are branded, delivered to clients and evaluated.
The viewing of app images in Software Center is inconvenient.

Written by Vahan Harutyunyan the 21 Sep 12 at 14:11. Related project: Ubuntu Software Center.

When we select the application and press "More Info" button we can get information about the app. A lot of applications have more than one images uploaded by developers. And it's very inconvenient if you want to zoom these images and view them. You have to select one image, zoom it (appears a window), then close the window, select next image, zoom it, etc.

Solution #1: Add "arrow" button on the current image.

Written by Vahan Harutyunyan the 21 Sep 12 at 14:11.

When you hover over image the "arrow" button appears and for viewing the next image you just need to press this button.
Hi there, Sign In to make a comment.

Ideas so far

Search Ideas

PRODUCT IDEAS

31,535 Coffee & Espresso Drinks
3,156 Frappuccino® Beverages
9,306 Tea & Other Drinks
14,469 Food
7,502 Merchandise & Music
14,868 Starbucks Card
2,355 New Technology
10,134 Other Product Ideas

EXPERIENCE IDEAS

7,555 Ordering, Payment, & Pick-Up
13,533 Atmosphere & Locations
10,504 Other Experience Ideas

Most Recent Ideas

22 Min(s) Ago  Different card designs for Passbook on iPhone
54 Min(s) Ago  Fun With Tea
1 Hour(s) Ago  Enriching an Elders Life
Sell ARM based systems

Posted by: shiningarcanine

Intel based systems are power hungry and with rising energy costs, many people are realizing that th ...

Learn More

6 Votes | 3 Comments

please put android on the ARM version of the dell xps duo 12

Posted by: bcriu11

Status: New

Oct 4, 2012

I love the dell xps duo but i really do not like windows 8, could you please put android on the ARM version of the dell xps duo 12

Explore More

Design idea

Posted by: Hto005

Status: Acknowledged

Oct 3, 2012

Well, to be honest and all: I hate Dell computers. why? because I start like the design. And no, I am not an apple fanboy...

Explore More
Goal: improve how ideas are automatically filtered
Our research so far

- Define Gi2MO ontology for formalising and interlinking idea management systems (IMS)
- Connect ideas with Enterprise systems following the Linked Data model
- Integrating Opinion Mining techniques with IMS
- Idea Classification, filtering and analysis of idea similarities independent of idea topic (this talk!)
Our research so far...

- Software released as open source, everything available at http://www.gi2mo.org
The problem

- Too many ideas to be analysed
- Many ideas are similar
Is it easy to define what is 'similar'?

Similar ≠ Equal
Some examples...

SIMILAR = DUPLICATE

Include Search String in Brainstorm Results Page

- Alt_idea Ideas (0)  - Alt_solution ideas (0)  - Complements Ideas (0)  - Details Ideas (0)
  - Disjoint Ideas (0)  - Duplicates Ideas (1)  - Excludes Ideas (0)  - Extends Ideas (0)
  - Generalizes Ideas (0)  - Iss_duplicated ideas (0)  - Iss_extended Ideas (0)  - Related_topic Ideas (0)
  - Similar Ideas (0)

Duplicates Ideas:

Brainstorm

When you search for some words in Brainstorm - you get the result, but nowhere on the page you can see what you were searching for. Sometimes I have two or three tabs open with searches, and I don't r(....)
Make available a downloadable printable properly formatted document for inclusion with a freshly burned (md5sum checked, and verified) Ubuntu LIVE CD to be given to a potential new Ubuntu user (who may not even know what Ubuntu or Linux even is.) Following is what I folded up with a LIVE CD I gave to a coworker who is frustrated with windows and is considering purchasing a Mac. This makes it gentle encouraging with no preaching needed (best chance I would bet): This is an Ubuntu Linux “LIVE” CD meaning that the linux operating system and all of the included software runs strictly off the CD. This gives the user the opportunity to “test drive” linux without modifying their existing system in any manner whatsoever. To use it, first make sure that the BIOS is set to boot CD first.

**Restoring the bootloader by Ubuntu installation CD**

If I install Windows after Ubuntu, it’s impossible to boot Ubuntu until I install again GRUB following several instructions. My idea is adding the option "Restore bootloader" in the list which appears(...)

**Author:**...
Proposal: similarity relationships

<table>
<thead>
<tr>
<th>A Based on knowledge</th>
<th>Relationship existing between knowledge content of ideas created independently</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 Similar</td>
<td>Ideas similar to each other</td>
</tr>
<tr>
<td>A1.1 Describes Same Object</td>
<td>Ideas that propose a similar innovation for the same item</td>
</tr>
<tr>
<td>A1.1.1 Extends</td>
<td>One idea extends other</td>
</tr>
<tr>
<td>A1.1.1.1 Complementary</td>
<td>Ideas that can work together</td>
</tr>
<tr>
<td>A1.1.1.1.1 Details</td>
<td>One idea focuses on part that other neglects</td>
</tr>
<tr>
<td>A1.1.1.1.2 Generalizes</td>
<td>One idea describes a more broad vision of other</td>
</tr>
<tr>
<td>A1.1.1.1.2 Excluding</td>
<td>Implementations of ideas exclude each other</td>
</tr>
<tr>
<td>A1.1.1.2.1 Alternative Solution</td>
<td>Ideas refer to the same object and problem but solved in different ways</td>
</tr>
<tr>
<td>A1.1.1.2.1 Alternative Idea</td>
<td>Two completely distinct ideas that in effect are impossible to implement together</td>
</tr>
<tr>
<td>A1.1.2 Duplicates</td>
<td>Ideas describe exactly the same innovation</td>
</tr>
<tr>
<td>A1.2 Describes Related Object</td>
<td>Ideas that propose innovation for different objects that are somehow related to each other</td>
</tr>
<tr>
<td>A2 Disjoint</td>
<td>Ideas not having any meaningful similarities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B Based on Action</th>
<th>The relationship is created by an action operating on both ideas by a user of the system</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1 Based on Moderator Action</td>
<td>Action taken by moderator of the system in reaction to submitted ideas and relationship annotations</td>
</tr>
<tr>
<td>B1.1 Follows</td>
<td>Implementation of an idea should follow some other idea</td>
</tr>
<tr>
<td>B1.2 Proceeds</td>
<td>Implementation of an idea should proceed some other idea</td>
</tr>
<tr>
<td>B1.3 Merged</td>
<td>Two ideas merged into a single one</td>
</tr>
<tr>
<td>B2 Based on Innovator Action</td>
<td>Relationships created based on user interaction with ideas</td>
</tr>
<tr>
<td>B2.1 Originates</td>
<td>Ideas created by extending some other idea</td>
</tr>
<tr>
<td>B2.2 Is version</td>
<td>Created by updating an idea (e.g. in reaction to community feedback)</td>
</tr>
<tr>
<td>B2.3 References</td>
<td>One idea referencing other idea (or resource from outside the system)</td>
</tr>
</tbody>
</table>
Proposal Similarity Relationships

IDEA GENERATION

RELATIONSHIP ANALYSIS & ASSESSMENT

IDEA CLUSTERING

Relationship hierarchy:
- Describes Same Object
  - Extends
    - Complementary
    - Details
    - Generalizes
  - Excluding
    - Alternative Solution
    - Alternative Idea
  - Duplicates

Aggregation Ratio
Evaluation methodology

- Collect Ideas from Ubuntu Brainstorm
- Manual Annotation of ideas with new relationships
- Evaluation of duplicate detection with new relationships

<table>
<thead>
<tr>
<th>Metric</th>
<th>Metric Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea number</td>
<td>21690</td>
</tr>
<tr>
<td>Comments number</td>
<td>133090</td>
</tr>
<tr>
<td>Users number</td>
<td>10062</td>
</tr>
<tr>
<td>Implemented Ideas number</td>
<td>576</td>
</tr>
<tr>
<td>Amount of Votes cast</td>
<td>2608917</td>
</tr>
</tbody>
</table>

Manual annotation

Idea title: User always confused about software update

Similar Idea by Title:

Suggestions:
Instead of typing idea title, choose a related idea from the suggestions list.

- The update process becomes exhausting.
- Update open arena in the repository.
- Improve update process.
- Ask for application restart after security update.
- Update the blog.

Create New Idea

Idea Categories
- Uncategorised (1921)
- System (3109)
- Others (2036)
- LookAndFeel (2035)
- Usability (1649)
- Internet
- Multimedia (971)
- Installation (903)
- HardwareSupport (715)
- Accessibility (683)
- Graphics (401)
- Office (375)
- Marketing (371)
- Security (341)
- Gearing (258)
- Programming (228)
- Server (196)
- Documentation (111)
- Quality (107)
- Education (90)
- Ideas/communities/Finance (89)
- IdeaStructure (67)
- WebsiteStructure (57)
- WebsiteNavigation (51)
- AdditionalSoftware (25)
- DeveloperFeedback (23)
- Brainstorm (1)
- Scientific_method
- Free_web_browsersSuchAsMidori,Epiphany,Strage
- SomeIdeasAreVeryStrange (1)
Experiment I

- Goal: determine if all the relationships are useful, apart from duplicate relationship
- We compare our manual annotation with the annotation of duplicate available in Ubuntu Brainstorm
Results Experiment I

- 76.7% new relationships compared with the original IMS

<table>
<thead>
<tr>
<th></th>
<th>Ubuntu Brainstorm</th>
<th>Gi2MO Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplicate</td>
<td>249</td>
<td></td>
</tr>
<tr>
<td>total 440 (328 without duplicates)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>similar</td>
<td>4</td>
<td>disjoint</td>
</tr>
<tr>
<td>related object</td>
<td>111</td>
<td>extends</td>
</tr>
<tr>
<td>is extended</td>
<td>3</td>
<td>complements</td>
</tr>
<tr>
<td>details</td>
<td>136</td>
<td>generalizes</td>
</tr>
<tr>
<td>excludes</td>
<td>0</td>
<td>alternative solution</td>
</tr>
<tr>
<td>alternative idea</td>
<td>26</td>
<td>duplicates</td>
</tr>
<tr>
<td>is duplicated</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Experiment II

- Goal: new relationships help to identify duplicates and reduce the data set

- We compare
  - Detected duplicates in Ubuntu
  - Detected duplicates in our dataset based on the new relationships
    - 200 ideas with 5 manual annotations suggested by Lucene
  - Same as before but taking into account the hierarchy
Results II

- Ubuntu: 1.13% of duplicate ideas of entire dataset
- Data set with relationships: 0.5%
- Data set with relationships + hierarchy: 1.95%

<table>
<thead>
<tr>
<th>Relationship</th>
<th>No Inheritance</th>
<th>Inheritance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Transitivity</td>
<td>Transitivity</td>
</tr>
<tr>
<td>Similar</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Related Object</td>
<td>0.72</td>
<td>0.75</td>
</tr>
<tr>
<td>Extends</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Complements</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Details</td>
<td>0.87</td>
<td>0.90</td>
</tr>
<tr>
<td>Generalizes</td>
<td>0.18</td>
<td>0.21</td>
</tr>
<tr>
<td>Excludes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Alternative Solution</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>Alternative Idea</td>
<td>0.17</td>
<td>0.18</td>
</tr>
<tr>
<td>Duplicates</td>
<td>0.71</td>
<td>0.71</td>
</tr>
</tbody>
</table>
Experiment III

- 558 out of 1000 ideas are not related each other (so, they are not similar)

- Analyse similarity based on other annotations:
  - Trigger type
  - Innovation type
  - Proposal type
  - Object type
Gi2MO Types

**Idea Title:** More buttons on the tablet.

**Idea Summary:**
I would like to propose adding more physical buttons on the 9 inch tablet that is currently available in your offer. When using the tablet I feel that the single 'home' button is not enough for many activities that the tablet is advertised for making the experience bad.

For example, for reading ebooks, it would be very useful to have "back" and "forward" buttons for scrolling pages of the book. I own a e-paper reader and I think those buttons could be also used for different activities (for example web browsing or games).
### Results Experiment III

- Calculated similarity $S$ between two related ideas $(i_A, i_B)$ for 50 ideas for Metric $M_x$

$$S(i_A, i_B, M_x) = 1 - |M_x(i_A) - M_x(i_B)|$$

<table>
<thead>
<tr>
<th>Metric/Relationship</th>
<th>Similar</th>
<th>Disjoint</th>
<th>Duplicate</th>
<th>Related Object</th>
<th>Extends</th>
<th>Complements</th>
<th>Excludes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completeness</td>
<td>0.18</td>
<td>-0.19</td>
<td>0.08</td>
<td>0.03</td>
<td>0.11</td>
<td>0.08</td>
<td>0.07</td>
</tr>
<tr>
<td>Experience Completeness</td>
<td>-0.04</td>
<td>0.06</td>
<td>0.07</td>
<td>0.01</td>
<td>-0.09</td>
<td>-0.07</td>
<td>-0.04</td>
</tr>
<tr>
<td>Situational Dependence</td>
<td>0.01</td>
<td>-0.03</td>
<td>0.02</td>
<td>0.05</td>
<td>-0.04</td>
<td>-0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Relatedness</td>
<td>0.01</td>
<td>-0.02</td>
<td>0.11</td>
<td>-0.04</td>
<td>-0.07</td>
<td>-0.02</td>
<td>-0.08</td>
</tr>
<tr>
<td>Adaptiveness</td>
<td>0.18</td>
<td>-0.20</td>
<td>0.01</td>
<td>0.01</td>
<td>0.18</td>
<td>0.12</td>
<td>0.11</td>
</tr>
<tr>
<td>Originality</td>
<td>0.15</td>
<td>-0.17</td>
<td>0.06</td>
<td>0.05</td>
<td>0.09</td>
<td>0.05</td>
<td>0.07</td>
</tr>
<tr>
<td>Originality Scope</td>
<td>0.06</td>
<td>-0.01</td>
<td>0.08</td>
<td>-0.14</td>
<td>0.13</td>
<td>0.06</td>
<td>-0.05</td>
</tr>
<tr>
<td>Cooperativeness</td>
<td>0.14</td>
<td>-0.14</td>
<td>0.12</td>
<td>0.03</td>
<td>0.04</td>
<td>0.06</td>
<td>-0.02</td>
</tr>
<tr>
<td>Freshness</td>
<td>0.09</td>
<td>-0.09</td>
<td>0.01</td>
<td>-0.11</td>
<td>0.15</td>
<td>0.10</td>
<td>0.09</td>
</tr>
<tr>
<td>Integrability</td>
<td>0.24</td>
<td>-0.25</td>
<td>0.08</td>
<td>0.02</td>
<td>0.19</td>
<td>0.16</td>
<td>0.07</td>
</tr>
<tr>
<td>Applicability Scope</td>
<td>0.14</td>
<td>-0.14</td>
<td>-0.01</td>
<td>0.01</td>
<td>0.10</td>
<td>-0.06</td>
<td>0.08</td>
</tr>
<tr>
<td>Constructiveness</td>
<td>-0.02</td>
<td>-0.01</td>
<td>0.01</td>
<td>-0.05</td>
<td>0.00</td>
<td>0.14</td>
<td>0.08</td>
</tr>
<tr>
<td>Scope</td>
<td>0.11</td>
<td>0.13</td>
<td>-0.01</td>
<td>0.09</td>
<td>0.07</td>
<td>0.09</td>
<td>-0.02</td>
</tr>
<tr>
<td>Object Dependability</td>
<td>0.24</td>
<td>-0.21</td>
<td>-0.01</td>
<td>0.01</td>
<td>0.25</td>
<td>0.21</td>
<td>0.11</td>
</tr>
</tbody>
</table>
Analysis

- Same correlation in similar and disjoint idea subsets with the analysed metrics
Conclusions

- Semantic relationship can improve the detection of similar ideas
- Relationship hierarchy and transitivity improve similarity detection
- Other annotations (Gi2MO types) and associated metrics do not help for detecting similar ideas
Questions?

It's QUESTION TIME!!