

Open Mind Common Sense Project

Every ordinary person has common sense of the kind we want to give our machines

- Push Singh, MIT Media Lab, 2002

→ **Gather common sense knowledge from users of the web, in plain English, through guided activities:**

- **Complete a template**

A hammer is for _____

- **Respond to stories**

Bob had a cold. Bob went to the doctor.

- **Describe a photo**

A mother is holding her baby. The baby is smiling. They are looking into each other's eyes. The baby is happy. The mother is happy.

- **Supply a story to illustrate a fact, e.g. "flashlights light up places"**

It is too dark to see. I went and got my flashlight. I turned on my flashlight. I could see much better.

- **Annotate movies of spatial events**

The small red ball rolls past the big blue ball.

Evaluation of knowledge collected with 1st generation OMCS system:

Evaluation of knowledge collected from September, 2000 to August, 2002:

- Over 456,195 entries from 9,296 people
- About 3,000 unique items evaluated by 7 judges on generality, truth, neutrality and sense

Lessons learned:

1. Different participants prefer to enter different types of knowledge
2. Templates are the most efficient way to solicit new knowledge and provide the most usable form of knowledge
3. Participants want the interaction to be more engaging and to provide a sense of the utility of the knowledge entered
4. Participants want to be able to assess, clarify and repair the knowledge
5. Participants want to help organize the knowledge entered

2nd Generation OMCS System

- **Most knowledge entry uses templates:**
 - Templates based on free-form knowledge entered in OMCS-1
 - User browses database for item associated with a template of interest
User selection: *Bob is hungry. Bob eats a sandwich. Bob is not hungry.*
- **User evaluates inferences derived from knowledge entered**
 - **Analogies over concepts**
 - user: *A mother can have a baby*
 - program: (1) finds other items relating *mother* and *baby*
e.g. *A mother can hold her baby*
 - (2) finds other items with new templates and other concepts
e.g. *A small girl can hold her small dog*
 - (3) inserts new concepts into original template
e.g. *A small girl can have a small dog*
 - (4) asks user to evaluate new assertions

2nd Generation OMCS System (cont'd)

- **User evaluates inferences derived from knowledge entered (cont'd)**
 - **Analogies over relations**
 - user: *A mother can have a baby*
 - program: (1) finds other items with same template, other concepts
e.g. *A child can have a goldfish*
 - (2) finds other items with new concepts, other templates
e.g. *A child can take care of a goldfish*
 - (3) inserts original concepts into new templates
e.g. *A mother can take care of a baby*
 - (4) asks user to evaluate new assertions
 - **Analogies as inference rules**
 - Known:** Ants like food. Sugar is food. You might find ants near sugar.
 - Given:** Bats like darkness. Caves are dark.
 - Inference:** You might find bats near caves.

2nd Generation OMCS System (cont'd)

- Restricts vocabulary by suggesting replacements for uncommon words in knowledge entered
- Tries to disambiguate word senses automatically, asks user to correct
- Asks user for ways to index and organize new items, to facilitate retrieval and application of knowledge
 - user enters a list of related concepts
- Peer review of knowledge entered, to maintain integrity
 - suspicious entries are posted for review by other users
 - more trustworthy users are given more weight

... we believe that work on building commonsense databases is no longer only the domain of multi-million-dollar "Manhattan projects", and can now be pursued by the distributed artificial intelligence community as a whole and by turning to the general public to achieve what is too difficult and expensive to be achieved by any one group.

- Singh et al., 2002