# How to Visually represent the reason why a link is recommended to the user

Alessandra Petromilli

Communication in the Information

society,

University of Turin

00393403121338

alessandra.petromilli@gmail.com

## ABSTRACT

My research presents a set of evaluations aimed at identifying the best way to represent and visualize through information visualization's techniques[1] a *scrutable user model*[2] in an existing web-based and social recommender system in the cultural events domain, iCITY[3]. The *scrutability* is an important feature because it explains the reason why a link is suggested to the user[4]. This was the subject of my degree thesis that I presented the 18th of March 2009 and at the moment I'm a PhD candidate for the Computer Science Department of the University of Turin my advisor is Roberto Montanari. The goal of my experiments is to evaluate three different visualizations' types (ordered, absolute and relative)[5] that enable the users to modify their levels of preferences concerning different categories of cultural events, which correspond to the classes in the taxonomy of iCITY. Because of that the 9 interfaces realized were divided into three homogeneous groups, based on the user model representation:

1. **Ordered representation**: list, podium, medals

2. **Absolute representation:** stars, sliders, cloud

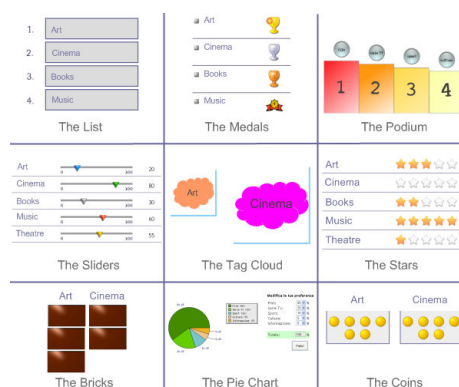3. **Relative representation:** coins, bricks, pie chart

**Figure 1 shows the 9 visualizations**

Two experiments were performed: i) a large between subjects evaluation aimed at confronting different representations and visualizations ways;

ii) a within-subjects lab evaluation aimed at confronting the same experimental condition.

The first evaluation was carried out as an online test aimed at evaluating the proposed user model visualizations with a large number of users (299).

The goal was to discover:

i) which visualization was the most appreciated;

ii) whether users actually appreciated the possibility to inspect and modify their user models;

The people subjected to the experiment were Facebook's users who are familiar with social media, such as iCITY. They were randomly assigned to one of the three groups (133 females and 166 males, between the ages of 16 and 65).

The second experiment was aimed at gaining a deeper insight on:

i) user preferences in specific visualizations;

ii) their opinion on the possibility to inspect and modify their models.

iii) which type of user model representation (ordered, absolute or relative) was the most meaningful and user-friendly.

The subjects involved in the evaluation were 12 females and 16 males, between the ages of 16 and 65. They were recruited among researchers and students at the University of Turin, according to an availability sampling strategy. All of them were frequent Internet users, familiar with social media.

Oral comments have been obtained through thinking aloud technique.

**Table 1  shows the distribution of values for the favourite and least favourite visualizations in the first  experiment**

|                    | Ordered      | Absolute               | Relative       |
|--------------------|--------------|------------------------|----------------|
| Favourite          | List: 61     | Stars:  34 Sliders: 38 | Pie Chart: 52  |
| Least Favourite    | Podium: 57   | Tag Cloud: 65          | Bricks: 47     |

With regard to the first experiment (see results table 1), the preferred prototypes were those which are commonly used in social websites, such as stars and sliders, for the absolute representation, and the list for the ordered representation.

However, for the relative representation, the favourite visualization was the pie chart which allowed more precise comparison between the values. The second experiment (see results table 2), was performed with a small user sample in order to collect user opinions, which can be better reached through direct observation and thinking aloud.

**Table 2 shows the distribution of values for the favourite and least favourite visualizations in the second   experiments**

|            | Favourite | Least favourite |
|------------|-----------|-----------------|
| List       | 5         | 2               |
| Medals     | 4         | 5               |
| Podium     | 4         | 0               |
| Cloud      | 3         | 8               |
| Stars      | 7         | 0               |
| Sliders    | 2         | 2               |
| Pie Chart  | 2         | 8               |
| Bricks     | 0         | 2               |
| Coin       | 1         | 1               |

Comments collected through thinking aloud were particularly useful in order to confirm the idea which emerged in the first experiment, that the absolute representation, to which users are quite accustomed, is easy to understand and to use.

However, the ordered representation is considered even easier. On the other hand, some users appreciated the visualizations based on the relative representation, because they were more precise and it allowed them to explicitly indicate relations among different categories.

Therefore, the idea which emerged in the first experiment that the relative representation was more informative has been partially confirmed.

It is important to note that in both experiments the choice of the favourite and least favourite visualizations were influenced by the kind of interaction suggested.

The coins, the bricks and the podium were penalized because of the horizontal movement which users found difficult to use, on the contrary the vertical movement rewarded the list and the medals. Surprisingly the users appreciated the more demanding, but also more complete pie chart and the precise count necessary to its interaction disconfirming the hypothesis that users would prefer an easy-to-use, direct manipulation-based visualization.

This study cannot be considered concluded: at the moment I'm going to perform a new among subjects experiment on a larger sample to confirm the first experiment's results and to understand what are the psychological stereotypes of  a scrutable system's user. I'm working also on a new graphical fit for the interfaces responding to subjects critiques.

# 2.  REFERENCES
[1] Stuart K. Card, Jock D. Mackinlay, Ben Shneiderman, 1999, Readings in Information Visualiztion. Using vision to think. Morgan Kauffman, San Francisco.

[2] J. Kay, 1999 A scrutable user modelling shell for user-adapted interaction. PhD thesis Department of Computer Science, University of Sydney, Sydney, Australia.

[3] F. Carmagnola, F.Cena, L.Console, O.Cortassa, C.Gena, A. Goy, I. Torre, A Toso and F. Vernero, 2008, Tag based user modeling for social multi-device adaptive guides. User model. University of Turin, Department of Computer Science.

[4] S. Bull, H.Pain 1995, Did I say what I think I said, and you agree with me?Inspecting and questioning the student model. In Proceedings of Al in Education, ACCE, pages 501-508.

[5] See and try the 9 interfaces at: http://www.icity.di.unito.it/prototipi/prototipi_old/all/istruzioni.html