Procedural Knowledge Verbalization

Prompt Templates:

- N/A ·····▶
- goal ──▶
- goal + plan ----▶
- goal + plan + condition ──▶

LLM

Supervised Critic

CoPlan Dataset

| Goals | Plans | Conditions | Counterfactual Plans |

Procedural Knowledge Distillation

Planning (P)

Provide steps:
  [goal] see a movie

Counterfactual Planning (CP)

Provide steps conditionally:
  [goal] see a movie
  [condition] see the movie at home

Counterfactual Plan Revision (CPR)

Rewrite steps:
  [goal] see a movie
  [plan] 1. Look up movie showings and times; 2. Choose a movie to see; ... 7. See a movie
  [condition] see the movie at home

Multitasking

P ⊕ CP ⊕ CPR

Distilled PLASMA

PLAN:
1. Look up movie showings and times
2. Choose a movie to see
3. Drive to the movie theater
4. Get items from the concession stand
5. Walk together towards the theater
6. Sit down in the assigned seats
7. See a movie.

COUNTERFACTUAL PLAN:
1. Choose a streaming service
2. Choose the movie and start streaming it
3. Get snacks or drinks from the kitchen
4. Set up the viewing device in a comfortable and safe place
5. Sit and enjoy the movie.