Basics of conceptual modelling

Knowledge Architecture

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Outline

Formal Concept Analysis

Ontology Visualisation: Trees

Ontology Visualisation: Relations

Ontology Visualisation: Networks

Formal Concept Analysis
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Ontology Visualisation: Trees
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Ontology Visualisation: Relations
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Ontology Visualisation: Networks
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Note: because of copyright reasons, most figures are omitted from this on-line version.

Part 1: Formal Concept Analysis

Concept Lattices were independently discovered by

- ▶ Gerard Salton (1968): document/term lattices [but his lattice retrieval models were omitted from the 2nd edition of his book!]
- ▶ Barbut & Montjardet (1970): Galois Lattices
- ▶ Yulii Shreider, Russian School of Taxonomy (1970-1980s)
- ▶ Rudolf Wille (1983): Formal Concept Analysis
- ▶ Jon Barwise & Jerry Seligman (1997): Classifications in Information Flow
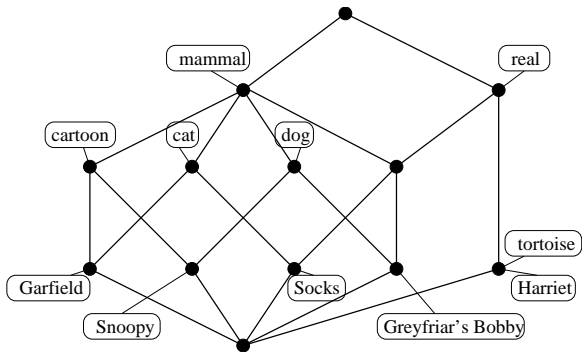
Applications in many domains:

software engineering, information retrieval, classification,
taxonomy, linguistics, data analysis, ontologies ....
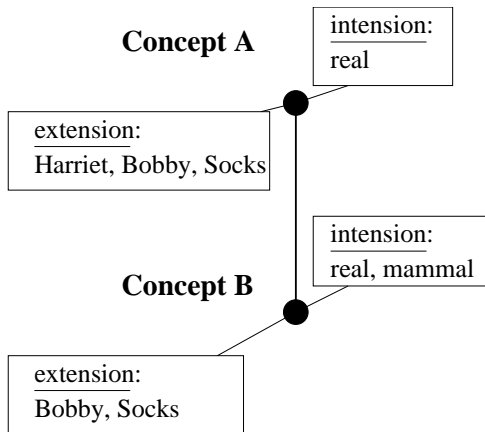
Example: Formal context of "famous animals"

	cartoon	real	tortoise	dog	cat	mammal
Garfield	✕				✕	✕
Snoopy	✕			✕		✕
Socks		✕			✕	✕
Greyfriar's Bobby		✕		✕		✕
Harriet		✕	✕			

A concept lattice

A subconcept-superconcept relation

An interval scale

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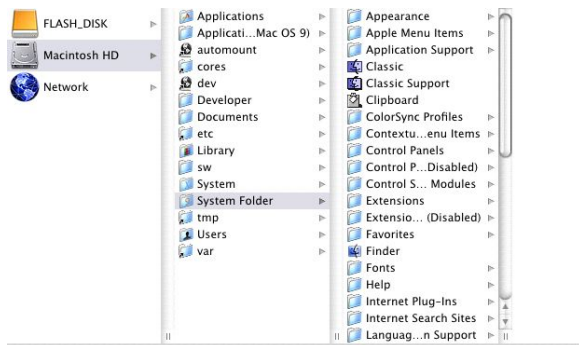# A nominal scale

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A nested line diagram

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Part 2: Ontology Visualisation

Tree of Porphyry (Lull's version)

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File hierarchy display (MacOS)

Similar: Instance trees:
http://protege.stanford.edu/plugins/instancetree/index.html

Hyperbolic tree

(picture removed)
(Source: Fluit et al. (2003))

Fisheye

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(Source: Mappuccino, www.cybergeography.org/atlas)

2-dimensional display: time and location

(picture removed)
(Source: Marey (1885) according to Tufte (1983))

Bipartite Graph: Documents and topics

(picture removed)
(Source: Kartoo; http://www.cybergeography.org/atlas/)

Emerging Hierarchy - Venn Diagram

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(Source: Cougar; Fluit et al. (2003))

Another example of a Venn Diagram

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(Source: InfoCrystal; Fluit et al. (2003))

Cluster Map

(picture removed)
(Source: Fluit et al. (2003))

Concept Lattice

can be used for visualising relations or class hierarchies

Clustering

(picture removed)
(Source: MapNet; http://www.cybergeography.org/atlas/)

Data structure graph (UML-, ER-like)

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(Source: protege.stanford.edu/plugins/ontoviz/ontoviz.html)

Conceptual Graphs

- ► Semantic Networks
- ► Mindmaps (eg. www.thebrain.com)
- ► Topicmaps

Spring Embedder Graphs

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(Source: TouchGraph; www.cybergeography.org/atlas)