A Collaborative Approach to Building Personal Knowledge Networks

or

How to Build a Knowledge Advantage Machine?

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Importance of Knowledge in Post-Modern Society

An investment in **Knowledge** returns the best interest of all.

Benjamin Franklin
Nature of Knowledge

- Knowledge is *power*
- Knowledge is *scattered*
- Knowledge is growing *exponentially*
- Knowledge is mingled with *trivia*
To be useful….

Knowledge must be synthesized, presented on-demand, be visualizable and adaptable to the present context.
Knowledge Advantage

Collaborate

CP

CM

SIP Lab, CSEE, west Virginia University
A way to be a master
Collaboration and Knowledge Advantage

- Management Science
- Artificial Intelligence
- Collaboration Science
- Distributed Computing
Welcome to the S/VA Paradigm

- Sieve
- Interlink
- Visualize
- Apply
SIVA Paradigm ---- Sieve, Interlink, Visualize, and Apply
Vijjana – A Model based on the SIVA Paradigm
An instance of Vijjana Model Application

Semantic network consists of units with enriched metadata, which can be searched, achieved, and accessed from everywhere by everybody.
A Vijjana based Photo Album

- Organizes itself
- Retrieves photos based on context
- Accessible to Personal Apps
The Vijjana Model

- Vijjana-X = \{J, T, R, dA, oA, cA, vA, sA, rA\}

X = the domain name
J= the collection of JAN’s in the Vijjana-X
T = the Taxonomy used for classification of JAN’s
R= the domain specific relations
dA = the discovery agent which finds relevant JAN’s
oA = the organizing agent which interlinks the JAN’s based on R
cA = the consistency/completeness agent
vA = the visualization agent
sA = the search agent
rA = the rating agent
Framework Infrastructure

• Knowledge is contributed by trusted user and administrated by their supervisor

• Semantic service is running on recognizing, organizing, and clustering knowledge.

• Access can be everywhere
Vijjana Client

VijSpace Client (Developer) Architecture

Actor

Web Browser
Editor
Discovery Agent
Markup
Parser
Chat Client
Mail Client
Organizing Agent
Consistency/Completeness Agent
Evaluation Agent
Mail server

Vijiana Database Server
Work Flow for knowledge accumulation

User

Add a Jan to the Library

Web Browser / file (Markup)

Metadata of a Jan.

Organizing Agent

Establishing the relationship and placing them in the taxonomy hierarchy.

Database (Digital Library)

Providing Dataset

Visualization Agent

Displays different Views

Client Interface (Vijjana Website)

The Collaboration Agent is embed in the Vijjana Website.

Collaboration Agent

Has access to Global Space, Personal Space, Validate his Jans etc.

Client Interface (Vijjana Website)

Has access to Global Space, Personal Space, Validate his Jans etc.
The Vijjana Work Process

- Identify the domain
- Create a Taxonomy and semantic links
- Discover URLs
- Markup
- Organize
- Archive
The Vijjana Work Process

- Check consistency and completeness
- Visualize
- Search
- Retrieve on demand contextually
Web Interface Prototype

- Browse JAN’s with in the user interest.
- Comment on the JAN, for discussion.
- Rate the JAN, to get best & useful content.
- Visualization of Taxonomy, for addition of JAN’s manually.
- Visualization of Knowledge Domains for easy navigation and User friendly search.
Web Interface of Singed User

Vijjana

Agriculture
The science and technology of growing living things (plants and animals) for human consumption or use as pets, ornament, food, fiber, or construction material. Includes Forestry, Horticulture and Soil Science.
Rate: 2

Astronomy
Astronomy is the study of physical and chemical properties of the stars, planets, galaxies and the universe, as we know it, today and in the past.
Rate: 0

Chemistry
Chemistry is typically defined as the science that studies the composition, structure, and transformation of matter. It has been called "the central science" because of the way it is related with all the other sciences. Chemistry bridges the gap between
Rate: 5

Technology
Engineering and related applied sciences.
Rate: 5

Environment
Scientific aspects (and many non-scientific aspects) of environmental protection, natural heritage conservation, sustainable living, environmental impact of technologies, and global environmental change. Environmental Science involves the focused applic
Rate: 0

Math
Math or mathematics is the study of numbers and variables representing numbers to solve everyday problems, learn about the world around us or to be an exercise in logical reasoning.
Some applications of math are in the areas of finance, physics.
Rate: 5

Physics
Physics is the study and application of the fundamental laws of nature, including the laws of motion, gravity, electromagnetism, heat, and microscopic interactions. These laws govern the
Vijjana Add-on

- We have also a **browser interface** for accessing Vijjana.
- **Browser required**: Mozilla Firefox 2.0.1 or later
- **Vijjana toolbar** is provided as add-on for Firefox
- when the **Add-On** installed, will install the Vijjana buttons
Go to Vijjana HomePage

Add-ons

Extensions

Internet Download Manager integration module for Mozilla

Skype extension for Firefox 2.2.0.70
Skype extension for Firefox

Talkback 2.0.0.11
Sends information about program crashes to Mozilla.

Yeoh Browser Plug-in 1.3
Add videos and videocasts to the Yeoh Player

Vijjana 1.0
Browser Extension for Vijjana.

Options

Disable
Uninstall

Get Extensions

Find Updates
SIVA Model (1)-- Context

- Context Awareness
  - Grammatical analysis—VKE algorithm

- Manually define
  - Semantic network
  - Search criteria— Knowledge Sieving

- Machine Learning
Context Awareness Prototype
SIVA Model(2) -- Channel

- Expert System
  - Context detection
  - Resource utilization

- Data Mining
  - Data warehouse
  - Mobile information
SIVA Model(3) – Sieving

○ Plenty of knowledge can be filtered
  ● Under context
    ○ Where
    ○ Who
  ● Under manual definition
    ○ Search Criteria
    ○ User preference
Visual knowledge Sieve of Vijjana
SIVA Model(4) – InterLink

- Relevant knowledge should be clustered together
- Similar topics can be grouped to be discussed
- People with same interest should be provided with communication channels.
- Links should be updated as time goes on
- Dynamically transform based on lower-level semantics changes
Visualization is more than a method of computing!
a visual form enabling the viewer to observe, browse, make sense, and understand the information.
interactive graphics, imaging, and visual design.
It relies on the visual system to perceive and process the information.
What is Information Visualization?

- “The use of computer-supported, interactive, visual representation of abstract data to amplify cognition.”
  
  Card, Mackinlay, and Shneiderman
  
  - Interactive
  - Visual representation
  - Amplify cognition
Vijjana Views

- HyperGraph
  - Hypergraph View

- Prefuse Toolkit
  - Tree View
  - RadialGraph View
HyperGraph & Prefuse Toolkit
HyperGraph

- HyperGraph is an open source project which provides java code to work with hyperbolic geometry and especially with hyperbolic trees.

- Hyperbolic trees are very useful - they show more data than standard tree representations like your favorite explorer, and they have a great look and feel.

http://hypergraph.sourceforge.net/
Knowledgebase of Computer Science Domain

http://eksarva.csee.wvu.edu/phpmyadmin/Computer_Science
JAN’s from Computer Science Domain

1. Computer Science - Wikipedia, the free encyclopedia
2. Computer Science - A gateway to computer science resources on the Web
3. SCHOOL OF COMPUTER SCIENCE/Carnegie Mellon University
4. Department of Computer Science - University of Illinois at Urbana
5. Computer Science - in the Yahoo! Directory
6. Stanford Computer Science
7. Department of Computer Science, Cornell University
8. Department of Computer Science
9. Computer Science Division | EECS at UC Berkeley
10. UCLA Computer Science Department

SIP Lab, CSEE, West Virginia University
Vijjana iphone app currently can detect user’s basic information and provide information correspondingly.
Conclusion and Future Work

- To exploit the knowledge that is so pervasive and accessible, we need something like Vijjana ......


The LINQ Project: [online].


The Semantic Web: [online].
Questions?