Hypermedia Discourse & Human-Agent Knowledge Cartography

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Hypermedia
Discourse
Hypermedia

- Modelling *discourse relations*
- Expressing *different perspectives* on a conceptual space
- Supporting the *incremental formalization* of ideas
- Rendering *structural visualizations*
- Connecting *heterogeneous* content
Discourse

- Verbal and written workplace communication
- Discourse communities: “making and taking perspectives”
- Dialogue
- Argumentation
- Claim making
- Analytical narrative
- Meetings
Hypermedia Discourse research

Discourse Ontology

Notation(s)

Intuitive User Interface

Computational Services

Literacy/Fluency
Compendium

- personal or group concept mapping
- real time meeting capture
- participatory modelling
- discourse as semantic hypertext
Discourse grounded in Horst Rittel’s IBIS: Issue-Based Information System

- Issue
  - generalises, specialises, replaces, questions
  - is-suggested-by
	- Issue
    - questions
      - is-suggested-by Position
      - responds to
        - issues
          - is-suggested-by Argument
          - supports
            - objects-to
Compendium: hypertext discourse mapping/conceptual modelling
Compendium: hypertext discourse mapping/conceptual modelling
MAPS contain other nodes, and show the network structure -- such as this example.

LISTS also contain other nodes, but display them in a list/table.

This is a NOTE for misc. comments.

REFERENCES link to external documents; double-click to launch, e.g....

REFERENCE to a website

REFERENCE to a PowerPoint file

REFERENCE to an Acrobat PDF file

REFERENCE to a movie file
Modelling using Issue-templates
Modelling organisational processes in Compendium using a Template
Completing a Compendium template
Generating Custom Documents and Diagrams from Compendium Templates
Structure management in Compendium

- Associative linking
  nodes in a shared context connected by graphical Map links

- Categorical membership
  nodes in different contexts connected by common attributes via metadata Tags

- Hypertextual Transclusion
  reuse of the same node in different views

- Templates
  reuse of the same structure in different views

- HTML, XML and RDF data exports for interoperability

- Java and SQL interfaces to add services
Using Compendium for personnel recovery planning

*Example of Conversational Modelling:*
real time dialogue mapping combined with model driven templates (AI+IA)

Co–OPR Project (with Austin Tate):
http://www.aiai.ed.ac.uk/project/co–opr
Mission Briefing: Intent template

Answers to template issues provided in the JTFC Briefing. Answers may be constrained by predefined options, as specified in the XML schema.
Capturing political deliberation/rationale

Dialogue Map capturing the planners’ discussion of this option
Planning Engine input to Compendium

Issues on which the I-X planning engine provided candidate Options
Modelling a document corpus: The Iraq Debate

http://kmi.open.ac.uk/projects/compendium/iraq
Annotating a document corpus: Chomsky’s article in the Iraq Debate

http://kmi.open.ac.uk/projects/compendium/iraq
Large scale NASA e-science field trials:

Interoperability with other databases, software agents and collaboration tools

www.kmi.open.ac.uk/projects/coakting/nasa

NASA e-science field trials (2004 and 2005)

Distributed Mars-Earth planning and data analysis tools for Mars Habitat field trial in Utah desert, supported from US+UK

www.kmi.open.ac.uk/projects/coakting/nasa
NASA Mobile Agents Architecture
Collaboration Configuration

Compendium used as a collaboration medium at all intersections: *humans + agents, reading + writing* maps
NASA testbed:
Compendium activity plans for surface exploration, constructed by scientists on ‘Earth’, interpreted by software agents on ‘Mars’

The Compendium nodes and relationships in this plan were interpreted by Brahms software agents for monitoring and coordinating astronaut and robot activity during surface explorations.
CoAKTinG NASA testbed:
Compendium science data map, generated by *software agents*, for interpretation by *Mars+Earth scientists*

The Compendium maps were autonomously created and populated with science data by Brahms software agents that use models of the mission plan, work process, data flow and science data relationships to create the maps.
CoAKTinG NASA testbed: Compendium-based photo analysis by *geologists* on ‘Mars’
NASA testbed: Compendium scientific feedback map *from Earth scientists to Mars colleagues*

This photo is very good - links Outcrop to the Rock perspective, and we are excited to incorporate it into the methodology :-(

Each sample should have an in situ Rock Perspective

No, Abby's sample's are from the same unit as Brent's rock hammer, but not from this exact area in the photograph

Not a good photo - sampling area is cut off

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Collaborative sensemaking in e-Science:
Meeting Replay tool for Earth scientists, synchronising video of Mars crew’s discussion as they annotate their mission plans.
Memetic Meeting Replay
The CoAKTinG project’s results are now mainstreamed in the Access Grid by the JISC Memetic VRE project
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In Gutenberg’s shadow (or standing on his shoulders)

[Information Technology] + [Social Networks] = Knowledge Medium
Newspapers + Invisible Colleges = Scholarly Journals

Le Journal des Scavans
January 1665

Philosophical Transactions of the Royal Society of London
March 1665
Jumping forward 343 years…

2008… Ideas and arguments (=knowledge claims) are now digital…

…digital paper!
Beyond document citations...

These annotations are freeform summaries of an idea, as one would find in researchers’ journals, fieldnotes, lit. review notes or blog entries.

“People try to maximise their rate of gaining information”

Making formal connections between ideas creates a semantic citation network — novel literature navigation, querying and visualization.

“Information foraging theory”

Paper: “The Scent of a Site: A System for Analyzing and Predicting Information Scent, Usage, and Usability of a Web Site”

Method

“Web User Flow by Information Scent (WUFIS)”

Claim

Applies

Addressable triple which can be contested e.g. supported/challenged

Paper: “Information foraging”
Combining formal relations with the expressive freedom of ‘folksonomies’
Relational classes and dialects (KMi Scholarly Ontologies project)

- **Link types**
  - **Problem Related**
    - **Causal**
      - predicts
      - envisages
      - causes
      - is capable of causing
      - is prerequisite for
      - prevents
      - is unlikely to affect
    - **Similarity**
      - is identical to
      - is similar to
      - is different to
      - is the opposite of
      - shares issues with
      - has nothing to do with
      - is analogous to
      - is not analogous to
    - **General**
      - proves
      - refutes
      - is evidence for
      - is evidence against
      - agrees with
      - is consistent with
      - is inconsistent with
  - **Supports/Challenges**
    - **Taxonomic**
      - part of
      - example of
      - subclass of
      - not part of
      - not example of
      - not subclass of
If we model concepts in a literature as concept maps… (KMi’s ClaiMapper, built on Compendium)
“Semantic del.icio.us”: KMi’s ClaimSpotter assigning and linking freeform tags

INTRODUCTION

The Semantic Web can be described as a substrate to support advanced functions for collaboration (human-human, computer-human, computer-computer), sharing of Web resources, and reasoning about their content [3]. The markup languages that are being proposed for the Semantic Web will be the basis to develop reasoners, proof checking and derivation tools, and many other functions such as Web services. The Semantic Web will also be the basis for the Web of Trust, which will provide mechanisms to handle authentication, permission, and validation of attribution in a Web where, by design, anyone can contribute content, links, and services.

A lot of current emphasis on the Web of Trust is in accessing resources, specifically authentication and permission issues. Digital signatures and public keys support authentication. Proofs are another important technology in the Web of Trust, since permission schemes are often described with rules and statements (e.g., anyone working for company C should be allowed to access D) and will need to rely on proofs that can reason about the rules and conclude whether access should be granted. An important issue with respect to both authentication and permission is checking that a document can be attributed to the source specified. For example, if Joe Doe writes an article and publishes it claiming Henry Kissinger as the author, it should be possible to check the truth about the document’s authorship.

Visualising claims and arguments

When multiple analysts annotate web documents via a server, they can generate a shared view of how they see the field, and where they agree/disagree.
“Semantic Google Scholar”
KMi’s ClaimFinder
Lineage tree (the roots of a concept)

2D spatial visualization of topics in database collections

uses-applies-isEnabledBy

Probabilistic LSI

uses-applies-isEnabledBy

improvesOn

Latent Semantic Indexing (LSI)

uses-applies-isEnabledBy

Singular value decomposition (SVD)

EM Algorithm (Expectation Maximisation)

isIdenticalTo

Expectation Maximisation (EM) algorithm

solves

Algorithm to probabilistically label documents

solves

Labeled training data is expensive
Adding Web 2.0 functionality to an open platform for mapping concepts and arguments

Cohere: http://cohereweb.net

<demo>
Cohere: creating a new Idea for Google’s “Knol”, linked to a website

In what sense is a knol different from a web?

In a contentious domain (“Causes of global

navigate competing views and arguments?"
Google blog proposes the “knol” concept
posted by sbs in December 14th, 2007 | Edit
in contested-knowledge, sensemaking

In yesterday’s Google blog post, VP Engineering Udi Manber proposes the knol, which we have duly registered in Cohere as an Idea:

“A knol on a particular topic is meant to be the first thing someone who searches for this topic for the first time will want to read. The goal is for knols to cover all topics, from scientific concepts, to medical information, from geographical and historical, to entertainment, from product information, to how-to-fix-it...
Cohere: raising issues about Google’s “Knol” Idea
Cohere: from tag clouds to idea webs

Learning how to learn
- Observation
- Key Skills
- Collaboration skills
- Reading Skills
- Study
- Problem Solving
- Information technology
- Information
- Communication
- Information on the web
- Finding
- Analytical skills
- Modelling Skills
- Interpersonal skills
- Knowledge technologies
- Knowledge Mapping
- Writing skills
- Thinking skills
Cohere: all incoming and outgoing links from a focal Idea
Cohere: extensible connection language doesn’t lock users into one ontology
Cohere: Argument from Expert Opinion with Critical Questions

Claim
Answer A may (plausibly) be taken to be true.

Supports
Expert E asserts that Answer A is known to be true.

Challenges

Critical Question
Is Answer A consistent with what other experts in Domain D say?

Critical Question
If more than one expert source has been cited, is each authority quoted separately? Could there be disagreements among the cited authorities?

Critical Question
Is Answer A consistent with known evidence in Domain D?

Critical Question
If the expert advice is not quoted, does it look like important information or qualifications may have been left out?

Critical Question
Did Expert E really assert that Answer A is known to be true?
Cohere: semantically filtering a focal Idea by “contrasting” connections
Cohere: a mashup visualization merging different connections around a common Idea
Cohere: homepage integrates People, Ideas and Connections
Social Software vs Argumentation?

Social Software

- social
- v. rapid
- v. low
- multimedia

Argumentation Tools

- work
- highly reflective
- learning required
- semiformal / formal
- textual

purpose → pace → entry threshold → structure → focal artifact
Acknowledgements

Compendium Project:
Al Selvin (Verizon/Open U.)
Maarten Sierhuis (NASA)
Jeff Conklin (CogNexus Inst.)
Michelle Bachler (Open U.)

Scholarly Ontologies Project:
Victoria Uren
Gangmin Li
Clara Mancini
Neil Benn
Bertrand Sereno
John Domingue
Enrico Motta

Funding gratefully acknowledged:
Hypermedia Discourse project:
community / theory / software / screencasts / case studies / user studies
www.kmi.open.ac.uk/projects/hyperdiscourse

Compendium Institute
www.CompendiumInstitute.org

Dialogue Mapping
www.cognexus.org

Visualizing Argumentation
www.VisualizingArgumentation.info

Knowledge Cartography