**Private 7th (Public 2nd) Place Solution Summary**

First of all, I'd like to thank kaggle team, host for hosting this competition , and my team mates (@tereka [@irrohas](https://www.kaggle.com/irrohas) [@aerdem4](https://www.kaggle.com/aerdem4))  
I finally got 5th gold medal. I'm really happy to be Competitions Grand Master.

**Overview**

Voting Ensemble of 3pipelines (Retriever + Reranker)  
All reranker inference with vllm

**Pipeline1 by Masaya**

This is brief summary.  
Masaya will write up detail on this [link](https://www.kaggle.com/competitions/eedi-mining-misconceptions-in-mathematics/discussion/551430).

Retriever

* Generate test answer with pretrained qwen35B
* model :SFR-Embedding-2\_R, Hard Negative Sampling(N=100) removed if unseen in training data.
* dataset: Filled unknown Misconception with GPT4o-mini
* candidate 60

Reranker

* Qwen2.5 32B AWQ+LoRA (with 40 options)
  + options → 0~9 + A~Z + a~z (40 charactors)
* dataset: only original
* candidate 40
* run twice and merge ([:40] and [20:])
* left 25 with logprobs

**Pipeline2 by Tereka+Kaeru**

Retriever

* model1 :SFR-Embedding-2\_R、Hard Negative Sampling(100）
  + dataset: original + synthesis with gemma 27B/Qwen2.5 32B
  + lb 0.378
* model2 : public model by sayoulala
* weighted avg model1 and model2
* candidate 70 and filter with masaya preds
* only single fold

Reranker

* Qwen2.5 32B AWQ+LoRA (with binary options)
  + options → yes, not
* dataset: original + synthesis unknown misconceptions with gemma2 27B/Qwen2.5 32B
* only single fold

**Pipeline3 by Ahmet**

Retriever

* Omitted in final pipeline

Reranker

* Candidates are each top9 from previous pipeline
* Qwen2.5 32B (with 9 options)

**Ensembling**

* Voting ensemble of each pipeline
* Apply rank like following, join, sum rank, sort by sum\_rank

sub0

.with\_columns(pl.col("MisconceptionId").str.split(" "))

.with\_columns(pl.lit([1/i for i in list(range(1, 26, 1))]).alias("rank"))

.explode(pl.col(["MisconceptionId", "rank"]))

submission

.sort(by=["QuestionId\_Answer", "sum\_rank", "rank1", "rank2"], descending=[False, True, True, True])

.group\_by(["QuestionId\_Answer"], maintain\_order=True)

.agg(pl.col("MisconceptionId"))

**Postprocessing**

* Boost missing misconception rank

**Accelerating Tips**

Retreiver

* Run parallel with cuda:0 and cuda:1
* Pre-calculating Misconception Vector
* Dynamic padding with collate\_fn

Reranker

* Inference with vllm (AWQ 4bit quantization)
* Set vllm parameter enabling\_prefix\_cache True
* Filter candidate with previous preds of pipeline

**What not worked**

Retrieval

* Concat vectors
* Avaraging many vectors

Reranker

* Full-data trained model
* QwQ model

Thank you!!