Cognitive AI CG

21 June 2021

Agenda for 21 June 2021

1. Status of the chunks data and rules specification
2. The role of chunks for simplifying digital transformation
3. Contextual AI as a new buzz word for commercial AI
4. Current plans for work on natural language processing

Status of the chunks specification

- Aim – to synch spec with implementation
- Outstanding pull requests?
- ~ now replaced by ! for use with property values in rules
- Chunk buffers cleared when @do get fails to return a match
- Mapping to RDF
- Support for tasks regarded as experimental and likely to change
- Test suite has been extended but needs review

Digital Transformation: what and why?

Digital Transformation:

- Businesses exist to provide a return on investment through generating value from products and services
- Digital Transformation is the adoption of digital technologies throughout the enterprise
- Boosting efficiency and transparency of operations for greater self-understanding
- Increasing resilience along with the organisation's agility for exploiting change

Challenges:*

- Businesses need to integrate heterogenous information systems and formats, including SQL/RDBMS, Spreadsheets, CSV files, XML, Property Graphs, Linked Data, PDF files, etc.
- Change is inevitable and on-going
- Different groups use different ways of talking about things
- Software development is generally speaking expensive, error prone and time consuming

** These challenges represent opportunities to improve organisational efficiency*

Incremental Evolution of Information Systems

We need incremental approaches to rolling out enterprise-wide knowledge graphs + web-based applications

- According to Jo Stichbury:

  Knowledge graphs are able to capture diverse meta-data annotations such as provenance or versioning information, which make them ideal for working with a dynamic dataset. There is an increasing need to account for the provenance of data and include it so that the knowledge can be assessed by its consumers in terms of credibility and trustworthiness. A knowledge graph can answer what it knows, and also how and why it knows it.

- Enterprise-wide knowledge graphs (EKR):
  - An integrated store for enterprise systems
  - Contain data, models and metadata
  - Federated across organisational units and geographic regions as required
  - Can be searched in a style closer to natural language, analogous to smart Web search
  - Can include services relating to the data
- RDF and OWL are perceived as hard by people used to SQL/RDBMS, Spreadsheets, etc.
- Relatively easy to transform to RDF, but much harder in the other direction
- Current practice: UML, Entity-Relationship and other kinds of diagrams as part of the design phase applications
  - Not used in subsequent phases
- Time to switch to Web based tools for diagrams that are directly integrated with EKR
  - Scaling to enterprise-wide models through hierarchical models and dynamic views based upon queries
  - **Chunks as a higher level approach compared to RDF**
- Spreadsheets are ubiquitous, but hard for businesses to manage, moreover, they tend to grow to the point where they become difficult to maintain
- It is time to wean users to a new generation of web-based spreadsheets where cells are connected live with enterprise knowledge graphs
  - Names rather than letters and numbers for identifiers.
  - Collaborative assistant helps with migration from EXCEL
- Early stage of planning for W3C Workshop on simplifying digital transformation

Contextual AI

“Contextual AI” is being touted as the next big thing for AI.

Contextual AI does not refer to a specific algorithm or machine learning method – instead, it takes a human-centric view and approach to AI. The core is the definition of a set of requirements that enable a symbiotic relationship between AI and humans. Contextual AI needs to be intelligible, adaptive, customizable and controllable, and context-aware.

https://blog.adobe.com/en/publish/2019/04/09/contextual-ai-the-next-frontier-of-artificial-intelligence.html#gs.3kqfzp

Even DARPA are promoting the new buzzword: Tim Grayson, Director, Strategic Technology Office at DARPA says:

Contextual AI will produce new opportunities along several dimensions. It has shown promise being able to handle sparse data. This is valuable when I do not actually have data on subject of interest or simply just to do faster training. It also enables AI reasoning over more complex, multi-step problems, inching AI a step toward more human-like intuitive reasoning.

https://www.awaire.events/2021/05/30/edge-executive-interview-tim-grayson-darpa/

What do you think?

Natural Language

- Work on demonstrating end to end communication of meaning through natural language
- NLU and NLP Pipelines with concurrent processing at each stage
- Shared statistics and models for NLU and NLG based on mimicry
- Model of processing inspired by gaze tracking as people are reading
- Word by word processing with very limited look ahead (one word)
- Incremental refinement + statistical priming, rather than backtracking
- Lexicon, phrase structure, semantics and pragmatics represented as chunks
- Shift-reduce parsing + loose grammar
- Handling of nominal groups, actions, and dynamic ranking of likely choices when interpreting meaning using concurrent asynchronous processing
- Differentiation between conscious and sub-conscious processing, reflecting use of different systems in the brain
- Initial focus on test suite covering broad range of basic language usage
- Extension to support learning of new words and phrasing
- Extension to support use of metaphors and stock phrases
- Application to mimicking human reasoning and learning on specific tasks
- Extension for use in emotional reasoning