

**Knoesphere:**  
**Building expert systems with encyclopedic knowledge**

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## Abstract

The Knoesphere project is an attempt to build an expert system that is *encyclopedic*, in the breadth of coverage of its knowledge base, and in the degree of integration of that knowledge. The primary issue is how to aid users in searching complex bodies of knowledge. Our approach is to frame the system more as a *museum* than a set of tomes, and to have the user take more or less guided *tours* of the exhibits therein. The impact of such a system on everyday life -- entertainment and, eventually, education -- is clear. We discuss its potential for progress in AI as well: a testbed for representation, speech understanding, natural language understanding and generation, automatic story generation and animation, learning, user modelling, and planning. Having an immensely broad and moderately deep knowledge base, the system may also serve as a useful testbed for exploiting analogy and metaphor as a source of power. The work is in its early stages, hence much of what we present is the design for this system, not finished results. We do calculate the magnitude of the tasks involved in such an ambitious endeavor, and give scenarios of its use.

### 1. Introduction to the Knoesphere

This paper describes an ongoing research project whose goal is to represent a comprehensive corpus of real world knowledge (both the size and scope of *The Encyclopedia Britannica*[1]) in a knowledge base; i.e., as a structured network of concepts, rather than as pieces of text. The purpose is to enable a user to browse through that knowledge in as effective and flexible a manner as possible. The project can be conceived as the combination of three methodologies: experts systems [2] (hitherto narrow in scope), encyclopedias and online data bases [1,3] (hitherto only lightly cross-indexed assemblages of prose), and videogames (hitherto rarely educational). We now present a scenario of a session with Knoesphere. We include it for motivation of the project, and to illustrate how the various levels of modelling and tailoring and filtering can affect what the user experiences.

It is Autumn, 1995. Sitting in our living room, we connect our home computer to the relevant encyclopedic service, and don a helmet and gloves. The helmet is a lighter, faster version of [4], with separate images for each eye, speakers for each ear, and sensors to track eye and head movements. The gloves enable our hand positions to be monitored, and provide pressure feedback.

Displayed before our eyes is a trio of three-dimensional arrays, labelled *Axes*, *Guides*, and *Filters*. Each array is filled with icons. We point at the *Axes* array, and it grows larger, as though we were approaching it. We now see that its icons symbolize various sorts of dimensions: ways of organizing knowledge: by location, by time, by degree of certainty, by principal objects involved, by philosophical orientation, by academic discipline, etc. In this context, *icons* have three-dimensional shapes and textures. We reach out and touch three of the icons (academic discipline, certainty, philosophic orientation), and off in a small corner we see them now labelling three orthogonal axes of a coordinate system labelled *Knowledge*, with tiny, illegible icons dotting that space. The *Axes* array has shrunk back down in size, and we now enter the *Guides* space. It grows, to become an array of pictures of people, arranged by their personality, profession, and teaching style. We select Jean, a blustery physicist who makes us draw our own conclusions. We notice that Jean is now standing off to one side of us, occasionally reaching over and peering at entries in the final, *Filters* array. It is filled with simulated clip-on sunglasses, with labels like NoAnalogies, EmphasizeTheory, and EmphasizeNames. These sunglasses filter out -- or stress -- various features of the tour we're about to take. We select NoMath and NoConnections, and put them on; Jean winces.

We tell Jean we're ready, and the new *Knowledge* array (with its axes labelled Field, Certainty, and Philos) grows to fill our entire field of vision. In front of us, all around us, are all the entries in the knowledge base, organized by these three attributes. We notice that we're positioned near Physics on one axis (Jean's specialty), at NearCertainty on another axis (Jean knows I wouldn't have selected her to guide me around speculative fiction), and at Ontology along the third axis (Jean prefers Teleology, or even Phylogeny, but knows I'm more interested in the current state of things). Moving around in this space for a couple minutes, with a running commentary from Jean, the image of Jupiter catches our eye, and we ask to spend some time finding out more about it.