From Words to Wisdom: Automatically Generating Knowledge Graphs for Interpretable Educational AI

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LLMs Are Remarkable...

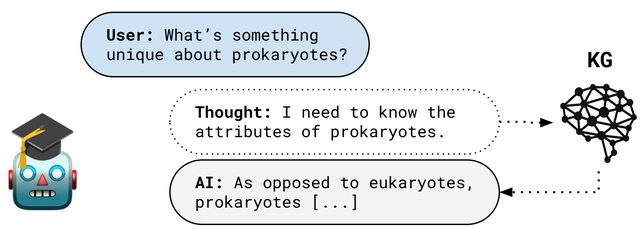
- ✗ ...remarkably prone to **hallucination**
- ✗ ...remarkably **expensive** to customize
- ✗ ...remarkably **difficult to explain**

How can a **nonsense-generating, expensive, uninterpretable** model be trusted in educational settings?

Leveraging Knowledge Graphs

Knowledge injection: Augment LLMs with KGs to patch their weaknesses

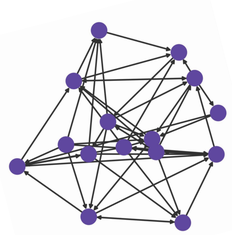
- ✔ Mitigate hallucination
- ✔ Improve interpretability & explainability
- ✔ **Logical reasoning!**



Knowledge Graphs 101

KGs are semantic structures that natively support **Q&A**, **reasoning,** etc.

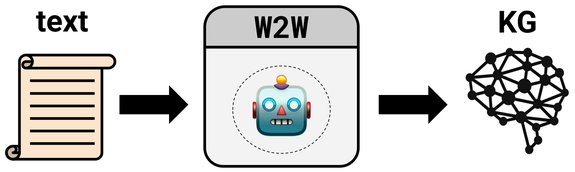
- Nodes = entities
- Edges = relations
- Example: `cell -(has)-> nucleus`



However, KG construction is traditionally resource-intensive...

Words2Wisdom

Can LLMs effectively generate KGs from text? **Yes!**



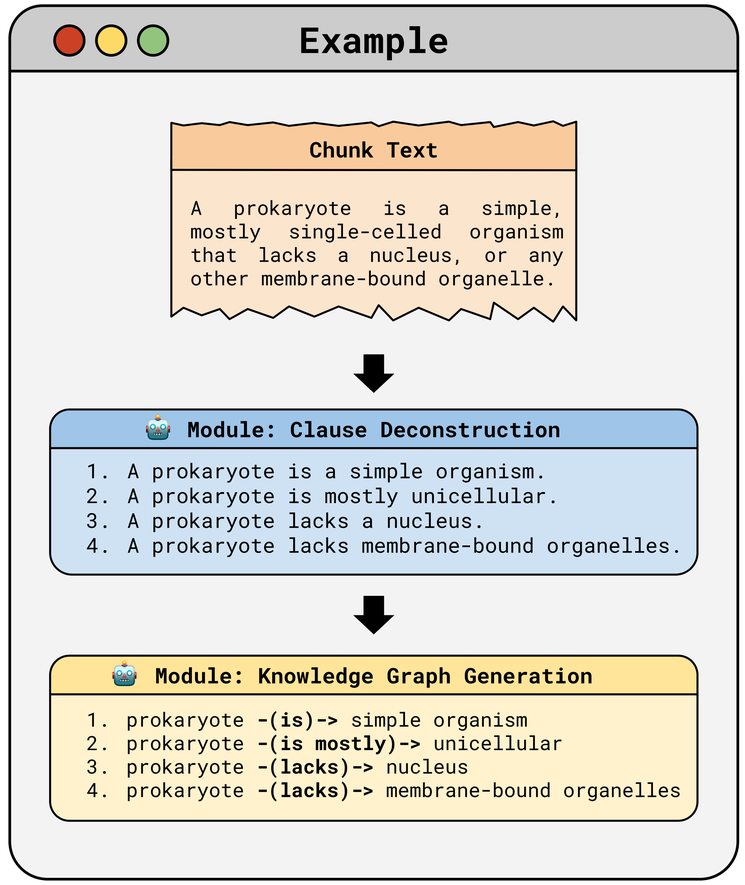
- KG **preserves global relationships** between ideas in text, despite chunking
- **Contribution: Clause deconstruction**
  - ✓ Parses complex & simple text uniformly
  - ✓ Aligns text to KG syntax to **improve quality** of KG components
- **Quick, cost-effective** at scale
- **Domain-independent**
- **Intuitive user interface**; command-line availability

Demonstration

HF Space

GitHub

Words2Wisdom: Pipeline



Evaluation (GPT-4)

GPT-3.5 Pipeline	Component Integrity			Relevance	Comprehensiveness
	subject	*relation*	*object*		
KGG	**0.93**	0.92	0.82	0.91	**0.74**
CD + KGG	**0.93**	**0.95**	**0.87**	**0.93**	**0.74**