

CS344

Artificial Intelligence

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Knowledge Representation (KR)

- AI is often equated with KR
- Four layers in KR – Each layer knows how to use the layer below it.

Wisdom

Knowledge

Information

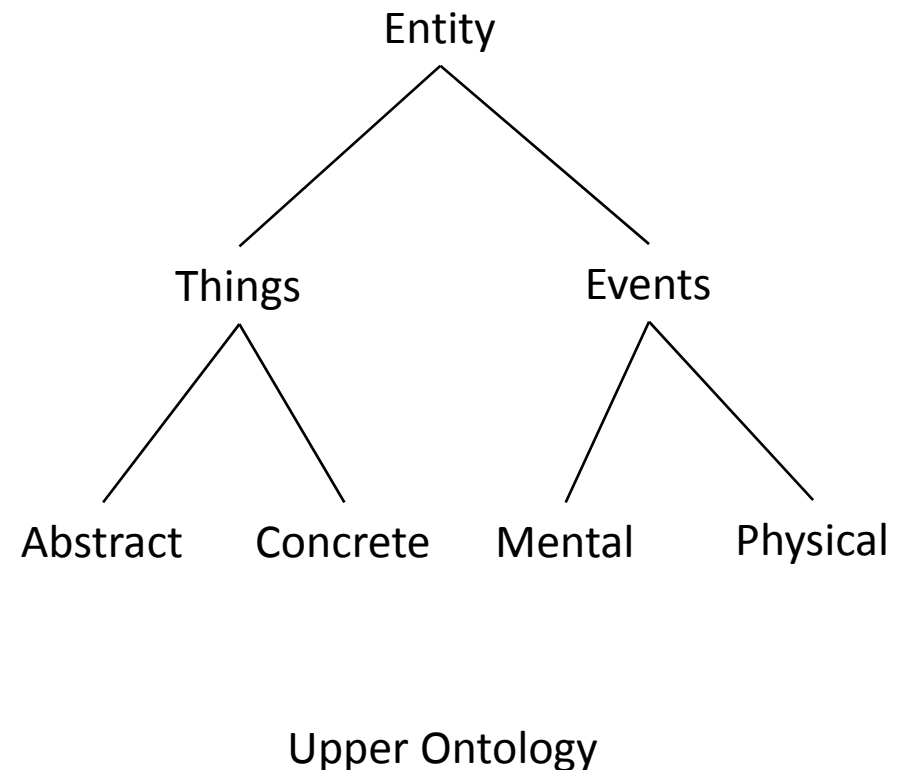
Data

KR (contd.)

- KR (kinds):
 - Structured (Semantic Net, Frame)
 - Unstructured (propositional and predicate calculus)
- KR (application to):
 - Language situation (Linguistic processing)
 - Visual situations (Geometric processing)
- KR (characterization):
 - Analytic (Problem solving)
 - Synthetic (Creative Situations, Arts)

Ontology/Taxonomy

- Ontology/Taxonomy is at the heart of KR
- Hierarchical organization of concepts (typical relation is IS-A)
- Terminology:
 - “Upper Ontology” – CYC project (D. Lenat – 1985)
 - IEEE SUMO (Standard Upper Merged Ontology)
 - Semantic Web efforts: Resource Description Framework (RDF), Web Ontology Language (OWL), Description Logic

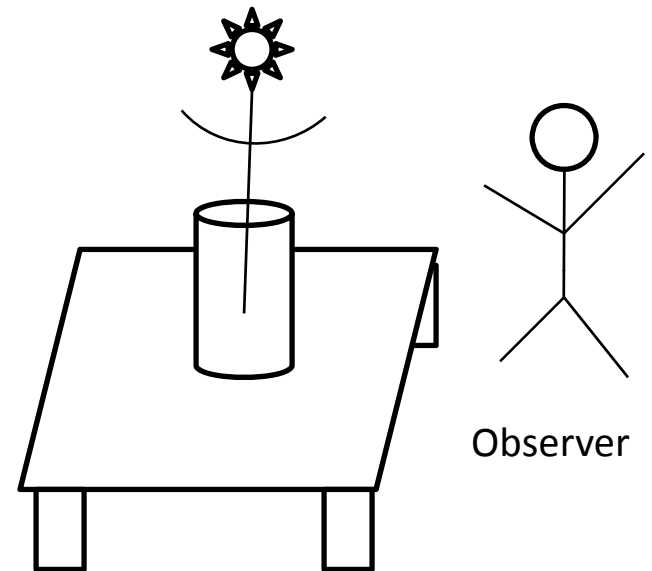


Structured Knowledge Representation

- Structured Knowledge Representation is of two types, *viz.*, Semantic Net and Frame
- Semantic Net
 - Concepts
 - Relations
 - IS-A
 - PART-OF

Knowledge Representation

- Illustration through
 - a) Visual situation
 - b) Language situation



Scene

ID of scene: Picture 101

Unstructured Knowledge Representation

- Visual situation – Unstructured knowledge representation for Picture 101:

near(table, Ram)

on(table, vase)

in(table, flower)

colour(flower, red)

Structured Knowledge Representation

- Representation of “Still Life” as **SemanticNet** is shown alongside.
- Storing as records:

```
Picture-101{  
  Instance_of: Still_life  
  Has-parts:  
    table-59{  
      instance_of: table}  
    vase-3112{  
      instance_of: vase}  
    ...  
}
```

