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# C-EVAL: A Multi-Level Multi-Discipline Chinese Evaluation Suite for Foundation Models

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## Abstract

New NLP benchmarks are urgently needed to align with the rapid development of large language models (LLMs). We present C-EVAL , the first comprehensive Chinese evaluation suite designed to assess advanced knowledge and reasoning abilities of foundation models *in a Chinese context*. C-EVAL comprises multiple-choice questions across four difficulty levels: middle school, high school, college, and professional. The questions span 52 diverse disciplines, ranging from humanities to science and engineering. C-EVAL is accompanied by C-EVAL HARD, a subset of very challenging subjects in C-EVAL that requires advanced reasoning abilities to solve. We conduct a comprehensive evaluation of the most advanced LLMs on C-EVAL, including both English- and Chinese-oriented models. Results indicate that only GPT-4 could achieve an average accuracy of over 60%, suggesting that there is still significant room for improvement for current LLMs. We anticipate C-EVAL will help analyze important strengths and shortcomings of foundation models, and foster their development and growth for Chinese users.<sup>1</sup>

## 1 Introduction

Evaluation benchmarks are at the core role for AI development. While traditional NLP benchmarks were mostly designed to measure specific and relatively simple abilities, large language models (LLMs), or foundation models, have demonstrated various new capabilities and shifted the evaluation focus to more general and intricate skills, such as broad world knowledge and complex reasoning. To align with the new era of LLMs, new benchmarks are proposed recently to probe a diverse set of LLM abilities. For example, MMLU (Hendrycks et al., 2021a), BIG-bench (Srivastava et al., 2022), and HELM (Liang et al., 2022) benchmarks attempt to aggregate a wide range of NLP tasks for holistic evaluation. Some other benchmarks specifically focus on advanced LLM abilities that emerge with scale, such as reasoning (Cobbe et al., 2021), hard math problem-solving (Hendrycks et al., 2021b), and coding (Chen et al., 2021). While traditional NLP benchmarks are becoming obsolete, these new ones are extensively used in recent research to assess the latest LLMs (Taylor et al., 2022; Chowdhery et al., 2022; Hoffmann et al., 2022; Touvron et al., 2023; OpenAI, 2023).

However, these modern benchmarks primarily target English language, resulting in a limited understanding of LLMs' capabilities in other languages. In this work, we focus on evaluating the advanced abilities of foundation models in a Chinese context, one of the most widely spoken language in the

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<sup>\*</sup>Equal Contribution. Full list of individual contributions is detailed in Appendix A.

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<sup>1</sup>The C-EVAL data and evaluation code are available at <https://github.com/SJTU-LIT/ceval>. Users can submit their predictions to our website (<https://cevalbenchmark.com>) where a public leaderboard is maintained.

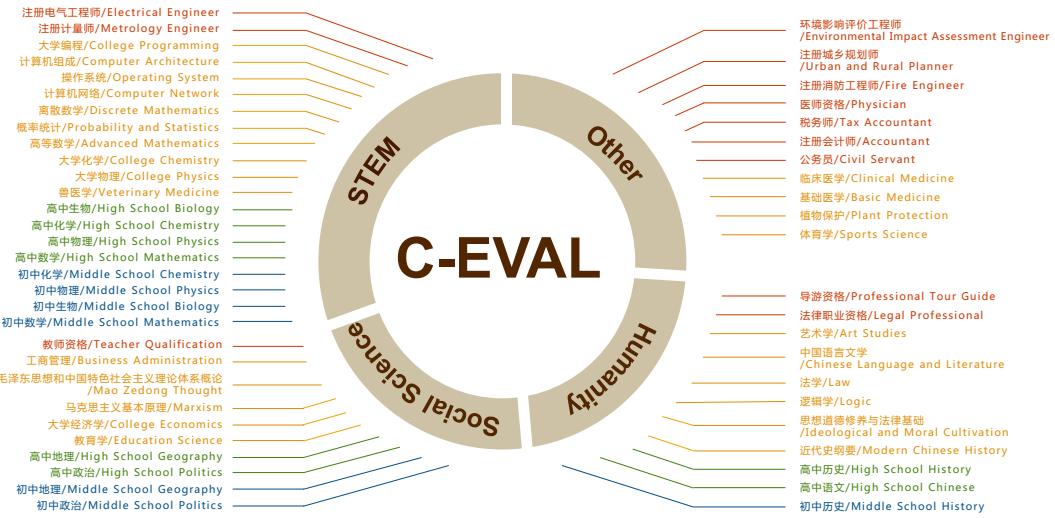


Figure 1: Overview diagram of C-EVAL. Different colors of the subjects indicate four difficulty levels: middle school, high school, college, and professional.

world. Although there has been a recent surge in powerful Chinese LLMs, such as GLM-130B (Zeng et al., 2023), Wenxin Yiyian,<sup>2</sup> and MOSS (OpenLMLab, 2023), the corresponding evaluation significantly lags behind, with the CLUE benchmark (Xu et al., 2020), the Chinese counterpart of GLUE, serving as the best available standard. We emphasize that simply translating English benchmarks as in OpenAI (2023), even with flawless translations, does not fulfill the goal – LLMs intended for use in a Chinese environment should be evaluated on their knowledge of Chinese users’ primary interests, such as Chinese culture, history, and laws, as well as other competencies unique in Chinese society. In contrast, English benchmarks tend to exhibit geographical biases towards the domestic knowledge of the regions that produce them.

To narrow the gap between Chinese LLM development and evaluation, we present C-EVAL, the first comprehensive Chinese evaluation suite to thoroughly assess LLMs’ advanced knowledge and reasoning abilities in a Chinese context. C-EVAL consists of 13948 multiple-choice exam questions spanning 52 diverse disciplines, ranging from humanities to science and engineering, as depicted in Figure 1. The questions are collected from four difficulty levels: middle school, high school, college, and professional tests. Along with C-EVAL, we introduce C-EVAL HARD as an accompanied benchmark, a subset of particularly challenging subjects in C-EVAL that demand highly advanced reasoning abilities to solve, such as advanced mathematics and college physics. Notably, C-EVAL HARD is among the few benchmarks for *advanced* reasoning where GPT-4 still struggles, achieving an accuracy of 54.9%. C-EVAL HARD is considerably more sophisticated than the widely used GSM8K English reasoning benchmark (Cobbe et al., 2021) that mainly covers elementary numeric reasoning. We regard C-EVAL HARD as comparable in difficulty to the English MATH benchmark (Hendrycks et al., 2021b), making it the first Chinese benchmark at this level.

We conduct experiments to evaluate the most advanced LLMs on C-EVAL in both answer-only and chain-of-thought settings. Results show that GPT-4 is the only model that surpasses 60% average accuracy. However, its 68.7% accuracy indicates that there is still large room for improvement in current LLMs. Despite not specially tailored for Chinese data, GPT-4, ChatGPT, and Claude emerge as the top three performers on C-EVAL. Upon examining the results of LLMs focused on Chinese, we find that while some models managed to narrow the gap on Chinese knowledge test with ChatGPT, acquiring reasoning abilities seems more challenging. On C-EVAL HARD, in particular, most models could only retain near-random accuracy. In addition to its use as a whole, we envision C-EVAL as a suite of benchmarks, subsets of which could be separately utilized to assess certain model abilities of interest and analyze important strengths and limitations of foundation models. We hope C-EVAL could guide the developers to understand the abilities of their models from multiple dimensions and facilitate the growth of foundation models for Chinese users.

<sup>2</sup><https://yiyian.baidu.com>.

Category	# Subjects	# Questions
<i>In terms of topic</i>		
STEM	20	4495
Humanities	11	2676
Social Science	10	2845
Other	11	3932
<i>In terms of difficulty level</i>		
Middle School	7	1409
High School	8	1594
College	25	6249
Professional	12	4696
<i>In terms of split</i>		
Dev	52	260
Valid	52	1346
Test	52	12342
Total	52	13948

Table 1: Statistics of C-EVAL.

洛伦兹曲线越是向横轴凸出\_\_\_\_\_  
The more the Lorenz curve is convex to the horizontal axis,  
\_\_\_\_\_.  
A. 基尼系数就越大，收入就越不平等  
the larger the Gini coefficient, the more unequal the income.  
B. 基尼系数就越大，收入就越平等  
the larger the Gini coefficient, the more equal the income.  
C. 基尼系数就越小，收入就越不平等  
the smaller the Gini coefficient, the more unequal the income.  
D. 基尼系数就越小，收入就越平等  
the smaller the Gini coefficient, the more equal the income.

答案: A  
Answer: A

Figure 2: Example from college economics. English translations are shown below the corresponding Chinese text for better readability.

## 2 The C-EVAL Evaluation Suite

### 2.1 Design Principle

**Overview:** The motivation of C-EVAL is to help developers quickly gain automatic feedback and understand the abilities of their models from multiple dimensions, so that they could target the shortcomings of the models and try to improve them accordingly. To this end, we focus on the relatively advanced abilities of LLMs such as world knowledge and reasoning, which are arguably the most critical skills for LLMs nowadays. While different LLMs may perform similarly in simple scenarios like casual conversations, complex tasks are often the key differentiators between LLMs (OpenAI, 2023). Therefore, we construct C-EVAL from real-world, challenging human exams in China that are used to assess humans’ abilities from multiple dimensions. We only select questions of a multi-choice format, similar to Hendrycks et al. (2021a), because: (1) metrics are clearly defined (i.e. accuracy), and (2) multi-choice questions are a simple but good proxy to evaluate the *potential* of advanced abilities of foundation models, which we consider could be easily exploited and reflected in various downstream applications through specialized instruction tuning (Chung et al., 2022; Wang et al., 2022). Each question has four choices and only one choice is the correct answer. LLMs are intended to be used to solve these questions through prompting. The questions in C-EVAL span 52 diverse disciplines that we later cluster them into broader categories as STEM, humanities, social science, and other areas. Summarized statistics of C-EVAL is shown in Table 1, and more detailed statistics per subject are in Appendix B.

**Attempt to mitigate data contamination:** Exam questions from national tests, such as China’s national college entrance exams (commonly known as Gaokao) and national professional exams, are often widely distributed and accessible online. Consequently, these questions may inadvertently be crawled and incorporated into LLM pretraining, leading to potential data leakage issues. To mitigate this risk, we collect our data either from mock exams or from small-scale local exams, such as those available online from specific high schools. This deviates from previous work that built benchmarks using the exact questions from official national exams (Zhong et al., 2023). Moreover, most samples in C-EVAL are sourced from PDF or Microsoft Word documents on the Internet, rather than directly from plain text or structured questions. These documents are subsequently parsed and carefully annotated by the authors to obtain the final structured format, a process that often involves complex L<sup>A</sup>T<sub>E</sub>X equation conversion for certain subjects. This further minimizes the risk of data contamination.

### 2.2 Data Collection

**Subject selection:** C-EVAL covers four difficulty levels: middle school, high school, college, and professional. We include the standard subjects for middle and high school levels in China, except

25 °C时，将pH=2的强酸溶液与pH=13的强碱溶液混合，所得混合液的pH=11，则强酸溶液与强碱溶液的体积比是(忽略混合后溶液的体积变化)\_\_\_\_\_

At 25 °C, when a strong acid solution with pH=2 is mixed with a strong alkali solution with pH=13, the resulting mixture has a pH of 11. The volume ratio of the strong acid solution to the strong alkali solution is (ignoring any volume changes upon mixing)\_\_\_\_\_.

- A. 11:1    B. 9:1    C. 1:11    D. 1:9

答案: B

Answer: B

答案解析:

1. pH=13的强碱溶液中 $c(OH^-)=0.1\text{mol/L}$ , pH=2的强酸溶液中 $c(H^+)=0.01\text{mol/L}$ , 酸碱混合后pH=11, 即 $c(OH^-)=0.001\text{mol/L}$ 。

2. 设强酸和强碱溶液的体积分别为x和y, 则: $c(OH^-)=(0.1y-0.01x)/(x+y)=0.001$ , 解得 $x:y=9:1$ .

Explanation:

1. In the strong alkali solution with pH=13,  $c(OH^-) = 0.1\text{mol/L}$ , and in the strong acid solution with pH=2,  $c(H^+) = 0.01\text{mol/L}$ . After mixing, the pH is 11, which means that  $c(OH^-) = 0.001\text{mol/L}$ .

2. Assuming the volumes of the strong acid and strong alkali solutions are x and y, respectively, then:  $c(OH^-) = (0.1y - 0.01x)/(x+y) = 0.001$ . Solving for x:y = 9:1.

Figure 3: An development example with explanations from high school chemistry. English translations are shown below the corresponding Chinese text for better readability.

for the English subject.<sup>3</sup> For the college level, we select 25 representative subjects from all the 13 official categories of undergraduate majors listed by the Ministry of Education in China,<sup>4</sup> at least one subject from each category is included in C-EVAL to assure comprehensiveness. For the professional level, we refer to the official national vocational qualification directory in China<sup>5</sup> and choose 12 representative ones, such as physician, legal professional, and civil servant qualification exams. We also cluster these subjects into four categories in terms of their topic: STEM (Science, Technology, Engineering, and Mathematics), Social Science, Humanities, and Other areas. All the 52 subjects and their assigned categories are illustrated in Figure 1.

**Data sources:** The primary source of our data are mock exams freely available on the internet. In addition, a portion of the college-level questions are past exam questions from top universities in China, publicly shared by the students. A minor fraction of college questions are mock questions for the national graduate entrance exam, sourced from the Weipu website<sup>6</sup> – these questions are not freely available to the public, and we have obtained their authorization to include around 2000 such questions into C-EVAL.

**Data Processing:** The collected data come in various formats, primarily as PDF or Microsoft Word documents and a minor fraction as web pages. PDF documents are initially processed into text using an OCR tool. All questions are subsequently parsed – automatically when possible, and otherwise manually by the authors – into a structured format, as exemplified in Figure 2. For subjects with complex mathematical notations such as many subjects in the STEM category, we manually convert them into standard L<sup>A</sup>T<sub>E</sub>X formats, similar to Hendrycks et al. (2021b); Taylor et al. (2022). All the questions in C-EVAL are processed to include exactly four choices. Most of the original questions were accompanied by four choices already, and we eliminate questions with fewer than four options and randomly drop incorrect choices for questions with more than four options. All questions also go through the standard data preprocessing pipeline, such as deduplication and cleaning. Following this, the questions undergo several rounds of human validation by the authors, and all the L<sup>A</sup>T<sub>E</sub>X notations are ensured to be complied without syntax errors. We process at least around 200 questions for each subject, and randomly split the questions into a development set, a validation set, and a test set within each subject. The development split per subject consists of five exemplars to facilitate few-shot evaluation. These dev exemplars are also annotated with explanations to enable few-shot chain-of-thought settings (Wei et al., 2022), as we detail next. The validation and test set are created with a 1:9 ratio, where the validation set is intended to be used for hyperparameter tuning.

<sup>3</sup>We also exclude the middle school Chinese subject since the corresponding exam mostly focuses on writing responses to questions with few multi-choice questions.

<sup>4</sup>The Undergraduate Major Catalogue of Higher Institutions in China.

<sup>5</sup>National Vocational Qualifications Directory in China.

<sup>6</sup><https://kaoyan.cqvip.com/view/postgraduate/index.aspx>

设有界区域 $\Omega$ 由曲面 $2x + y + 2z = 2$ 与三个坐标平面围成,  $\Sigma$ 为整个表面的外侧; 计算曲面积分:

$$I = \iint_{\Sigma} (x^2 + 1) dy dz - 2y dz dx + 3z dx dy = \underline{\hspace{2cm}}$$

Let  $\Omega$  be a bounded region enclosed by the surface  $2x + y + 2z = 2$  and three coordinate planes, and let  $\Sigma$  be the surface of the region  $\Omega$ . Calculate the surface integral:  $I = \iint_{\Sigma} (x^2 + 1) dy dz - 2y dz dx + 3z dx dy = \underline{\hspace{2cm}}$

- A. 1/2    B. 1    C. 3/2    D. 5/2

答案: A

Answer: A

Figure 4: Example from advanced mathematics, a subject in C-EVAL HARD. English translations are shown below the corresponding Chinese text for better readability.

**Explanation data generation:** Chain-of-thought (COT) reasoning (Kojima et al., 2022; Wei et al., 2022) – that prompts LLMs to generate a text sequence of reasoning process along with the final answer – has shown great success on reasoning-heavy tasks. Compared to zero-shot COT, the few-shot version is more commonly used and achieves the state-of-the-art performance on various tasks (Gao et al., 2022; Wang et al., 2023; Zhou et al., 2023; Xie et al., 2023). To facilitate the potential usage of C-EVAL in a few-shot COT setting, we combine automatic generation and human annotation to produce high-quality explanation data for the development split. Specifically, we first prompt GPT-4 to generate step-by-step explanation to explain the ground-truth answer, then we manually revise the generated explanations to obtain the final explanations. Details on prompting GPT-4 are in Appendix C. A dev example with explanations is illustrated in Figure 3.

### 2.3 C-EVAL HARD

We select 8 challenging math, physics, and chemistry subjects from C-EVAL to form a separate benchmark, C-EVAL HARD, which includes advanced mathematics, discrete mathematics, probability and statistics, college chemistry, college physics, high school mathematics, high school chemistry, and high school physics. These subjects often involve with complex L<sup>A</sup>T<sub>E</sub>X equations and require non-trivial reasoning abilities to solve. An example from advanced mathematics is shown in Figure 4. C-EVAL HARD aligns with recent efforts to create difficult benchmarks to assess advanced reasoning abilities (Hendrycks et al., 2021b; Suzgun et al., 2022), which are the key differentiators among various LLMs and could reflect LLMs’ potential in general and complex scenarios. We emphasize that C-EVAL HARD is the first Chinese benchmark to provide highly complicated reasoning questions. C-EVAL HARD serves as an example of how C-EVAL could be employed as an evaluation suite – individual subjects can be selected out to benchmark different abilities of LLMs.

### 2.4 Evaluation

We use accuracy as the metric. While ground-truth labels of the development and validation splits are released, we keep the labels of the test split private. This is to ensure the fair use of the C-EVAL, as the C-EVAL data may unconsciously be included in pretraining data due to web crawling. Instead, users are required to submit their model predictions to <https://cevalbenchmark.com> to automatically obtain the test accuracy, where a public leaderboard is maintained. Users have the option to include their submission results in the public leaderboard, depending on their own preference.

## 3 Experiment

Our experiments below aim to evaluate various LLMs on C-EVAL, analyze their performance, and provide baselines for future usage of C-EVAL.

### 3.1 Setup

**Few-shot evaluation:** We evaluate LLMs in a five-shot setting on C-EVAL, where the five exemplars are from the development split. We focus on five- rather than zero-shot settings since our experiments aim to assess the *potential* of the LLMs from a developer’s perspective – few-shot settings can highlight the inherent abilities of a model and we believe these potential abilities will be manifested in various (zero-shot) downstream applications after simple further adaptation. This is particularly helpful for assessing foundation models that have not been instruction-tuned – these

以下是中国关于临床医学的单项选择题，请选出其中的正确答案。  
The following are multiple-choice questions about clinical medicine in China. Please select the correct answer.

男性, 65岁, 昏迷10小时。血气分析: pH 7.26, PaCO<sub>2</sub> 82mmHg, PaO<sub>2</sub> 45mmHg。下列哪项处理不适宜\_\_\_\_\_  
A 65-year-old male patient has been in a coma for 10 hours. Blood gas test shows a pH of 7.26, PaCO<sub>2</sub> 82mmHg, and PaO<sub>2</sub> 45mmHg. Which of the following treatments is not appropriate?\_\_\_\_\_  
A. 机械通气    B. 呼吸兴奋剂    C. 支持疗法    D. 高浓度给氧  
A. mechanical ventilation B. respiratory stimulants C. supportive therapy D. high concentration oxygen therapy

答案: D  
Answer: D  
... [5-shot examples] ...  
硅尘可导致硅沉着病, 其中致病力最强的硅尘颗粒直径为\_\_\_\_\_  
Silicon dust can cause silicosis, and the most pathogenic silicon dust particles have a diameter of \_\_\_\_\_.  
A. > 5μm    B. 4 ~ 5μm    C. 1 ~ 2μm    D. 2 ~ 3 / μm  
答案: C  
Answer: C

Figure 5: An example of few-shot evaluation in answer-only scenarios. The red text is the autocompleted response from model, while the preceding text is the inputted prompt. We indicate English translation below the corresponding Chinese text.

以下是中国关于计算机组成考试的单项选择题, 请选出其中的正确答案。  
The following are multiple-choice questions about computer architecture in China. Please select the correct answer.  
... [5-shot examples] ...  
设寄存器R的内容(R)=1500H, 内存单元1500H的内容为2500H, 内存单元2500H的内容为3500H, PC的值为4500H, 采用相对寻址方式, 有效地址为2500H的操作数是\_\_\_\_\_.  
If the content of register R is set to 1500H, the content of memory address 1500H is 2500H, the content of memory address 2500H is 3500H, and the value of the program counter (PC) is 4500H, using the relative addressing mode, the operand at the effective address of 2500H is \_\_\_\_\_.  
A. 1500H    B. 2500H    C. 3500H    D. 4500H  
答案: 让我们一步一步思考。  
1. 根据题目中的信息, 内存单元1500H的内容为2500H, 内存单元2500H的内容为3500H, 表示当前指令的地址为2500H-1500H=1000H。  
2. 根据相对寻址方式, 有效地址为2500H的操作数需要加上当前指令地址1000H才能得到实际的操作数地址, 即3500H。  
所以答案是C。  
Answer: Let's think step by step,  
1. According to the information given in the question, the content of memory unit 1500H is 2500H, and the content of memory unit 2500H is 3500H. This indicates that the current instruction address is 2500H-1500H=1000H.  
2. According to the relative addressing mode, in order to obtain the actual operand address of the effective address with the value of 2500H, the current instruction address of 1000H needs to be added to it, resulting in the actual operand address of 3500H.  
Therefore, the answer is C.

Figure 6: An example of few-shot evaluation in chain-of-thought scenarios. The red text is the autocompleted response from model, while the preceding text is the inputted prompt. We indicate English translation below the corresponding Chinese text.

models may learn strong abilities but may not follow zero-shot instructions well, rendering them inferior in a zero-shot evaluation. However, common instruction-following abilities could be easily acquired through a lightweight instruction tuning process, as demonstrated in recent work (Wang et al., 2022; Taori et al., 2023). Our setup is consistent with the fact that the English MMLU benchmark is mostly used in a five-shot setting to track LLM progresses, such as in Flan-T5 (Chung et al., 2022), Chinchilla (Hoffmann et al., 2022), LLaMA (Touvron et al., 2023), and GPT-4 (OpenAI, 2023).

**Prompt:** We evaluate LLMs in both answer-only (AO) and chain-of-thought (COT) settings. Prompts used in both settings are shown in Figure 5 and Figure 6 respectively. We note that in the COT setting, the five-shot exemplars could exceed the maximum context length of some LLMs for certain subjects. In such cases, we dynamically reduce the number of exemplars to fit within the context window.

Model	Creator	#Parameters	Access
GPT-4	OpenAI	<i>undisclosed</i>	API
ChatGPT	OpenAI	<i>undisclosed</i>	API
Claude-v1.3	Anthropic	<i>undisclosed</i>	API
Claude-instant-v1.0	Anthropic	<i>undisclosed</i>	API
Bloomz-mt	BigScience	176B	Weights
LLaMA-65B	Meta	65B	Weights
GLM-130B	Tsinghua	130B	Weights
ChatGLM-6B	Tsinghua	6B	Weights
Chinese-LLaMA-13B	Cui et al.	13B	Weights
Chinese-Alpaca-13B	Cui et al.	13B	Weights
MOSS	Fudan	16B	Weights
MiniMax	MiniMax	<i>undisclosed</i>	API

Table 2: Models evaluated in this paper. The "access" column shows whether we have full access to the model weights or we can only access through API.

### 3.2 Models

To give a comprehensive view of the status of LLM in a Chinese language context, we evaluate 12 accessible top-performing LLMs that are able to process Chinese input, covering diverse organizations and varying in size, as shown in Table 2. ChatGPT (OpenAI, 2022) and GPT-4 (OpenAI, 2023) are the strongest GPT model variants from OpenAI that have undergone pretraining, instruction tuning, and reinforcement learning from human feedback (RLHF, Ouyang et al. (2022)). Claude (Anthropic, 2022), developed by Anthropic, is often considered comparable to ChatGPT. We evaluate both the Claude-v1.3 and Claude-instant-v1.0 variants, with Claude-instant being a lighter version. Bloomz-mt (Muennighoff et al., 2022) is based on the pretrained multilingual BLOOM model (Scao et al., 2022) after multitask prompted finetuning, thus is suitable for non-English languages. LLaMA (Touvron et al., 2023) is probably the best open-weight foundation model so far that achieves the highest accuracy on the English MMLU benchmark within open-weight models. The aforementioned models except Bloomz-mt are English-oriented during development, while they are able to process Chinese input because a minor fraction of Chinese text is present in the pretraining data.

We further include recent LLMs developed by Chinese institutions or individuals that is Chinese-oriented. GLM-130B (Zeng et al., 2023) and ChatGLM-6B (THUDM, 2023) are based on the General Language Model architecture (GLM, Du et al. (2022)) trained on English and Chinese data. ChatGLM-6B is further adapted on conversational data. Chinese-LLaMA (Cui et al., 2023) is an adaptation of LLaMA, where the original LLaMA vocabulary is extended with Chinese vocabulary, and the LLaMA checkpoint is further pretrained on Chinese data. Chinese-Alpaca (Cui et al., 2023) is a model based on Chinese-LLaMA, which is further instruction-tuned using Chinese instruction tuning data. MOSS (OpenMLLab, 2023) is the first publicly available Chinese LLM, and it follows a training procedure similar to ChatGPT. MiniMax (MiniMax, 2023) is another Chinese LLM, however, the details of its training and structure are not publicly disclosed. A detailed description of these models can be found in Appendix D.

### 3.3 Results

**General comparison:** Answer-only results of all the models are shown in Table 3. We report the average accuracy, while a detailed breakdown of accuracy per subject is provided in Table 8 of Appendix E. GPT-4 is the only model that exceeds 60% average accuracy, highlighting the challenge presented by C-EVAL. GPT-4 significantly outperforms all other models, with the second-best model, ChatGPT, trailing about 14 percentage points behind. Claude-v1.3 achieves similar performance to ChatGPT, in terms of both the category-wise average and the overall average. In addition to average accuracy, Table 8 reveals that GPT-4 surpasses ChatGPT in almost every subject, indicating a comprehensive advantage. This result affirms the benefits of scaling - even at the scale of ChatGPT, further scaling can yield significant improvement. Among Chinese-oriented models, MiniMax exhibits the best performance, ranking fourth on the leaderboard, 5.4 points behind ChatGPT on average. The next model on the leaderboard, Claude-instant-v1.0, slightly underperforms MiniMax on average but outperforms MiniMax in STEM subjects. Other models are ranked as follows: GLM-130B, Bloomz-mt, LLaMA-65B, ChatGLM-6B, Chinese-LLaMA-13B, MOSS, and Chinese-

<b>Model</b>	<b>STEM</b>	<b>Social Science</b>	<b>Humanities</b>	<b>Other</b>	<b>Average</b>
Random	25.0	25.0	25.0	25.0	25.0
GPT-4	67.1	77.6	64.5	67.8	68.7
ChatGPT	52.9	61.8	50.9	53.6	54.4
Claude-v1.3	51.9	61.7	52.1	53.7	54.2
MiniMax	40.6	60.3	56.6	46.6	49.0
Claude-instant-v1.0	43.1	53.8	44.2	45.4	45.9
GLM-130B	34.8	48.7	43.3	39.8	40.3
Bloomz-mt	35.3	45.1	40.5	38.5	39.0
LLaMA-65B	37.8	45.6	36.1	37.1	38.8
ChatGLM-6B	30.4	39.6	37.4	34.5	34.5
Chinese-LLaMA-13B	31.6	37.2	33.6	32.8	33.3
MOSS	28.6	36.8	31.0	30.3	31.1
Chinese-Alpaca-13B	26.0	27.2	27.8	26.4	26.7

Table 3: Five-shot average accuracy (%) in answer-only setting. We report the average accuracy over the subjects within each category. “Average” column indicates the average accuracy over all the subjects.

<b>Model</b>	<b>STEM</b>	<b>Social Science</b>	<b>Humanities</b>	<b>Other</b>	<b>Average</b>
Random	25.0	25.0	25.0	25.0	25.0
GPT-4	67.3	76.5	64.4	66.6	68.3
ChatGPT	47.8	58.3	47.7	48.5	50.0
Claude-v1.3	51.9	63.2	50.9	53.6	54.2
MiniMax	38.3	—	—	—	—
Claude-instant-v1.0	43.3	52.7	41.3	42.4	44.5
GLM-130B	24.3	33.0	30.8	30.0	28.6
LLaMA-65B	28.0	36.3	29.3	30.0	30.3
ChatGLM-6B	29.9	40.0	37.9	34.5	34.5
Chinese-LLaMA-13B	20.5	30.5	28.2	27.1	25.4
MOSS	27.3	38.1	33.6	29.4	31.2

Table 4: Five-shot average accuracy (%) in chain-of-thought setting. We report the average accuracy over the subjects within each category. “Average” column indicates the average accuracy over all the subjects. Bloomz-mt and Chinese-Alpaca-13B are excluded as they could not generate valid reasoning and thus fail to answer for many questions. Only the STEM accuracy of MiniMax is reported since its API retracts any generation that it considers potentially sensitive, such as politician names and topics on wars. This affects many subjects and only the STEM category is not influenced.

Alpaca-13B, with performance generally correlating with model size. We note that models below the scale of 50B parameters can only achieve less than a 10-point improvement over the random baseline, demonstrating a significant performance gap with larger models. This contradicts recent assertions that a 10B-scale instruction-tuned model can achieve comparable performance to ChatGPT (Taori et al., 2023; Chiang et al., 2023) – we argue that while these models may perform well on simpler tasks, their inherent advanced abilities significantly lag behind when faced with more complex scenarios.

**Does chain-of-thought prompting help?** We evaluate the models in chain-of-thought settings. We exclude Bloomz-mt and Chinese-Alpaca-13B since these two models are unable to generate valid COT reasoning for a large portion of questions, failing to produce final answers. Our hypothesis for this behavior is that these two instruction-tuned models did not incorporate COT data during their instruction tuning phase, which may have led to an overfitting of the provided instruction data at the expense of their COT reasoning abilities. Moreover, we only present the MiniMax performance for the STEM category, given that its API is heavily regulated – any generation containing potentially sensitive phrases, such as names of politicians, is withdrawn, with the API yielding no output. This limitation impacts various subjects, leaving the STEM category as the only one unaffected. The average accuracy in the COT setting is reported in Table 4, while Table 8 in Appendix E

Model	AO	COT
GPT-4	54.9	56.8
ChatGPT	41.4	35.0
Claude-v1.3	39.0	39.2
Claude-instant-v1.0	35.5	33.4
LLaMA-65B	31.7	21.4
Bloomz-mt	30.4	—
GLM-130B	30.3	21.4
MiniMax	27.3	25.0
Chinese-LLaMA-13B	27.3	15.4
Chinese-Alpaca-13B	27.1	—
MOSS	24.0	21.6
ChatGLM-6B	23.1	26.1

Table 5: Five-shot average accuracy on C-EVAL HARD in both answer-only (AO) and chain-of-thought (COT) settings.

Model	Average
GPT-4	69.9
Claude-v1.3	55.5
ChatGPT	53.5
MiniMax	48.4
Claude-instant-v1.0	47.4
GLM-130B	40.8
LLaMA-65B	39.8
Bloomz-mt	38.0
ChatGLM-6B	37.1
Chinese-LLaMA-13B	33.1
MOSS	28.9
Chinese-Alpaca-13B	27.2

Table 6: Five-shot average accuracy on the validation split in the answer-only setting.

provides a detailed breakdown of the accuracy per subject. All models achieve comparable or lower average accuracy than in the answer-only setting. This suggests that COT prompting does not necessarily improve results for many subjects in C-EVAL. The primary reasons for this are twofold: (1) many subjects in C-EVAL are not reasoning-intensive, and additional reasoning steps may impair performance. This observation is supported by Chung et al. (2022), who noted performance degradation on MMLU with COT prompting. (2) Some models fail to leverage the benefits of COT prompting, particularly those that did not undergo COT-inclusive instruction tuning. Chung et al. (2022) reported this, noting an 8-point accuracy drop when using COT on MMLU with the 540B PaLM model. This finding partly elucidates the significant decrease in performance of the GLM-130B and LLaMA-65B models in the COT setting. Encouragingly, we still observe that COT prompting leads to considerable improvements for some models in certain subjects – for example, detailed results in Table 8 show that COT improves GPT-4’s performance in college physics from 50.6% to 60.2%, in probability and statistics from 53.6% to 62.0%, ChatGLM’s performance in middle school physics from 20.2% to 41.0%, and in high school geography from 29.2% to 38.2%.

**Difference between English- and Chinese-oriented models:** MiniMax is the best-performing Chinese-oriented model in our assessment, thus we focus on comparing it to the represented English-oriented model, ChatGPT, in answer-only settings. We do not analyze GPT-4 here since it is not at the same level as all other models, and comparing MiniMax to it is not very helpful and informative. While MiniMax underperforms ChatGPT on average by 5.4 points in Table 3, it beats ChatGPT on Humanities category – a breakdown of performance in Table 8 shows that MiniMax notably outperforms ChatGPT in subjects focusing on Chinese knowledge, such as Mao Zedong Thought (73.5% vs. 60.7%), Art Studies (65.4% vs. 49.7%), Chinese Language and Literature (59.3% vs. 50.2%), and Modern Chinese History (70.1% vs. 62.8%). This reflects the limitations of English-oriented models like ChatGPT when applied to Chinese contexts, highlighting situations where Chinese-oriented models may have the upper hand. This observation also implies that incorporating Chinese data into the pretraining phase is indeed essential for these models to function effectively within a Chinese context and to cater to Chinese users. Additionally, we observe a significant difference of 12.3 points between MiniMax and ChatGPT in the STEM category, which suggests that the gap between MiniMax and ChatGPT is not as minimal as it appears based on the overall average. On the contrary, their disparity widens when tasks grow in complexity and necessitate advanced reasoning skills, as we further confirm next on C-EVAL HARD.

**Results on C-EVAL HARD:** Table 5 shows the average accuracy on C-EVAL HARD. GPT-4 can only achieve 54.9% accuracy, implying the difficulty of C-EVAL HARD. Interestingly, chain-of-thought prompting improves GPT-4 slightly on these extremely challenging subjects. MiniMax suffers from the most substantial drop in the leaderboard ranking – while it is only 5.4 points behind ChatGPT on C-EVAL, its performance deteriorates to nearly random accuracy on C-EVAL HARD,

lagging 14.1 points behind ChatGPT. Indeed, only GPT-4, ChatGPT, and the Claude variants manage to make meaningful progress – improving by at least 10 points – over a random baseline. Our results further confirm that some critical distinction among LLMs comes out when the tasks become complex enough. We underscore the importance of evaluating LLMs in such challenging settings, as current LLM development goes beyond creating a casual chatbot – it involves the development of complex systems or agents capable of interacting with various data types, receiving feedback, reasoning and using tools, and even performing actions (Mialon et al., 2023).

**Results on the validation split:** Since we do not publicly release the labels for our test split, we provide the average accuracy on the validation split as a reference for developers. The validation split comprises a total of 1346 questions, with each subject contributing fewer than 30 validation questions on average. Therefore, tracking accuracy on a specific subject may not yield significant insights. Instead, we report the average answer-only accuracy across all subjects in Table 6. The average validation accuracy closely mirrors the average test accuracy as presented in Table 3. Additionally, the model ranking on the validation split broadly corresponds to that on the test split. These observations suggest that developers may use the average validation accuracy as a good indicator for expedited development processes.

## 4 Related Work

**English benchmarks:** Traditional English benchmarks mainly focus on assessing certain abilities of models on a single task or a single type of tasks, such as natural language understanding (NLU, Wang et al. (2019)), reading comprehension (Rajpurkar et al., 2018), machine translation (Bojar et al., 2014), and summarization (Hermann et al., 2015; Narayan et al., 2018). As a representative example, the GLUE benchmark (Wang et al., 2019) combines a collection of NLU tasks, and has witnessed superhuman model performance due to the burst of pretraining models such as BERT (Kenton & Toutanova, 2019) and GPT (Radford et al., 2019). Meanwhile, Goyal et al. (2022) recently find that LLMs are able to generate summaries that are even more desirable than the reference ones in the CNN/Daily Mail dataset (Hermann et al., 2015), leading to reduced significance for further efforts on these benchmarks. In order to assess the capabilities of LLMs more comprehensively, recent benchmarks have cast light on the broader knowledge and advanced abilities. The MMLU benchmark (Hendrycks et al., 2021a) provides multi-domain and multi-task evaluation collected from real-world examinations and books. LLMs’ performance on MMLU fluctuates around random-chance accuracy until they reach the scale of GPT-3. The BIG-bench benchmark (Srivastava et al., 2022) consists of 204 diverse tasks, some of which are considered to be beyond the capabilities of current LLMs. The HELM benchmark (Liang et al., 2022) aggregates 42 different tasks and evaluates LLMs with 7 metrics ranging from accuracy to robustness.

**Chinese benchmarks:** Despite the flourishing of English benchmark, language abilities in Chinese language environment remain under-developed. The CLUE benchmark (Xu et al., 2020) is the first large-scale Chinese NLU benchmark, and still serves as the most widely-used and best available Chinese benchmark. Recently, the AGIEval benchmark (Zhong et al., 2023) contains data from the Chinese College Entrance Exam, Chinese lawyer qualification test and Chinese civil service examination. The MMCU benchmark (Zeng, 2023) consists of tests from four major domains including medicine, law, psychology and education, which are also collected from Chinese College Entrance Exam, qualification test as well as university examinations. Compared to AGIEval and MMCU, C-EVAL (1) has a broader coverage of domains (§2.2), (2) features four different levels of difficulty – particularly, the C-EVAL HARD benchmark is the first Chinese benchmark to provide sophisticated reasoning problems, and (3) makes an effort to mitigate data leakage – our questions mostly come from mock exams as PDF or Microsoft Word documents that are further processed by us, while AGIEval and MMCU collects the exact questions from past national exams in China.

## 5 Discussion

We believe that the evaluation of LLMs should transcend the scope of casual conversational bots, guiding developers in preparing LLMs to function in more complex scenarios. This was the primary motivation behind the creation of C-EVAL, a challenging evaluation suite. We hope that

C-EVAL along with C-EVAL HARD have made important progress on this direction particularly in a Chinese context. We also note that, C-EVAL, along with all the English-language benchmarks, are far from perfect for LLM evaluation. There are many other abilities such as reasoning over and calling APIs, as well as multiple aspects that extend beyond accuracy, including safety, bias, and robustness. We leave further exploration on their evaluation for future work, with a specific emphasis on the Chinese context.

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## A Author Contributions

**Data collection, annotation, and initial validation:** Yuzhen Huang, Yuzhuo Bai, Zhihao Zhu, Junlei Zhang, Jinghan Zhang, Tangjun Su, Junteng Liu, Yikai Zhang, and Jiayi Lei collected the first version of the data, including some necessary manual annotation from PDF or Word documents. They then cross-validated the collected data. Junlei Zhang prompted GPT-4 to generate the explanation data, and then Yuzhen Huang, Yuzhuo Bai, and Junxian He manually revised the explanations.

**Data processing:** Yuzhen Huang did most of the data processing job including a lot of manual revisions, such as fixing typos/incorrect formats of the questions from PDF documents and ensuring all the L<sup>A</sup>T<sub>E</sub>X notations can be correctly compiled. Jinghan Zhang did the data deduplication.

**Evaluation:** Yuzhen Huang tested ChatGPT and MOSS; Yuzhuo Bai tested ChatGLM and Mini-Max; Junlei Zhang tested GLM-130B; Chuancheng Lv tested Bloomz-mt, LLaMA, Chinese-LLaMA, and Chinese-Alpaca; Yao Fu tested GPT-4 and the Claude model variants.

**Website and submission system:** Zhihao Zhu built the website and the online submission system.

**Paper Writing:** Yuzhen Huang, Yuzhuo Bai, and Junxian He wrote the main content of this paper, while other authors helped proofread.

**Advising:** Yao Fu, Maosong Sun, and Junxian He take advisor roles in this project. Junxian He is the main advisor, initializing and organizing this project.

## B Detailed Stats of C-EVAL

Table 7 lists all the C-EVAL tasks and their broader categories, as well as the number of questions included in each task.

## C Explanation Data Generation

We show an example of the automatic COT explanation generation via GPT-4 in Figure 7. We use five human-written question-explanation pairs to prompt GPT-4 to generate explanation giving question and its correct answer. The generated explanations are further revised manually to obtain the final explanations.

## D Details of the models being evaluated

**ChatGPT and GPT-4** are GPT-series models that are enhanced to follow human instructions and be more helpful, harmless and honest using Reinforcement Learning from Human Feedback. GPT-4 additionally enables image inputs and goes through well-designed post-training alignment process, as well as having a larger scale than most of the existing model. GPT-4 achieves human-level performance on various benchmark, and even scored to be the top 10% in some simulated exams.

**Claude** is the latest Anthropic-series LLM that also focuses on human intention alignment. Applying the constitutional AI approach(Bai et al., 2022), Claude manages to be both helpful and trustworthy. Claude-instant is the lighter version with less cost and faster inference of Claude.

**BLOOMZ-mt** (Muennighoff et al., 2022) is created by combining multitask prompted finetuning to the pretrained multilingual BLOOM model(Scao et al., 2022), using not only English prompts but also machine-translated prompts to match the language of multilingual tasks, and are found to be capable at task- and language-agnostic generalization. We evaluate the 176B version in our experiment.

Subject	Category	# Questions
Advanced Mathematics (高等数学)	STEM	197
College Chemistry (大学化学)	STEM	253
College Physics (大学物理)	STEM	200
College Programming (大学编程)	STEM	384
Computer Architecture (计算机组成)	STEM	219
Computer Network (计算机网络)	STEM	195
Discrete Mathematics (离散数学)	STEM	174
Electrical Engineer (注册电气工程师)	STEM	381
High School Biology (高中生物)	STEM	199
High School Chemistry (高中化学)	STEM	196
High School Mathematics (高中数学)	STEM	189
High School Physics (高中物理)	STEM	199
Metrology Engineer (注册计量师)	STEM	248
Middle School Biology (初中生物)	STEM	218
Middle School Chemistry (初中化学)	STEM	210
Middle School Mathematics (初中数学)	STEM	201
Middle School Physics (初中物理)	STEM	202
Operating System (操作系统)	STEM	203
Probability and Statistics (概率统计)	STEM	189
Veterinary Medicine (兽医学)	STEM	238
Business Administration (工商管理)	Social Science	339
College Economics (大学经济学)	Social Science	557
Education Science (教育学)	Social Science	304
High School Geography (高中地理)	Social Science	202
High School Politics (高中政治)	Social Science	200
Mao Zedong Thought (毛泽东思想和中国特色社会主义理论体系概论)	Social Science	248
Marxism (马克思主义基本原理)	Social Science	203
Middle School Geography (初中地理)	Social Science	125
Middle School Politics (初中政治)	Social Science	219
Teacher Qualification (教师资格)	Social Science	448
Art Studies (艺术学)	Humanities	336
Chinese Language and Literature (中国语言文学)	Humanities	237
High School Chinese (高中语文)	Humanities	202
High School History (高中历史)	Humanities	207
Ideological and Moral Cultivation (思想道德修养与法律基础)	Humanities	196
Law (法学)	Humanities	250
Legal Professional (法律职业资格)	Humanities	243
Logic (逻辑学)	Humanities	231
Middle School History (初中历史)	Humanities	234
Modern Chinese History (近代史纲要)	Humanities	240
Professional Tour Guide (导游资格)	Humanities	300
Accountant (注册会计师)	Other	497
Basic Medicine (基础医学)	Other	199
Civil Servant (公务员)	Other	481
Clinical Medicine (临床医学)	Other	227
Environmental Impact Assessment Engineer (环境影响评价工程师)	Other	317
Fire Engineer (注册消防工程师)	Other	318
Physician (医师资格)	Other	497
Plant Protection (植物保护)	Other	226
Sports Science (体育学)	Other	204
Tax Accountant (税务师)	Other	497
Urban and Rural Planner (注册城乡规划师)	Other	469

Table 7: Summary of all 52 subjects.

**LLaMA** (Touvron et al., 2023) is a Transformer-architecture LLM that is trained on a mixture of several open sources. Applying several improvements on vanilla Transformers used by previous LLMs, and optimized to improve the training efficiency, LLaMA shows strong language abilities and can surpass models having 10x larger parameters than LLaMA. We evaluate the LLaMA-65B version in our experiment.

... [5-shot examples] ...

以下是中国关于初中物理的单项选择题，请，请根据以下题目和答案，生成一段正确，合理的答案解析。

The following are multiple-choice questions about middle school physics in China. Please generate a correct and reasonable explanation based on the following questions and answers.

下列属于可再生能源的是\_\_\_\_\_。

Which of the following is a renewable energy source?

- A. 石油    B.煤炭    C.核燃料    D.太阳能  
A. petroleum   B. coal   C. nuclear fuel   D. solar energy

答案: D

Answer: D

你生成的答案解析是什么?

What is your explanation generated?

答案解析: 让我们一步一步思考,

1. (A) 石油是一种化石能源，是从地下深处开采出来的，不属于可再生能源。  
2. (B) 煤炭也是一种化石能源，是从地下深处开采出来的，不属于可再生能源。  
3. (C) 核燃料是指用于核反应堆中的燃料，包括铀、钚等，虽然可以通过核反应产生能量，但是核燃料是有限的，不属于可再生能源。  
4. (D) 太阳能是指从太阳辐射中获取的能量，是一种可再生能源，因为太阳每天都会升起，不会因为使用而枯竭。

所以答案是D。

Explanation: Let's think step by step,

1. (A) Petroleum is a fossil fuel extracted from deep underground and is not a renewable energy source.  
2. (B) Coal is also a fossil fuel extracted from deep underground and is not a renewable energy source.  
3. (C) Nuclear fuel refers to the fuel used in nuclear reactors, including uranium, plutonium, etc. Although energy can be generated through nuclear reactions, nuclear fuel is limited and is not a renewable energy source.  
4. (D) Solar energy refers to the energy obtained from solar radiation and is a renewable energy source, because the sun rises every day and will not be exhausted due to use.

Therefore, the answer is C.

Figure 7: An example of generating explanations via GPT-4. The red text is the autocompleted response from model, while the preceding text is the user-inputted prompt. We indicate English translation below the corresponding Chinese text for each paragraph.

**MiniMax** is a new-generation Chinese LLM based on Transformer structure, using "user-in-the-loop" mechanism, MiniMax iteratively updates its foundation model based on users' feedback. We evaluate the chat-completion version in our experiment.

**GLM-130B and ChatGLM-6B** are based on the General language model (GLM) structure that gain benefits from its bidirectional attention advantage. By using alterable number and length of blanks, GLM can adapt to various tasks. GLM-130B is a bilingual pre-trained GLM that utilizes self-supervised learning and multitask instruction pretraining. GLM-130B also realized INT4 quantization with little to no quality degradation that significantly accelerate its inference efficiency. ChatGLM-6B is a lightweight conversational version of the GLM family that has been specially optimized for Chinese contexts. ChatGLM-6B also applies quantization so it can be deployed with a consumer-grade graphic memory requirement as little as 6GB. We evaluate on the fp16 settings for both two models in our experiment.

**Chinese-LLaMA** is an adaptation of original LLaMA into Chinese language environments. Chinese-LLaMA expands the original LLaMA by adding 20K Chinese tokens into its vocabulary, and is secondarily pre-trained and instruction fine-tuned on Chinese data. We evaluate Chinese-LLaMA-13B in our experiment, the largest Chinese-LLaMA variant.

**Chinese-Alpaca** is based on the Chinese-LLaMA checkpoint that is further tuned on Chinese instruction tuning data. We evaluate Chinese-Alpaca-13B in our experiment, the largest Chinese-Alpaca variant.

**MOSS** MOSS is the first open-source Chinese LLM that matches ChatGPT on both the training scale and alignment techniques. MOSS is initialized with CodeGen(Nijkamp et al., 2022), being pretrained on 100B Chinese tokens and 20B English tokens, and has further integrated supervised fine-tuning and preference model, as well as plugin augmentation, but not all the version are publicly available. We evaluate the moss-moon-003-sft version in our experiment.

## E Breakdown of Model Performance

Table 8 shows the detailed breakdown of accuracy per subject of four representative models.

Subject	GPT-4	ChatGPT	ChatGLM	Minimax
Advanced Mathematics	49.7 / 53.8	48.0 / 29.5	3.5 / 23.1	22.0 / 17.3
College Chemistry	59.4 / 55.8	39.7 / 33.9	17.0 / 28.6	31.7 / 24.6
College Physics	50.6 / 60.2	35.8 / 35.2	14.8 / 30.1	26.7 / 22.2
College Programming	78.1 / 77.5	57.9 / 57.9	18.7 / 24.0	43.0 / 35.7
Computer Architecture	74.6 / 75.6	68.9 / 63.7	30.1 / 27.5	53.4 / 48.2
Computer Network	77.8 / 77.2	58.5 / 59.6	36.3 / 28.1	47.4 / 49.1
Discrete Mathematics	66.7 / 62.7	43.1 / 30.7	17.0 / 26.1	23.5 / 24.8
Electrical Engineer	49.9 / 56.0	39.5 / 44.0	23.9 / 31.3	35.4 / 38.4
High School Biology	72.6 / 70.3	53.7 / 48.0	28.0 / 26.9	44.6 / 42.3
High School Chemistry	52.3 / 55.8	52.9 / 36.0	19.8 / 28.5	34.3 / 43.6
High School Mathematics	38.0 / 42.8	34.3 / 37.3	4.2 / 24.1	27.1 / 19.9
High School Physics	69.1 / 61.1	43.4 / 34.9	10.9 / 21.7	28.0 / 28.6
Metrology Engineer	70.3 / 71.2	63.0 / 59.8	41.1 / 48.4	49.8 / 48.4
Middle School Biology	91.2 / 86.5	67.7 / 63.5	30.7 / 38.0	65.6 / 55.2
Middle School Chemistry	81.1 / 71.4	71.4 / 60.0	36.8 / 42.2	56.8 / 61.1
Middle School Mathematics	62.7 / 66.7	44.6 / 42.4	3.4 / 20.3	31.6 / 24.9
Middle School Physics	81.5 / 78.7	66.9 / 57.9	20.2 / 41.0	58.4 / 55.6
Operating System	82.1 / 80.4	71.5 / 60.3	40.8 / 27.4	54.8 / 55.3
Probability and Statistics	53.6 / 62.0	33.7 / 42.8	27.7 / 26.5	24.7 / 19.3
Veterinary Medicine	80.0 / 80.0	64.3 / 58.1	39.5 / 35.2	53.3 / 51.0
Business Administration	67.1 / 65.4	52.8 / 46.8	32.6 / 34.9	48.5 / –
College Economics	71.4 / 74.4	52.5 / 51.3	22.1 / 30.0	40.2 / –
Education Science	68.5 / 69.3	59.6 / 54.4	37.8 / 33.0	54.8 / –
High School Geography	74.7 / 70.2	58.4 / 55.1	29.2 / 38.2	60.1 / –
High School Politics	77.8 / 69.3	52.3 / 51.1	25.0 / 29.6	46.6 / –
Mao Zedong Thought	79.5 / 79.9	60.7 / 63.5	46.6 / 50.7	73.5 / –
Marxism	81.6 / 82.7	71.5 / 70.4	40.2 / 49.2	74.3 / –
Middle School Geography	83.3 / 83.3	60.2 / 56.5	33.3 / 44.4	60.2 / –
Middle School Politics	87.1 / 85.5	74.1 / 67.4	41.5 / 40.9	66.3 / –
Teacher Qualification	85.0 / 85.0	75.7 / 66.9	48.9 / 49.1	78.5 / –
Art Studies	65.1 / 66.1	49.7 / 52.3	34.6 / 36.9	65.4 / –
Chinese Language and Literature	61.2 / 67.0	50.2 / 51.7	32.5 / 37.3	59.3 / –
High School Chinese	37.6 / 39.3	36.0 / 27.5	26.4 / 19.1	25.8 / –
High School History	68.1 / 68.1	54.4 / 45.1	35.2 / 40.1	65.4 / –
Ideological and Moral Cultivation	77.3 / 77.3	66.9 / 68.0	48.3 / 52.3	77.3 / –
Law	60.6 / 54.8	43.9 / 34.8	23.5 / 29.9	47.1 / –
Legal Professional	54.4 / 48.4	44.7 / 32.6	27.0 / 26.5	36.7 / –
Logic	60.3 / 63.2	37.7 / 35.8	32.8 / 31.4	39.2 / –
Middle School History	84.5 / 86.5	62.8 / 63.8	48.3 / 52.7	70.1 / –
Modern Chinese History	68.9 / 67.0	52.8 / 51.4	36.3 / 39.2	69.3 / –
Professional Tour Guide	71.8 / 70.3	61.3 / 62.0	44.0 / 51.9	66.5 / –
Accountant	64.6 / 61.9	51.7 / 42.0	23.9 / 32.7	47.4 / –
Basic Medicine	80.6 / 78.3	61.1 / 60.6	31.4 / 33.7	46.3 / –
Civil Servant	62.5 / 59.0	46.9 / 43.1	24.5 / 29.6	41.0 / –
Clinical Medicine	76.0 / 73.5	55.0 / 53.0	34.5 / 32.0	46.5 / –
Environmental Impact Assessment Engineer	63.7 / 59.8	50.9 / 49.1	37.7 / 35.6	48.4 / –
Fire Engineer	50.0 / 49.6	42.6 / 37.9	28.4 / 32.3	39.7 / –
Physician	76.8 / 76.1	63.7 / 54.6	34.8 / 37.7	56.9 / –
Plant Protection	78.9 / 80.4	65.8 / 57.8	43.2 / 36.2	52.3 / –
Sports Science	72.2 / 70.0	58.3 / 50.6	42.2 / 41.1	46.1 / –
Tax Accountant	58.0 / 58.2	42.0 / 35.7	16.3 / 30.9	43.3 / –
Urban and Rural Planner	63.2 / 65.6	52.2 / 49.3	36.8 / 37.3	44.3 / –

Table 8: Five-shot accuracy per subject. We report both the answer only (AO) and chain-of-thought (COT) accuracy in an AO / COT format. For MiniMax, the non-STEM COT accuracies are omitted since the MiniMax API is aggressively regularized to prevent generating any potentially sensitive terms like politician names. This causes failure to output COT responses for many subjects.