

Where is the Knowledge gone?

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Neuro-symbolic integration

Where is the Web ?

- Discussions on pros/cons of **neural vs. symbolic AI**
- Questions on the **integration** between the two

Are the **original aims of the Web** still viewed as relevant?

The Original Web vision

- “documents on the web [should] **describe real objects** and **imaginary concepts**, and give particular relationships between them.”
- “[computers] become **capable of analyzing all the data** on the Web – the content, links, and transactions between people and computers”

The Web vision in 2022?

- With DL, computers can analyse data on the Web **by themselves**
- Does this means with DL we do **not need RDF anymore?**

Let's rethink the SW mission

- not about creating intelligent agents (“analysing the Web”)
- but about **unambiguous knowledge interchange**

Where DL can help

- Providing **use-cases** (eg *recommendations from a KG using link prediction*).
- Dealing with **noise and inconsistency** (affecting KGs at scale)
- **Extraction** from large structured data (Web-scale learning)
- Capturing **complex semantics** (difficult class proper boundaries, humans learn from examples [1])

Where DL cannot help

- Dealing with **rare/unique events** (most of the Web data)
 - Hard to learn from them
 - If you throw away rare data, you most likely overfit
- Replacing **symbols**
 - Extraction from structured data still need metadata for training
 - *DL needs symbols*
- **FAIR data**
 - findability, interoperability
 - not (yet?) a DL problem

We need Knowledge in AI

(One) Solution : Knowledge Science [2]

- Or : **Knowledge in AI**, $\mathcal{K} \subseteq \text{AI}$
- Back to empirical semantics
 - empirical analysis of KGs [3]
 - **understand modeling style** and the overall semantic structure of KGs
 - check for K **usefulness, limitations**, etc.

[2] Fletcher, G., Groth, P., & Sequeda, J. (2020). Knowledge Scientists: Unlocking the data-driven organization. arXiv preprint arXiv:2004.07917.

[3] Asprino et al. "Observing LOD using Equivalent Set Graphs: it is mostly flat and sparsely linked." ISWC2019.

The SW-DL integration

- acknowledge the **limitations / failings** of both methods
 - not just those of DL
- Hype : a leading question
- Shift from “*how can we fit knowledge in a learning process*” to “***which*** knowledge do we need to fit”