Between too informal and too formal

Dr Philippe Martin, Griffith University
Dr M. Eboueya, La Rochelle University,
Dr Jun Jo, Griffith University
Dr Lorna Uden, Staffordshire University

Plan

- Introduction: why "between too informal and too formal »
- Various Readable, Expressive and Normalising Notations
- Querying and Comparing
- Supporting Cooperation Between Knowledge Providers
- Ontologies
- Conclusion
Introduction

- Informal documents:
  - good for storing "data" in redundant and inconsistent ways

- DBs or structured documents
  - store predefined kinds of data and very lightweight metadata

- Metadata for documents (topic hierarchies, ..)
  - still only for document retrieval;
    browsing/querying/updating a semantic network is much more efficient

- KBs: store formal/semi-formal knowledge (representations)
  - Concept/Topic Maps: too permissive -> often worse to read/exploit than sentences
  - Classic KBs: for inferencing purposes -> complex but restricted notations
    and little k. sharing support -> too time-consuming for enterprise memories
  - WebKB-2: various notations, cooperation protocols, lexical ontology

Readable, Expressive and Normalising Notations

Languages:
- FCG ("Frame-CGs" or "For Conceptual Graphs")
  - to provide an expressive and concise notation for expressing statements or queries.

- FL ("For Links") (alias FT ("For Taxonomy")),
  - to provide a simple notation for declaring, interlinking and searching categories.

- FC ("For Control")
  - to provide parsing control commands (e.g. "load", "load mode", "use names", "default creators:" and soon "if", and "while").
Readable, Expressive and Normalising Notations

CONCEPT_X->RELATION->CONCEPT_Y
is to be read as
CONCEPT_X has for RELATION CONCEPT_Y
or
CONCEPT_Y is a RELATION of CONCEPT_X.

ex1:
animal > cat

"(the type) animal has for subtype (the type) cat"
or
"animal is a subtype of cat"
Readable, Expressive and Normalising Notations

CONCEPT_X->RELATION->CONCEPT_Y
  is to be read as
CONCEPT_X has for RELATION CONCEPT_Y.
  or
CONCEPT_Y is a RELATION of CONCEPT_X.

ex3:
[any human_body, part: at most 2 arm, part: 1 head]

"any human_body has for part at most 2 arms and has for part exactly 1 head"

Readable, Expressive and Normalising Notations

CONCEPT_X->RELATION->CONCEPT_Y
  is to be read as
CONCEPT_X has for RELATION CONCEPT_Y.
  or
CONCEPT_Y is a RELATION of CONCEPT_X.

ex3:
"human_body part arm [0..1,0..2]"
"any human_body may have for part 0 to 2 arms, and any arm may be part of a human_body"
**Readable, Expressive and Normalising Notations**

CONCEPT_X->RELATION->CONCEPT_Y
is to be read as
CONCEPT_X has for RELATION CONCEPT_Y.
or
CONCEPT_Y is a RELATION of CONCEPT_X.

ex4:

[Ned, agent of: (a sell, object: a car)](pm, 21/2/2001)]

« Ned is agent of a sell that has for object a car, according to the representation made by pm on the 21/2/2001 »

---

**Readable, Expressive and Normalising Notations**

CONCEPT_X->RELATION->CONCEPT_Y
is to be read as
CONCEPT_X has for RELATION CONCEPT_Y.
or
CONCEPT_Y is a RELATION of CONCEPT_X.

ex5:

"...A..." argument: "...B..." (pm, objection: "...C..."(fg))
" according to pm ...A... has for argument ...B... and/but an objection by fg to this argument relation is ...C...".
Readable, Expressive and Normalising Notations

- General notations: Frame-CG and Formalised-English are improvements on CGs.

- Restricted notations: FL (the only notation that most users will need to see)

FL can also be used for structured discussions.
Readable, Expressive and Normalising Notations

For readability reasons and to support various kinds of knowledge entering or views on the knowledge, various formal and semi-formal notations should be supported but precision and normalisation should be encouraged.

The above examples (and the implementation of FCG, FE and FL in WebKB-2) show that doing this while keeping the notations readable is possible.

Querying and Comparing

Category querying
Category comparison
Statement querying

? [a person, agent of: a sell] a query graph
[Ned, agent of: (a sell, object: a car)](pm, 21/2/2001); ]

extended specializations are

Statement comparison: in the article
Supporting Cooperation Between Knowledge Providers

- Asynchronous cooperation
  - is more scalable than exchanges of information between co-temporal users of a system.

- Cooperation between users?
  - Co4 (Euzenat, 1996)
  - WebKB-2.

---

Supporting Cooperation Between Knowledge Providers

- Each category, relation and statement has a creator ->
  - any identifier is prefixed by its creator identifier to avoid lexical conflict;
  - knowledge filtering can be done on the creator.

- Furthermore:
  - relations such as corrective_specialization, correction more_concise_reformulation must be used when redundancies or inconsistencies are detected; this solves semantic conflicts, encourage knowledge sharing and permit later automatic knowledge filtering.

  - argumentations relations between statements and votes on statements permit to valuate the originality and usefulness of each statement and each statement creator, thus easing the filtering of uninteresting statements and encouraging authors to be precise and original.
Ontologies

- The users of a knowledge repository cannot be asked to update the shared ontology for declaring and defining most of the terms they use.

- A "lexical ontology" for English or another natural language should at least be provided to ease, check and guide knowledge entering and permit knowledge sharing and retrieval.

Ontologies

- Merge/alignment of various top-level ontologies
- Transformation of WordNet 1.7 into a genuine lexical ontology
- Beginning of the representation of Knowledge Management Resources (data structures, techniques, tools, ...), first focusing on CG-related resources (e.g., classification of 7 CG tools according to 160 features).

After extensions, this is intended to be the core of a state of the art in ontology engineering that will be cooperatively updatable by researchers in this domain and according to the above cited protocols.
Conclusion

The described approach and tool complement document-based knowledge sharing tools by offering additional or alternative ways to enter, index and retrieve some of the content of the documents.

Precision, structuring and knowledge sharing is encouraged and supported while various degrees of formality are still allowed and users do not need to discuss and do not have to agree (making explicit the disagreements is sufficient).

Conclusion

The provided notations may still be difficult to read or use by non-technical people but
- no simpler-to-use notations can be designed for realistic unrestricted semantic networks (since the concision of those notations already seems optimum);
- they are as necessary for easing the retrieval and comparison of general information as musical notations are necessary for learning to play or analyze music.

Document retrieval and keyword-based retrieval techniques have inherent strong limitations.