

A. Brief introduction of ChatGLM2-6B

In brief, ChatGLM2-6B uses technology similar to ChatGPT, but optimized for Chinese Question-Answering and dialogue. The model was trained on about one trillion tokens – equally of Chinese and English corpora, supplemented by supervised fine-tuning, feedback bootstrap, and reinforcement learning with human feedback. With only about 6.2 billion parameters, the model can generate answers that are in line with human preference. ChatGPT mainly learns from English, while the ChatGLM series of LLMs learn from both English and Chinese, enabling the model to perform well in both languages.

B. Fine-tuning dataset

Due to the significance of high-quality data, we carefully curated a p-tuning dataset involving both real-world and distilled instruction data specific to ophthalmic domain[1]. The real-world data consisted of Chinese textbook questions and board examination preparation materials for trainees in ophthalmic fields. By incorporating this data into LLMs, we aimed to instill medical knowledge and enable them to simulate ophthalmologists' diagnostic and prescriptive capabilities while providing accurate information. To further enhance the training process, we leveraged self-instruct methodology and utilized ChatGPT and ChatGLM to generate a distilled dataset from our Chinese ophthalmic knowledge databases [2]. This additional instructional data helped refine language models to follow medical guidelines and communicate fluently. Supplemental table 1 showed the examples of real-world and distilled instruction data.

Supplemental table 1. Examples of real-world and distilled instruction data

Data	Sources	Scale	Example
Real-world instruction data	Chinese textbook questions and board examination preparation materials	1352	<p><问题>:急性闭角型青光眼的体征是什么?</p> <p><回复>: 主要体征: 发病眼房角关闭,眼压急性升高, 角膜水肿, 对侧眼房角关闭或者房角贴附。</p> <p>其他体征: 结膜充血, 瞳孔中度散大,固定。</p>
			<p><Question>: What are the clinical signs of acute angle-closure glaucoma?</p> <p><Response>:Main signs: angle closed in the affected eye, raised intraocular pressure, corneal edema, and closure or narrow of the angle in the fellow eye.</p> <p>Other signs: conjunctival hyperemia, and fixed semi-dilated pupil.</p>
Distilled instruction data	ChatGPT and ChatGLM	1500	<p><问题>:介绍一下干眼症的物理治疗方法?</p> <p><回复>: 传统物理治疗方法包括熏蒸、雾化、眼周按摩、热敷、湿房镜等。熏蒸疗法可以直接将药物作用于眼表, 促进泪液循环和分泌。热敷可以使局部温度升高, 有利于清除局部脂质沉积和促进眼部血液循环。这些治疗方法可以单独使用, 也可以结合使用, 具体取决于患者的病情和医生的建议。</p>
			<p><Question>: Introduce the physical treatment methods for dry eye syndrome?</p> <p><Response>: Traditional physical treatment methods include fumigation, atomization, periocular massage, warm compress, and humidity chamber glasses, etc. Fumigation therapy can directly apply medication to the ocular surface, promoting the circulation and secretion of tears. Warm compress can increase local temperature, which is beneficial for clearing local lipid deposition and promoting blood circulation around the eyes. These treatment methods can be used independently or in combination, depending on the patient's condition and the doctor's recommendation.</p>

Reference:

1. Zhang H, Chen J, Jiang F, et al. HuatuoGPT, towards taming language model to be a doctor. *arXiv*. Preprint posted online May 24, 2023. doi:10.48550/arXiv.2305.15075
2. Yizhong Wang, Yeganeh Kordi, Swaroop Mishra, Alisa Liu, Noah A Smith, Daniel Khashabi, and Hannaneh Hajishirzi. Self-instruct: Aligning language model with self generated instructions. *arXiv preprint arXiv:2212.10560*, 2022.

C. Natural language processing in this study

The natural language process includes:

- 1) loading the dataset to text,
- 2) chunking the loaded text into smaller chunks,
- 3) creating a numerical embedding for each chunk of text,
- 4) putting embeddings and documents into a vector store,
- 5) matching the top k most similar text vectors to the question vector,
- 6) adding the matched text to prompt along with the question as context,
- 7) submitting to MOPH to generate an answer.