1 Triple Conversion

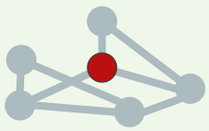
KG Triples:(Tunisia, participated, Insurgency in the Maghreb (2002–present))

Natural Language: Tunisia participated in insurgency in the Maghreb (2002–present)

2 Multi-Granularity NeighborHood-Boosted Fine-tuning

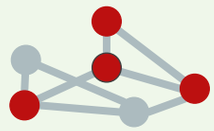
Fine-tuning LLaMA3 with three levels of neighborhood information granularity

Entity-Boosted



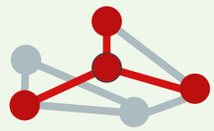
Q: Now answer the question: What is the relationship between Tunisia and Insurgency in the Maghreb (2002–present)? Please choose your answer from: is known for | has currency |…| participated in | is married to | plays for.
A: participated in

Neighbor-Boosted



Q: Tunisia is related to the following entities:[Tunis, ⋯, Libya, War on Terror, Africa,]. Insurgency in the Maghreb (2002–present) is related to ⋯ Now answer the question: What is the relationship between Tunisia and Insurgency in the Maghreb (2002–present)? Please choose your answer from: is known for | has currency |…| participated in | is married to | plays for.
A: participated in

Context-Boosted



Q: Tunisia is related to the following entities:[Tunisia has capital Tunis, Tunisia has neighbor Libya, Tunisia participated in War on Terror, Tunisia is located in Africa,]. Insurgency in the Maghreb (2002–present) is related to ... Now answer the question: What is the relationship between Tunisia and Insurgency in the Maghreb (2002–present)? Please choose your answer from: is known for | has currency |…| participated in | is married to | plays for.
A: participated in

Entity-boosted fine-tuning includes **only** the question and the correct response

Neighbor-boosted fine-tuning adds related **neighbor entities** as additional information

Context-boosted fine-tuning adds relate **neighbor entities** and their corresponding **relations** as additional information

3 Fine-tuning Method

LoRA | LoRA+ | PiSSA

(Closed source LLMs do not need fine-tuning)

4 Insight-Driven Prompt & Instruction

Primary prompt: Following is triple classification/relation prediction task in knowledge graph. Now answer the question⋯

Contextualized prompt: Following is some information that can help solving triple classification/relation prediction task in knowledge graph. You can use the given neighbors to better understand the entities and build their relation network. Now answer the question⋯

Direct Answer instruction: only give me the answer. No other words

Justified Answer instruction: Please give me the answer. If you are not sure about the answer, please give your reasons so that we can help you.

5 LLM-Assisted Evaluation

Response from NB-LLM → *LLM* → summarize → Answer → Yes/No for triple classification or Predicted relation