

Visual User Interfaces to Information Spaces

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- “Semantic road maps”, Doyle (1961).
- Spatial metaphor is a powerful one in human information processing.
- Maps of information spaces help in information space navigation.
- They provide interactive, responsive person-machine interaction.
- They lend themselves to self-organization in distributed processing environments.

Literature Maps

- Responsive user interfaces to main astronomical journals - 20,000+ scientific articles accessible in this way.
- Catalogs relating to tens of millions of astronomical objects similarly accessible via interactive visual user interface.

Kohonen self-organizing feature map:
one visual user interface building approach.

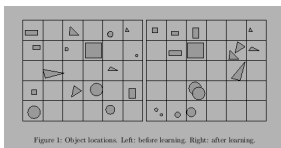
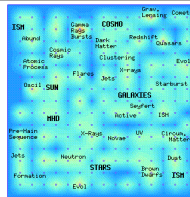


Figure 1: Object locations. Left: before learning. Right: after learning.

Astrophysical Journal (1994-2000)

[CDR](#) [Simbad](#) [Vizieff](#) [Aladin](#) [Catalogues](#) [Nomenclature](#) [Bibli](#) [StarPages](#) [AstroWeb](#)



This map gives access to 10081 articles from *Astrophysical Journal*. We used the technique of “Self-Organizing Maps”, where documents are classified in areas on the basis of their keywords. Density of documents is smallest in blue regions, and largest in red regions.

In order to consult the document map, and to retrieve the abstracts of relevant papers, please follow the following steps:

- Select with the mouse, a region (symbolized by a white point). Keywords related to the documents of the region will appear in the adjacent frame.
- Selecting a keyword provides access to the full list of related papers.
- If there are more than 30 articles on the selected region, you can access to a more detailed map.
- To submit a keyword query, just type a few letters of an expression you are looking for. All the keywords containing these letters will appear allowing to select one or more of these keywords.

[Keyword query](#) [Bibcode query](#) [Help](#)

Astronomy & Astrophysics (1994 - 1999)

CDR [Simbad](#) [Vizieff](#) [Aladin](#) [Catalogues](#) [Nomenclature](#) [Bibli](#) [StarPages](#) [AstroWeb](#)

This map gives access to 7475 articles from *Astronomy & Astrophysics* (1994 - 1999). We used the technique of “Self-Organizing Maps”, where documents are classified on the basis of their keywords. Density of documents is smallest in blue regions, and largest in red regions.

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1. If you already know the catalogue [cds simbad](#), [vizieff](#), [aladin](#), enter it below.

2. Alternatively, you can find the catalogue by selecting sublengths or relation or other keys.

You may type in the box below either an author's name or the word(s) from title, description, etc.

You may also choose (checked) related to [Astrophysics](#), [Physics/AA](#) or [Simbad](#)

JACOBI	PHASE	COSED
COMPARISON	JE	COMPARISON
PHASE	QUALITY	QUALITY
ANALOGY	STY	ANALOGY
ANALOGY	STY	ANALOGY
ANALOGY	STY	ANALOGY
ANALOGY	STY	ANALOGY

3. A Kohonen Self-Organizing Map, displaying an interactive catalogue, organized according to their associated keyword.

This map is based on a visual feature analysis of the keywords associated to the catalogue (see Landwehr et al., 1995).

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Server- vs. Client-side

- Foregoing were CGI-based.
- Next: Java client-side implementations.
- Multigraph established in real time between following objects: author names; object names; article titles.
- Based on XML. (AML = astronomical markup language).
- Different types of link - different weights.
- Clusters determined using compactness criterion.

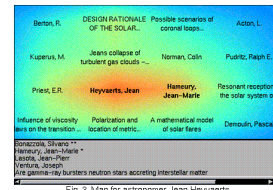


Fig. 3. Map for astronomer Jean Heyvaerts.

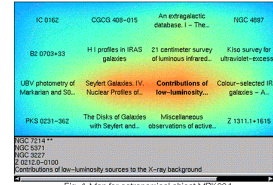
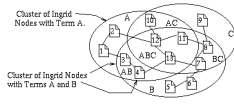


Fig. 4. Map for astronomical object MFK334.

Ingrid - a self-configuring information grid
 (P. Francis, NTT Software Labs, Tokyo, 1995)
 Distributed, scalable architecture based on
 information self-organization.



Comparative assessment - recall and precision plots, based on (i) Kohonen visual user interface, and (ii) free-text keyword query system.

Reference:
 "Maps of information spaces: assessments from astronomy",
 Poincot, Lesteven and Murtagh,
 JASIS, 2000, in press.

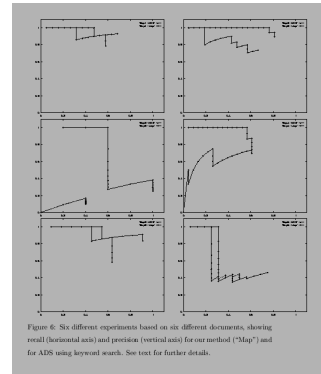


Figure 6: Six different experiments based on six different documents, showing recall (horizontal axis) and precision (vertical axis) for our method ("Map") and for ADS using keyword search. See text for further details.

One current focus of activity, of relevance for visual user interfaces:

IRAI - Getting Information in Complex Information Spaces as an Emergent Behavior of Autonomous Information Agents,

5th Framework IST project, 2000-2002.

Planned work by us in this project:

- Client-side 3-way "cube" presentation of database contents - interactive, responsive. "Glasnost for databases".
- Advanced analysis of (web, database) log files, for user profiling.

Long-term issue:

What do information maps say when they talk to one another...?