Questions 5:
Knowledge Representation

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Question 1

Describe four approaches to knowledge representation according to Mylopoulos & Levesque (1984).

Answer:

Logical *calculus is used, such as first-order predicate calculus, modal, temporal logics.*

Procedural *or algorithmic representations can encode how to solve particular problems (e.g. rule-based systems).*

Networks *are used to represent objects and relations (associations) between them (e.g. semantic networks).*

Structured *data is used to represent classes of objects and relations between them (e.g. frames, ontologies).*

Question 2

What is an OAV-triplet? Give examples.

Answer: *OAV stands for Object-Attribute-Value. OAV-triplet is an association of an object $o \in O$ with a value $v \in V$ of an attribute $a \in A$:*

$$object \xrightarrow{a} value$$

For example, the facts that an ostrich cannot fly and ostrich is a bird can be represented by OAV-triplets:

object	**attribute**	**value**
ostrich	*flies*	*false*
ostrich	*category*	*bird*

Question 3

What is a frame? Give examples.

Answer: *Frames are structured knowledge representations used to represent objects and concepts by sets of attributes or properties. For example, attributes* `locomotion`, `habitat` *and* `diet` *can be used to represent animals, and* `locomotion`, `cargo` *and* `fuel type` *can be used to represent vehicles.*

Question 4

Describe stages of the knowledge engineering process.

Answer:

Knowledge acquisition *: the process of obtaining the knowledge from experts (by interviewing and/or observing human experts, reading specific books, etc).*

Knowledge representation *: selecting the most appropriate structures to represent the knowledge (lists, sets, scripts, decision trees, object-attribute-value triplets, etc).*

Knowledge validation *: testing that the knowledge of ES is correct and complete.*