

Guest lecture on
“Semantic Technologies -
Knowledge Graph and Ontology”

DATE: 23/02/2022

Event Coordinators:

1. Chhaya Dhavale

2. Sushama Khanvilkar

Date & Place:

Online using Meet

23rd February 2022

Xavier Institute of
Engineering

Department:

Information Technology
& Computer Engineering

No of participant:

78

An online guest lecture was organized for T.E. (IT) and T.E.(COMP) on the topic “*Semantic Technologies - Knowledge Graph and Ontology*” and it was delivered by Dr. Ujwala H. Bharambe PhD (IITB) who works as an **Assistant Professor Thadomal Shahani Engineering College, Mumbai.**

The guest lecture was conducted using Google meet on 23rd February 2022 and was organized by Ms. Chhaya Dhavale from I.T Department and Ms. Sushama Khanvilkar from Computer Department.

Total 76 students attended the guest lecture and the objective of the guest lecture was to provide an insight to the third year students about the semantic technologies used in Artificial Intelligence in the form of Knowledge Graph and Ontology. Similarly, the speaker elaborated on how these technologies are applicable in the different domains in real time and explained the concept very well with analogies.

The speaker shared her views on ‘artificial intelligence concepts related to knowledge representation, ontology and knowledge graph, recent applications.

The students were quite astonished at the way graph data structures used for knowledge representation in Artificial Intelligence. Overall, the session was very informative, interesting and motivating for students to explore knowledge representation and ontology in Artificial Intelligence.

Student Feedback and Benefits: The students found the session very informative, useful and excellent. It was a knowledge gaining session about knowledge representation using graph data structure.

Images of the guest lecture

Todays Agenda

- Knowledge Representation
- Ontology
- Knowledge Graph

What is Artificial Intelligence ?

• Traditional programming approach and AI approach

The diagram shows two flows. The traditional approach starts with a 'Problem' leading to a 'Solution Step (Program)' which leads to a 'Solution'. The AI approach starts with a 'Problem Class' leading to a 'Solver (Program)' which leads to a 'Solution Step' which leads to a 'Solution'. A 'Domain Model' is shown as a cloud connected to the 'Problem' in both flows.

Facets of Knowledge

- Declarative Knowledge:**
 - Declarative knowledge is to know about something.
 - It includes **concepts, facts, and objects**..
- Procedural Knowledge**
 - Procedural knowledge is a type of knowledge which is responsible for knowing **how to do something**.

Ontology Component

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graph TD
    Ontology --> Concepts
    Ontology --> Relations
    Ontology --> Instances
    Ontology --> Axioms
    Concepts --> PrimitiveConcepts[Primitive Concepts]
    Concepts --> DefinedConcepts[Defined Concepts]
    Relations --> Taxonomy
    Relations --> AssociativeRelationships[Associative Relationships]
  
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Ontology Languages

- A formal language used to encode an ontology
- Formal language based on a logic paradigm that can represent concepts and the constraints between them. Reasoning capabilities of the language depend on the paradigm in which the language is based on.

The diagram shows three layers: Logical layer (OWL), Schema layer (RDF Schema), and Metadata layer (XML/JSON Schema). OWL and RDF Schema are grouped under 'Semantics', and XML/JSON Schema is grouped under 'Syntax'.

Comparison

RDF	Relational Database	XML
Flexible - can store any connections between nodes	Data structured into predefined tables	Structure depends on XML language
Data connected into a graph	Relations form sets of tables	Most naturally maps to a hierarchical or tree structure
URIs to name things	Naming of columns is local	XML namespaces make similar use of URIs
Enable data to be combined	No natural link to web, but frequently used to store data behind websites	Closely linked to web languages
Use of web technology	SPARQL query language	SQL query language
SPARQL query language	Comparatively new. Software and tools are still developing. Some RDF stores use a relational database to store the triples	Established for 30 years plus. Many mature, suitable tools available. There are tools to expose data from a RDBMS as RDF
		Mature technology with many tools. RDF can be expressed in XML. annotates XML documents with RDF metadata

10:02 AM | chr-nuffm-gtr

Ontology and knowledge graph

- Ontologies represent the **backbone of the formal semantics** of a knowledge graph.
- A user could be another human being or a software application that wants to **interpret the data in a reliable and precise way**.
- Ontologies ensure a **shared** understanding of the data and its meanings.

10:06 AM | chr-nuffm-gtr

Knowledge Graph

Business Analytics, Subject Matter Experts

Business Users, Data Scientists

Explicit knowledge

Machine learning

BI & Data Analytics Platform

Knowledge graph

Content

Semantic metadata

Other Enterprise Systems

Data Architects, ML Ops

Authors of content and applications

Editors, Customers

10:06 AM | chr-nuffm-gtr

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