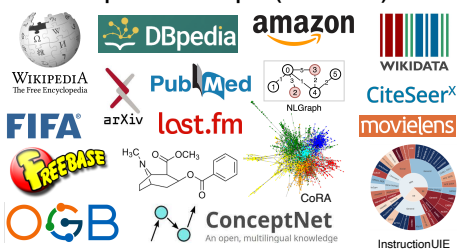


Graph-centric Corpus (about 1.5M)



Input graph from multiple tasks

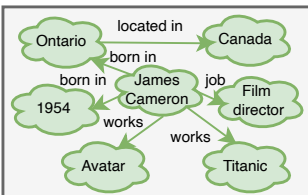
Graph Input Engineering

Instruction & Definition

You are a good graph reasoner / generator, ...

Graph

Passage



James Francis Cameron CC (born August 16, 1954) is a Canadian film-maker ...

Code Format Verbalizing

```

Graph[name="wiki-knowledge-graph"]{
  entity_list = [
    "James Cameron", "Ontario",
    "Canada", "1954",
    "Film director",
    "Avatar", "Titanic"
  ],
  triple_list = [
    ("James Cameron" -> "Ontario") [relation="born in"],
    ("James Cameron" -> "Film director") [relation="job"],
    ("James Cameron" -> "1954") [relation="born in"],
    ("James Cameron" -> "Avatar") [relation="works"],
    ("James Cameron" -> "Titanic") [relation="works"],
    ("Ontario" -> "Canada") [relation="located in"]
  ],
}
  
```

Graph Instruction Tuning

You are a good graph reasoner, you need to understand the graph and the task definition, and answer the question.
Graph[name="wiki-knowledge-graph"]{ ... }

Q: Generate a caption to describe the graph information.

A: James Francis ...

Q: What's the birthday of the film TITANIC's director?

A: 1954.

Q: What's the relation between 'James' and 'Canada'?

A: Birth place.

Q: What's the degree of the target node "James Cameron"?

A: 5.

You are a good graph generator, you need to understand the task definition, and generate a graph to answer the question.

A: The graph is



Q: Generate a knowledge graph.

James Cameron was born in August 16, 1954 ...

A: The graph is

So, the answer is ...

Q: First generate a graph express the rethink process, then output the answer.



Maximum Likelihood

Instruction Tuning

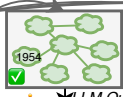


Graph Preference Aligning

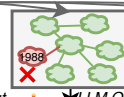


You are a good graph reasoner, you need to understand the graph and the task definition, and answer the question.
Graph[name="wiki-knowledge-graph"]{ ... }

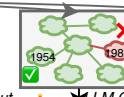
Q: What is the birthday of the film TITANIC's director?



LLM Output
1988 X



LLM Output
1988 X



LLM Output
1988 X



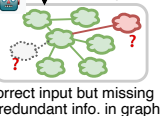
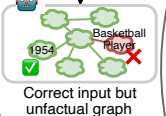
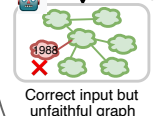
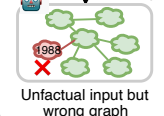
LLM Output
1988 X

James Cameron was born in August 16, 1988 X

James Cameron was born in August 16, 1954 ✓

James Cameron was born in August 16, 1954 ✓

James Cameron was born in August 16, 1954 ✓



You are a good graph generator, you need to understand the task definition, and generate a graph to answer the question.

Q: Given a text, please generate a knowledge graph.

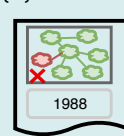
Generation

Optimization Algorithm (PPO, DPO, ...)

x = You are a great reasoner, ...
\nGraph[name="..."]{ ... } \nQ: ...



Y_w

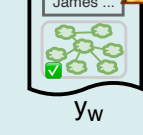


Y_l

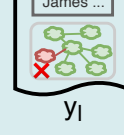
.....

.....

x = You are a great generator, ...
\nGraph[name="..."]{ ... } \nQ: ...



Y_w



Y_l

.....

.....

Preference Aligning

Maximum Likelihood

