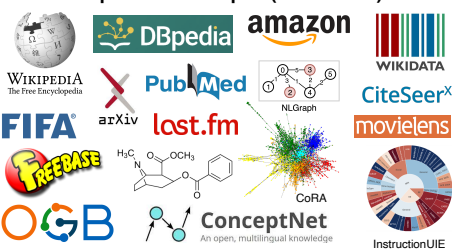


## Graph-centric Corpus (about 1.5M)



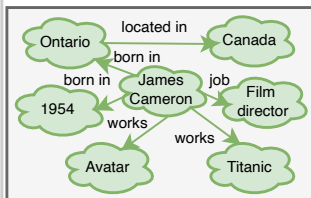
Input graph from multiple tasks

## Graph Input Engineering

### Instruction & Definition

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

### Graph



### Text

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

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

Maximum Likelihood

Instruction Tuning

Instruct Graph

## 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?



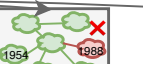
LLM Output

1988 X



LLM Output

1988 X



LLM Output

1988 X



LLM Output

1988 X

James Cameron was born in August 16, 1988



LLM Output

1988 X

James Cameron was born in August 16, 1954



LLM Output

1954 X

James Cameron was born in August 16, 1954



LLM Output

1954 X

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



LLM Output

1954 X

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.



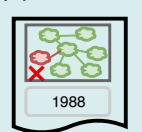
Text2Graph

## Optimization Algorithm (PPO, DPO, ...)

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



Yw

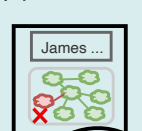


Yl

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



Yw



Yl

Preference Aligning

Maximum Likelihood

LLaMA2 WizardLM Vicuna