KRR: Unit 5 Formative Activities

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Introduction to Modelling

Activity 1: Bimba

Read the article by Bimba et al (2016) and then answer the following questions:

Four Knowledge based modelling techniques

- **Linguistic Knowledge Bases**
  - Language and grammar
  - Tools: FrameNet, WordNet, ConceptNet
  - Analyse linguistic elements and their semantic relationships
- **Expert Knowledge Bases**
  - Domain-specific knowledge.
  - Primarily rule-based systems: logic and fuzzy
  - Problem solving, decision-making in specific fields
- **Ontologies**
  - Nature of being and conceptualisation
  - Organise knowledge into taxonomies of concepts and relationships
  - Share and re-use
- **Cognitive Knowledge Bases:**
  - Newest approach, combines other three.
  - Model knowledge dynamically (like a human mind)
  - Focus on automated knowledge acquisition and manipulation

What are the 3 knowledge bases identified by the authors?

- FrameNet
- WordNet
- ConceptNet

What are the differences between them?

- **FrameNet**
  - Linguistic.
  - Lexical representation of English.
  - In sentence context. So can’t link across sentences.
  - Frame semantics – generalisations over groups of words
  - Documents range of semantic and syntactic possibilities of each word.
  - Smaller lexicon than WordNet.
  - Describe a particular type of situation and event
- **WordNet**
  - Linguistic.
  - Lexical database for English.
  - Sets of cognitive synonyms (synsets)
  - Synonyms, antonyms, hyponyms, hypernyms and moronyms

    - Used to improve text clustering.
    - Lexical categorisation and word-similarity determination
- **ConceptNet**
    - Describes human knowledge and how it is expressed as a graph
    - Nodes include higher-order compound concepts composed of action verbs.
    - Practical context-based inferences – contextually richer than the others.

How are these related to ontologies?

- Provide structured frameworks for representing knowledge.
- Ontologies are formal representations of a set of concepts within a domain and the relationships between those concepts.
- Semantic and linguistic structure to enhance ontologies, like in NLP and semantic web.

Activity 2: Leydesdorff

Read the article by Leydesdorff, L. (2010) and then answer the questions below:

How does the author define a 'Knowledge based economy'?

In multiple ways rather than one.

- **Transformative dynamics**
    - Functions analysed in terms of. Feeds back as a transformation mechanism on the institutional arrangements.
- **Codification**
    - Distinguish knowledge and information. Contrasted with tacit knowledge, as it can be decontextualised and traded on a market. Codified knowledge can be commercialised.
- **Coordination mechanism and Triple Helix**
    - 3 sub-dynamics reproduced as functions of KBE:
        1) Economic wealth generation
        2) Novel generation by organised science and technology
        3) Governenace of the interactions of these two sub-dynamics by policy making in the public sphere and management in the private sphere.
- Driven more by **reflexively codified** expectations than historical conditions.

What is the triple helix model?

Triple Helix has 3 main institutions:

- University
- Industry
- Government

Activity 3: Fensel et al

Read the Fensel et al (2000) paper then answer the following questions:

What are the components of the Onto Knowledge model/ framework?

- A toolset for semantic information processing and user access
- OIL (Ontology-Based Inference Layer) – on top of WWW.
- An associated methodology
- Validation by industrial test cases.

What are the example use cases given for the framework?

- Swiss Life: organisational memory
    - Organisational memory using intranet.
        - Centralised skills database
        - Centralised Insurance product documents for sales
        - Searchable international accounting standards 1000 page document.
- BT: Call Centres
    - Helpdesk expertise and best practice in knowledge base
- EnerSearch: virtual enterprise
    - Enhance knowledge transfer to
        - Researchers in virtual organisation in different disciplines and countries
        - Specialists from shareholding companies to get up-to-date R&D results