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Using ‘basic level categories’ to retrieve multimedia from the world-wide-web

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Search engines today allow a user to quickly find relevant documents among the hundreds of millions of documents on the world-wide-web. These search engines use keywords as the primary way to index into documents. Most users learn to live with this, as keywords are still an approximation to textual material. However, it becomes a serious constraint for searching other media such as images. Search engines that provide facilities to search pictures (e.g. AltaVista) usually link to specialized closed image databases. The results, however, in no way parallel the success of text retrieval. This is deplorable, given the vast amount of multimedia on the web and their significance for communication. In our research we begin

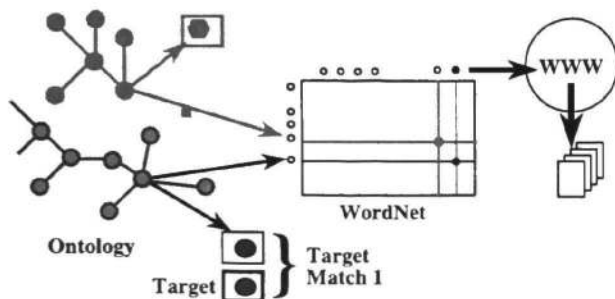


Figure 1: Retrieving an image step one (schematic): (1) match the target with basic level images, (2) look up the corresponding basic level word, (3) retrieve documents from WWW

to see how the cognitive status of ‘basic level’ categories can improve this situation. In a taxonomy of concepts, a concept at the *basic level* adds many attributes to the level above (e.g. from ‘chair’ to ‘furniture’), but very few are added to the level below (e.g. from ‘chair’ to ‘kitchen chair’). At the basic level, many remarkable connections exist between imagery and language (Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976). For example:

- the basic level appears the most abstract level for which an image can represent a class as a whole,
- when people have to name a picture of an object at

the subordinate level, they almost always use the word for the basic level,

- For words that stand for physical objects and organisms, parts notably proliferate at the basic level.

We built a system that uses the basic level to retrieve images through linguistic means (keywords), as depicted in the figures. The results are promising. To further assess the role of the basic level we investigated the following conjectures:

- Documents about parts of a basic level category can be retrieved by searching for the basic level word,
- Images of a basic level category can be retrieved by searching for the basic level word,
- The previous two cases should show notably higher precision for unambiguous basic level words than for polysemous basic level words.

These conjectures were confirmed. For an impression of the actual data, see:

<http://ontologia.nici.kun.nl/~stanf4/images.html>

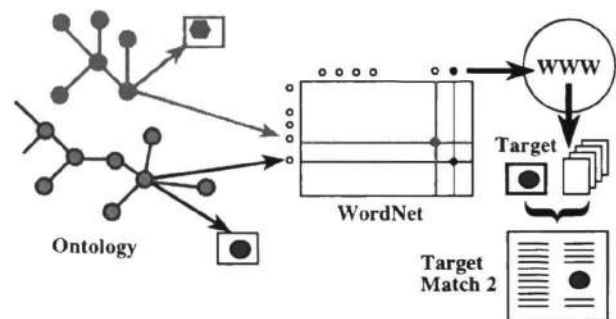


Figure 2: Retrieving an image step two: (1) select retrieved documents that contain images, (2) match images to target image, (3) collect matching images.

References

- Rosch, E., Mervis, C. B., Gray, W. E., Johnson, E. M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology*, 8, 382–439.