

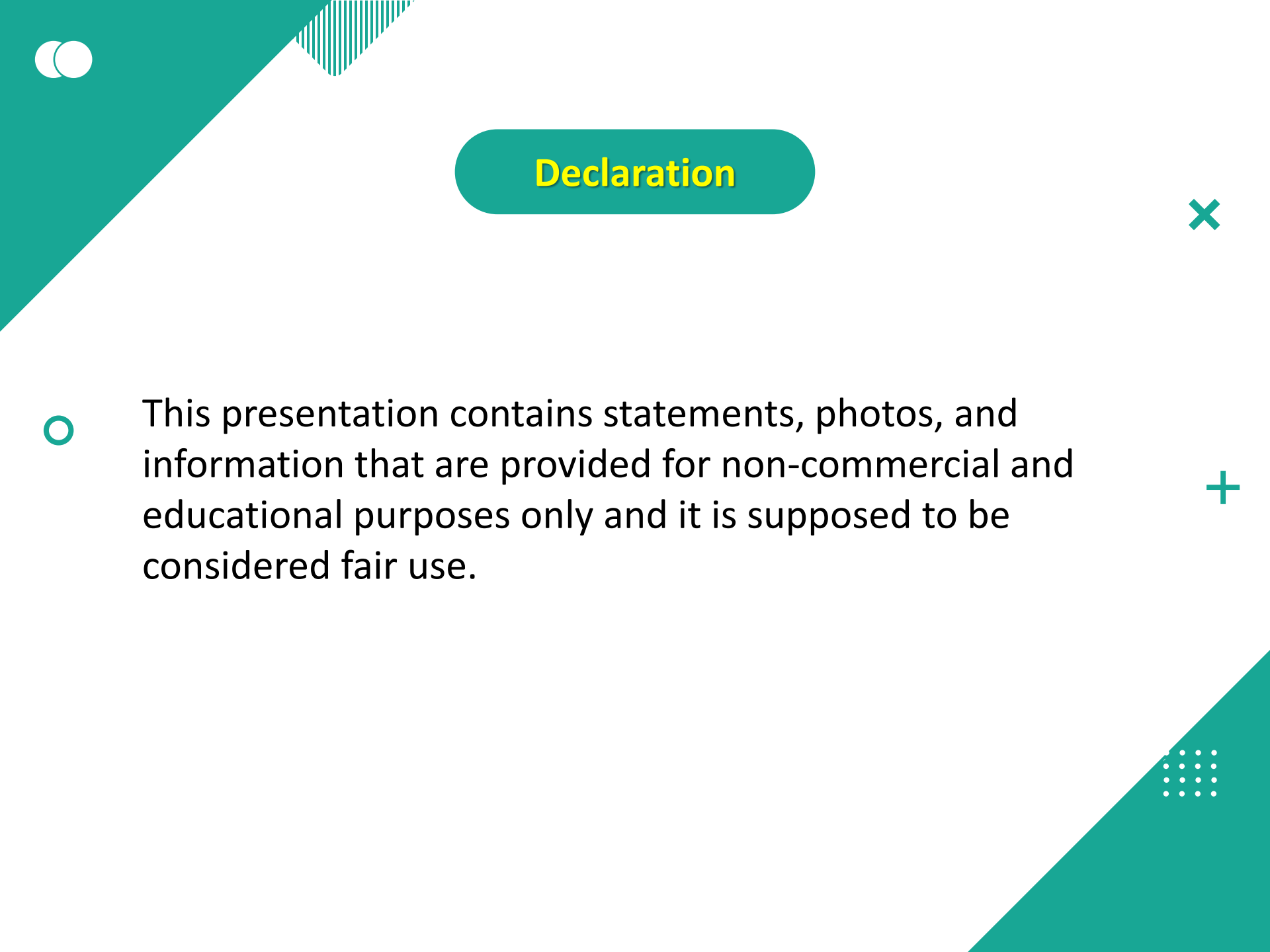
بنام خداوند عشق و زیبا پر

Large Language Models & Prompt Engineering

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Declaration



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Agenda



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- ❖ *Introduction*
 - ❖ *Large Language Models*
 - ❖ *Prompt Engineering*
 - ❖ *Prompt Engineering Techniques*
 - ❖ *Prompt Engineering Parameters*
 - ❖ *Academic Integrity*
 - ❖ *References*
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Introduction

AI is a method of making a computer, a computer-controlled robot, or a software **think intelligently like the human mind.**

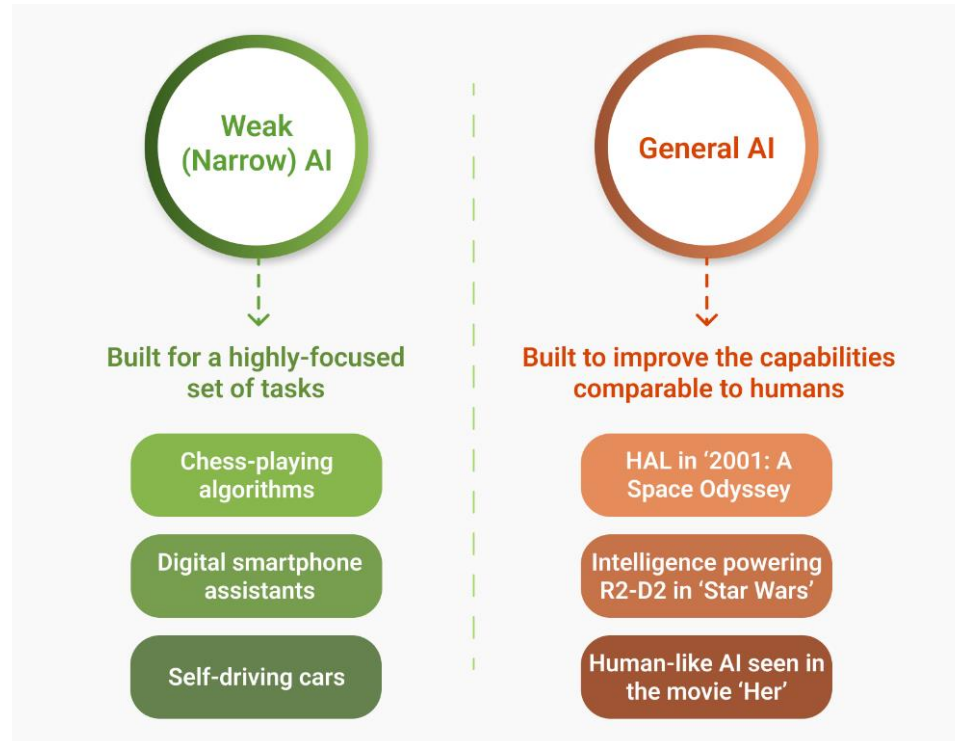
AI is accomplished by studying the patterns of the human brain and by analyzing the cognitive process. The outcome of these studies develops intelligent software and systems.



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Today AI

- ❖ AI today is properly known as **narrow AI (or weak AI)**, in that it is designed to perform a narrow task such as only facial recognition, ...
- ❖ However, the long-term goal of many researchers is to create **general AI (AGI or strong AI)**.



ARTIFICIAL INTELLIGENCE VS MACHINE LEARNING VS DEEP LEARNING

1 Artificial Intelligence

Development of smart systems and machines that can carry out tasks that typically require human intelligence

2 Machine Learning

Creates algorithms that can learn from data and make decisions based on patterns observed
Require human intervention when decision is incorrect

3 Deep Learning

Uses an artificial neural network to reach accurate conclusions without human intervention



Machine Learning

Machine learning is a subfield of AI that enables systems to **learn and improve from experience without being explicitly programmed.**

It involves training algorithms on large datasets to recognize patterns and make predictions, powering applications like image recognition, speech processing, and predictive analytics.

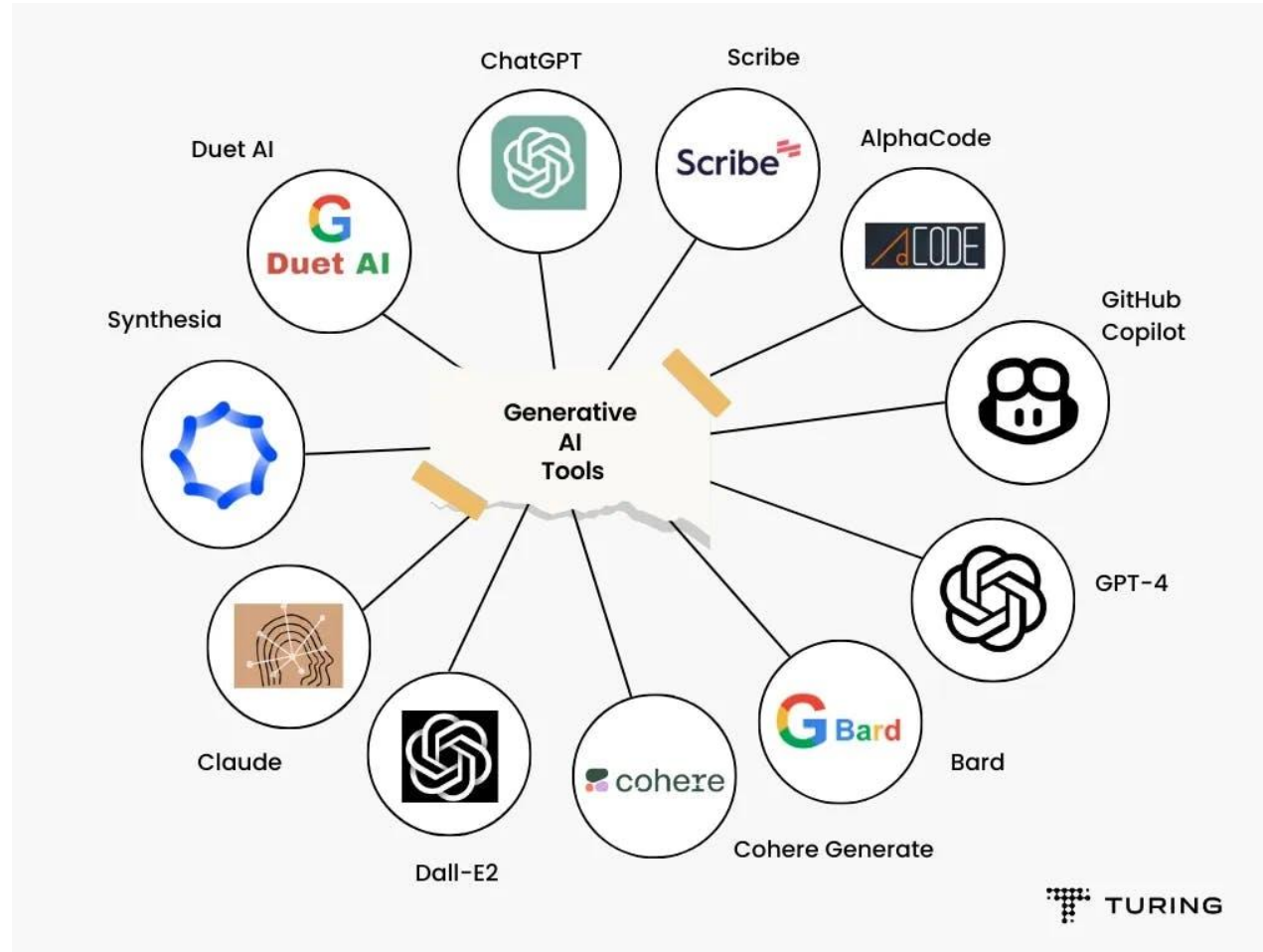
Generative Artificial Intelligence and NLP

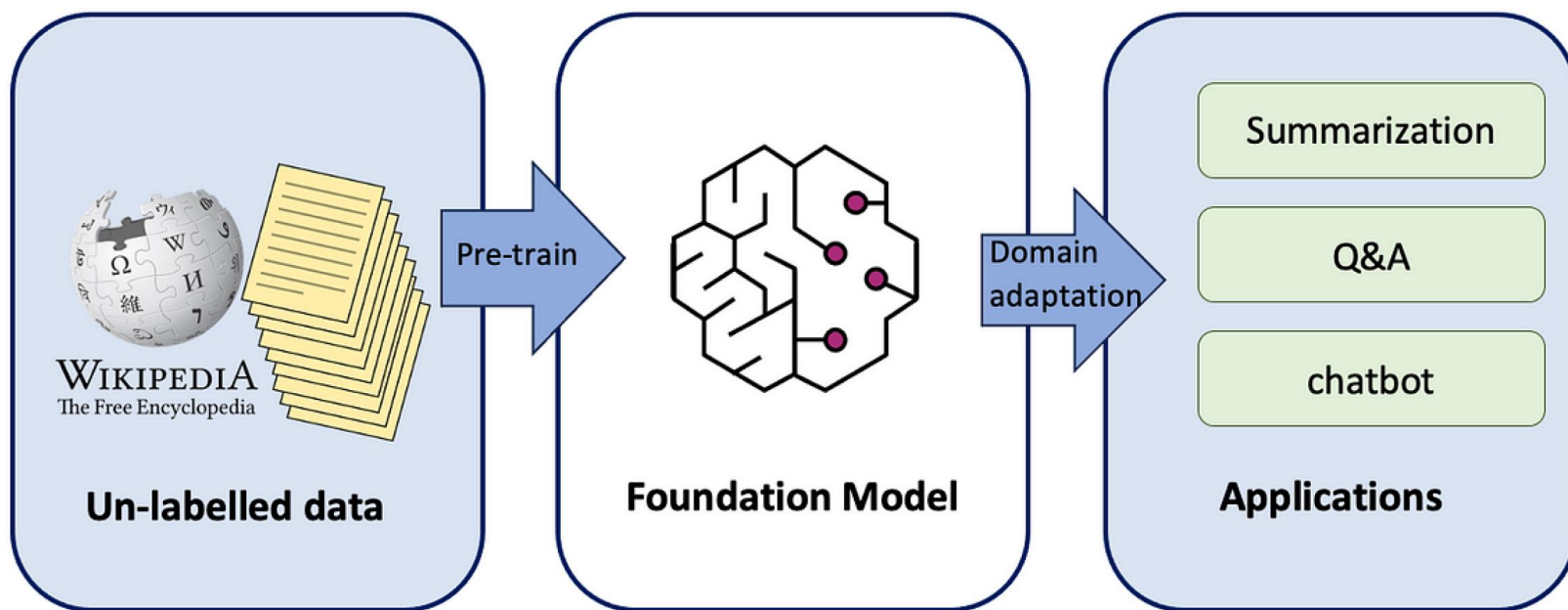
- ❖ **Generative artificial intelligence:** GAI describes algorithms that can be used to create new content, including audio, code, images, text, simulations, and videos.
- ❖ **Natural Language Processing:** NLP systems are primarily used to analyze data and make predictions, while generative AI can create new data similar to its training data.
- ❖ **Large Language Models:** In LLM, a deep neural network trained on huge amounts of data, that's able to perform various tasks using natural language. Its main capability is to recognize and generate text.
- ❖ **chatbot** is an extrapolation of a class of machine learning NLP models known as LLMs. LLMs digest huge quantities of text data and infer relationships between words within the text.

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Generative Artificial Intelligence and Natural Language Processing





بیاندیشیم:



آیا می توان از یک هوش مصنوعی خواست که با توجه به متن کامل کتاب اصول طب داخلی هاریسون برای بیماری با شرح حال پیچیده، چندین بیماری زمینه‌ای، و نتایج آزمایشگاهی غیرقطعی، تشخیص نهایی و افتراقی دقیق را ارائه دهد و برنامه درمانی جامعی را پیشنهاد کند که تمام تداخلات دارویی، بالقوه و ملاحظات فردی را بدون خطا در نظر گرفته باشد؟



بیاندیشیم:



آیا می توان از یک هوش مصنوعی خواست که با دسترسی کامل به فارماکوپه دارویی ایران و مقالات مروری جدید در مورد تداخلات دارویی، برای بیماری که انواع مختلفی از داروها را مصرف می کند، با اطمینان کامل مناسب ترین رژیم دارویی جدید را تجویز کند؟



بیاندیشیم:



آیا می توان از یک هوش مصنوعی خواست که با بررسی وضعیت بروز کرونا در قسمت های مختلف ایران، احتمال یک اپیدمی جدید کووید-۱۹ در کشور را پیش بینی کند؟



بیاندیشیم:



آیا می توان از یک هوش مصنوعی خواست که با مطالعه
گایدلاین بیماری های قلب و عروق انجمن قلب آمریکا
برای بیماری که با آریتمی مراجعه کرده و از روی نوار
قلبی، نتایج آزمایشگاهی و شرح حال کامل وی، برنامه
درمانی مناسب را ارائه کند؟



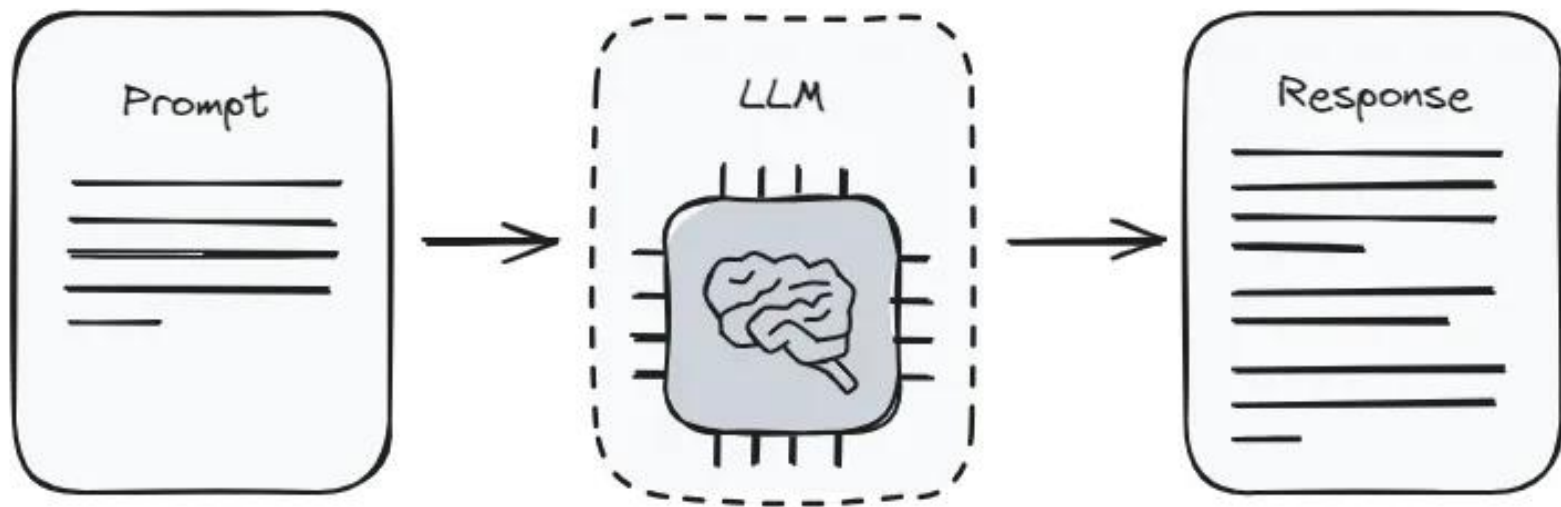
General LLMs are almost useless
in Medicine without **careful
Specialization**

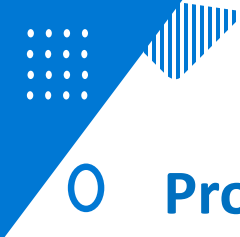
Techniques designed to enhance LLM response clarity, context, and compliance

Prompt Engineering

- Prompting is the most basic way to interact with any LLM.
- With a prompt, you're telling the model what kind of information you want it to give you.
- Learning how to ask the right questions to get the best answers.
- Limitation: The model can only give back what it already knows from its training.

0 Prompt Engineering





0 Prompt Engineering

Pros

- **Ease of Use:** Is user-friendly, doesn't require advanced technical skills.
- **Cost-Effectiveness:** It utilizes pre-trained models, minimal computational costs.
- **Flexibility:** Without the need for retraining the model.

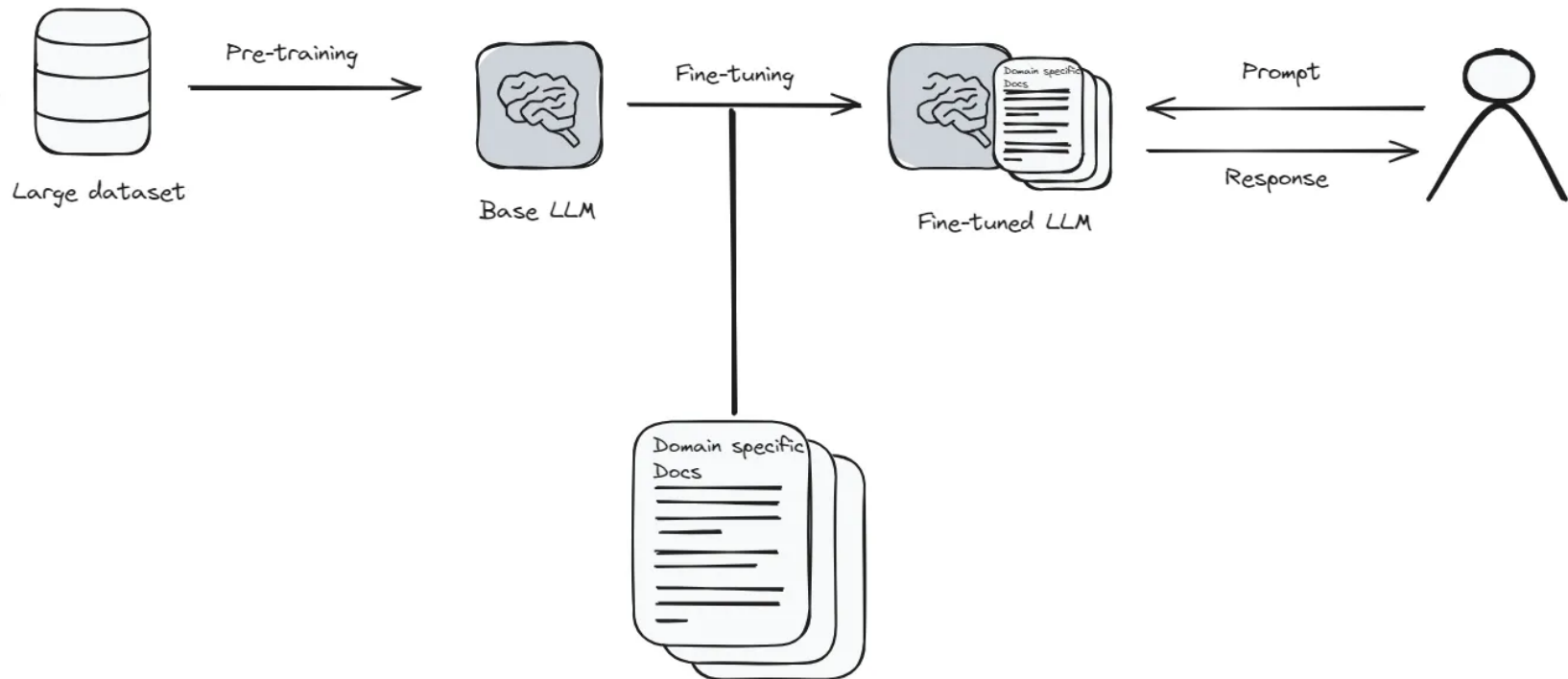


0 Prompt Engineering

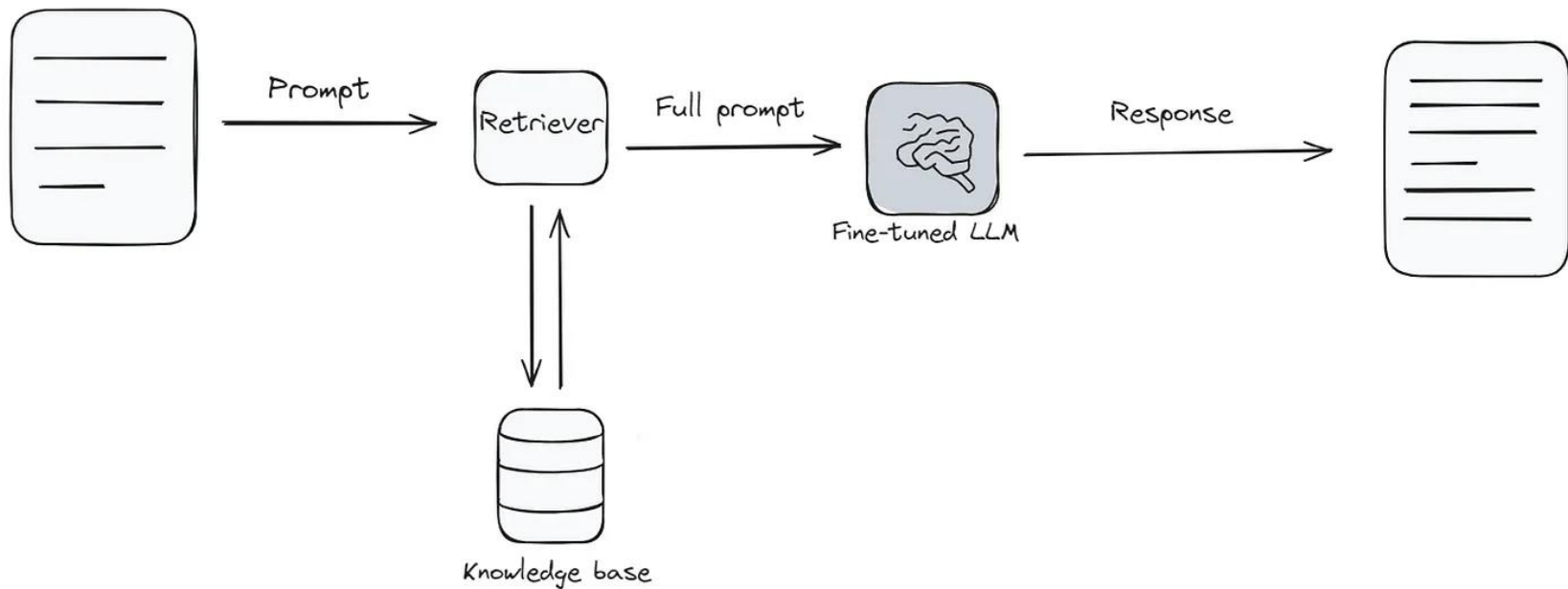
Cons

- **Inconsistency:** Responses can vary significantly based on the phrasing of the prompt.
- **Limited Customization:** Responses are restricted to the creativity and skill in crafting effective prompts.
- **Dependence on Model's Knowledge:** Outputs are limited to what the model has learned during its initial training.

0 Fine-tuning

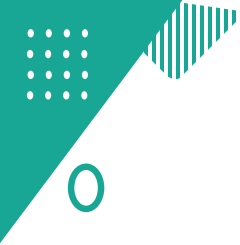


0 Retrieval Augmented Generation (RAG)



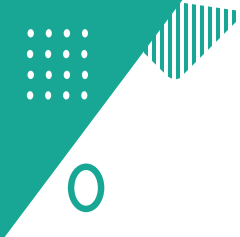
How do you create an LLM?

- First you take as much data as you can from various sources, and feed it to the model: **very expensive \$\$\$ (= fundamental models)**
- Next, you can fine-tune the model using specialized domain-specific data, and give it more weight: **cheap \$ (= specialized models)**
- To improve the quality of the results, you reinforce the training by having humans ask questions and evaluate the results: **long and complicated**



Sample prompts for Patient communication

- ❖ "Explain [medical condition] in simple language for a newly diagnosed patient. Give me 3 examples. You have 200 words max for each explanation."
- ❖ "Describe the treatment options for [medical condition]. Provide 3 examples, each within 150 words."
- ❖ "A patient is worried about the side effects of their prescribed medication for [medical condition]. Write 3 responses addressing their concerns and providing reassurance. Each response should be no more than 150 words."



Sample prompts for Medical documentation

- ❖ "Summarize the key findings from a patient's diagnostic tests for [medical condition]. Create 3 concise summaries with a maximum of 200 words each."
- ❖ "Compose 3 progress notes for a patient undergoing treatment for [medical condition]. Each note should be no more than 150 words."
- ❖ "Write a referral letter for a patient with [medical condition] to see a specialist. Provide 3 examples, each within 250 words"



Sample prompts for Medical research

- ❖ "Create a concise summary of the key findings from a recent study on [medical condition]. Develop 3 examples with a maximum of 150 words each."
- ❖ "Propose 3 research topics related to [medical condition] that would be valuable for further study. Each topic should be accompanied by a brief explanation of its significance, within 100 words."

Large Language Model

How to ask AI?

Effective A.I. chatbot prompts



Abbreviations & Terminology

- **GenAI** = Generative AI
- **AI, GenAI, GenAI tool, AI model** = used synonymously
- **Prompt Chains** = 'Conversations' with GenAI; Prompt sequences
- **Prompt Design vs. Prompt Engineering**
 - terminological ambiguity
 - using them synonymously
 - 'Prompt Engineering' most established

محدودیت‌های معمول در مدل‌های زبانی بزرگ

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- ❖ مدل‌های زبانی ورودی‌ها را بر اساس **تعداد توکن‌ها** پردازش می‌کنند.
- ❖ توکن: واحدهای کوچکی از زبان (یک کلمه کامل، بخشی از یک کلمه، یا حتی یک علامت)
- ❖ ۱۰۰۰ توکن تقریباً برابر ۷۵۰ کلمه انگلیسی است.
- ❖ در زبان فارسی، چون کلمات معمولاً طولانی‌ترند، این نسبت کمی متفاوت است.
- ❖ در Copilot، محدودیت پرامپت بین ۴۰۰۰ تا ۸۰۰۰ توکن است (حدود ۴۰۰۰ کلمه فارسی)
- ❖ نکته مهم:
- اگر پرامپت خیلی طولانی باشد:
- ❖ ممکن است بخشی از آن نادیده گرفته شود.
- ❖ یا پاسخ کوتاه‌تر و سطحی‌تر شود.
- ❖ یا حتی مدل نتواند به آن پاسخ دهد

Prompt Engineering

Why? ○



Why Prompt Engineering?

- The quality of the responses from AI writing tools depends totally on the **information you feed** to the tool in the prompt. Vague prompts get generic results.
- PE is crafting your prompt to improve the tool's response. By providing more information and context in the prompt, you get a **more customized and relevant response**.
- Great prompts give clear direction, stay on topic, and provide context.

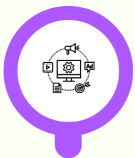
Where to use Prompt Engineering?



NLP Tasks



Chatbots & Assistants



Content Generation



FAQ Systems



Recommendation Systems



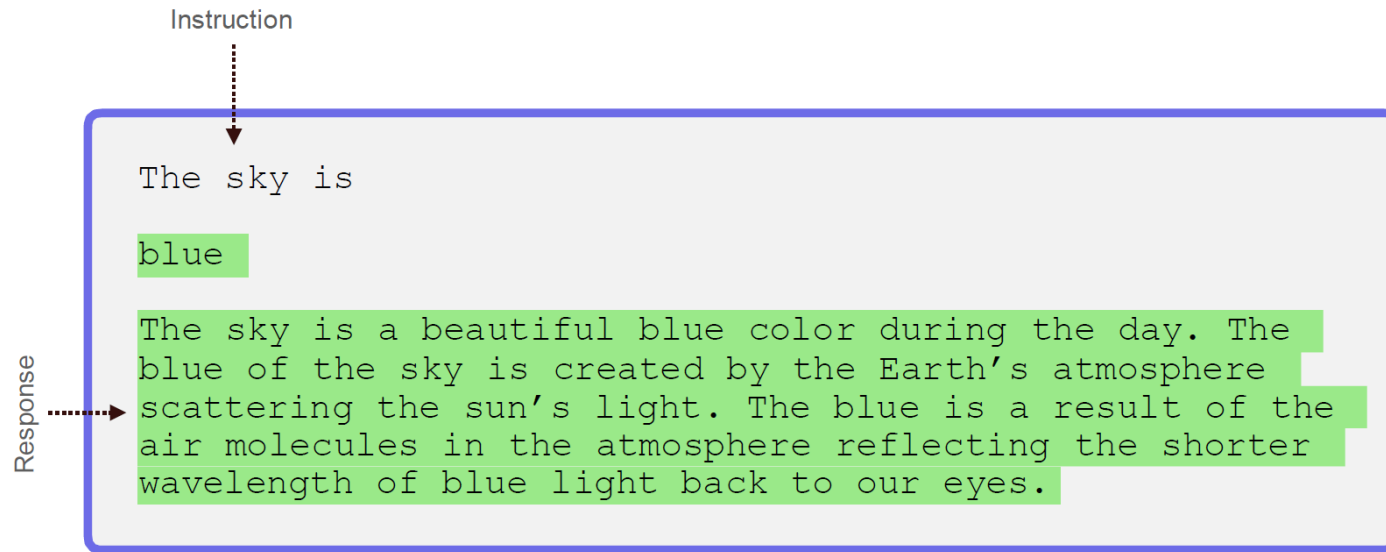
Data Analysis

Prompt Engineering Applications



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First Basic Prompt



Model: "text-davinci-003"
temperature: 0.7
top-p: 1

Designing Prompts for Different Tasks

- ❖ Text Summarization
- ❖ Question Answering
- ❖ Text Classification
- ❖ Role Playing
- ❖ Code Generation
- ❖ Reasoning



<https://botpenguin.com>

Text Summarization

Context

Antibiotics are a type of medication used to treat bacterial infections. They work by either killing the bacteria or preventing them from reproducing, allowing the body's immune system to fight off the infection. Antibiotics are usually taken orally in the form of pills, capsules, or liquid solutions, or sometimes administered intravenously. They are not effective against viral infections, and using them inappropriately can lead to antibiotic resistance.

Instruction

Explain the above in one sentence:

Antibiotics are medications used to treat bacterial infections by either killing the bacteria or stopping them from reproducing, but they are not effective against viruses and overuse can lead to antibiotic resistance.

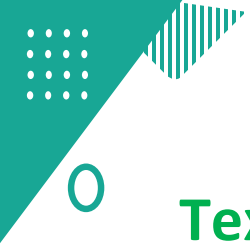
Question Answering

Answer the question based on the context below. Keep the answer short and concise. Respond "Unsure about answer" if not sure about the answer.

Context: Teplizumab traces its roots to a New Jersey drug company called Ortho Pharmaceutical. There, scientists generated an early version of the antibody, dubbed OKT3. Originally sourced from mice, the molecule was able to bind to the surface of T cells and limit their cell-killing potential. In 1986, it was approved to help prevent organ rejection after kidney transplants, making it the first therapeutic antibody allowed for human use.

Question: What was OKT3 originally sourced from?

Answer: Mice.



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Text Classification

Classify the text into neutral, negative or positive.

Text: I think the food was okay.

Sentiment: **Neutral**



Role Playing

The following is a conversation with an AI research assistant. The assistant tone is technical and scientific.

Human: Hello, who are you?

AI: Greetings! I am an AI research assistant. How can I help you today?

Human: Can you tell me about the creation of blackholes?

AI: Sure! Black holes are regions of spacetime where the gravitational force is so strong that nothing, not even light, can escape from it. They are created when a very massive star dies and its core collapses in on itself, forming a singularity of infinite density. The intense gravity of the singularity pulls in all the matter and radiation around it, creating the black hole. |

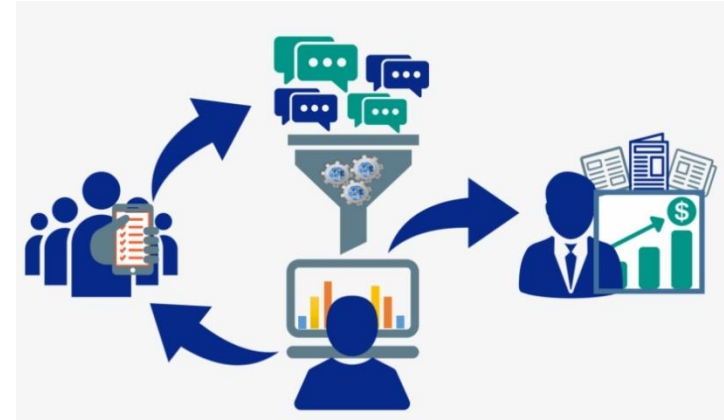
Code Generation

```
"""
Table departments, columns = [DepartmentId,
DepartmentName]
Table students, columns = [DepartmentId, StudentId,
StudentName]
Create a MySQL query for all students in the Computer
Science Department
"""
```

```
SELECT StudentId, StudentName
FROM students
WHERE DepartmentId IN (SELECT DepartmentId FROM
departments WHERE DepartmentName = 'Computer Science');
```

Tips for Prompt Engineering

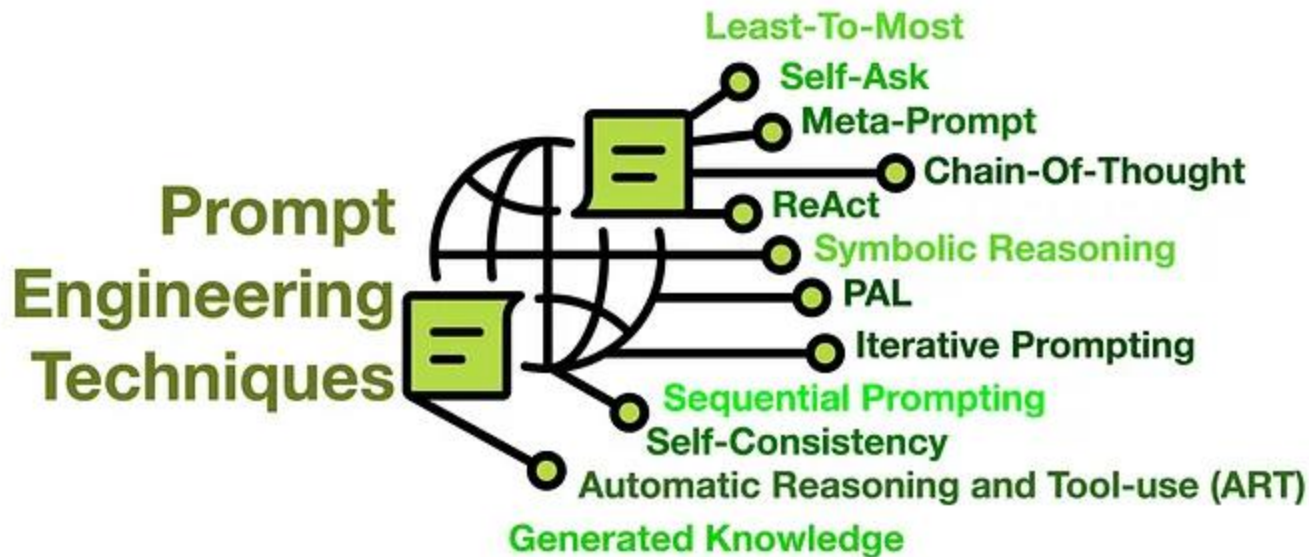
- Provide the Audience
- Give direction on tone of voice
- Share the purpose of the content
- Include areas of focus and audience challenges
- Include preferred length
- Use “Act As” to set the stage
- Ask follow-up questions to refine and expand
- Don’t include too much information



Prompt Engineering Techniques



12 Prompt Engineering Techniques





Generative AI with JavaScript

Essential prompt engineering techniques

Prompt engineering

Prompt engineering

=

Process of **designing** and **optimizing** prompts
to better utilize AI models

Prompt Engineering Techniques

Many advanced prompting techniques have been designed to improve performance on complex tasks

- Few-shot prompts
- Chain-of-thought (CoT) prompting
- Self-Consistency
- Knowledge Generation Prompting
- ReAct
-

Least-To-Most Prompting

This method is underpinned by the following strategy:

- Decompose a complex problem into a series of simpler sub-problems.
- And subsequently solving for each of these sub-questions.

Solving each subproblem is facilitated by the answers to previously solved subproblems.

Hence least to most prompting is a technique of using a progressive sequence of prompts to reach a final conclusion.

Least-To-Most Prompting

Task: Generating a detailed summary of a topic.

1. Natural Cue:

- **Description:** Present the task to the AI without additional information.
- **Example:** "Tell me about the French Revolution."

2. Verbal Prompt (General):

- **Description:** Provide a general hint to the AI.
- **Example:** "Can you give me a brief overview of the French Revolution?"

3. Verbal Prompt (Specific):

- **Description:** Provide a more specific instruction to guide the AI.
- **Example:** "Please include key events and figures in the French Revolution."

Least-To-Most Prompting *(Example from Copilot)*

Task: Generating a detailed summary of a topic.

4. Verbal Prompt (Detailed):

- Description:** Provide a detailed instruction with specific points to include.
- Example:** "Provide a summary of the French Revolution, including the causes, major events like the Storming of the Bastille, key figures such as Robespierre and Napoleon, and the impact on France and the world."

5. Visual Prompt:

- Description:** Provide a visual cue to guide the AI (in a multimodal model scenario).
- Example:** Upload an image of a historical painting depicting the Storming of the Bastille and ask, "Can you describe the significance of this event in the French Revolution?"

Least-To-Most Prompting *(Example from Copilot)*

Task: Generating a detailed summary of a topic.

6. Combining Prompts:

- Description:** Use a combination of prompts to guide the AI.
- Example:** Provide both a verbal prompt and a visual prompt to ensure comprehensive output. "Here's a timeline of the French Revolution. Can you provide a detailed summary based on this timeline, highlighting key events and figures?"

Using this least-to-most prompting approach, the goal is to provide the AI with the least amount of assistance necessary to generate the desired output. As the AI becomes more proficient with context and detailed instructions, you can start with less prompting and rely on the AI's capability to produce comprehensive answers.

من یک پزشک متخصص داخلی هستم و قصد دارم از شما برای بررسی تشخیص یک مورد مشکوک به لوپوس کمک بگیرم. لطفاً پاسخ‌هایتان را مرحله به مرحله و با استدلال ارائه دهید:

مرحله ۱: بیمار یک زن ۳۲ ساله است که با علائم خستگی مزمن، تب خفیف، و درد مفاصل مراجعه کرده. آیا این علائم می‌توانند نشانه‌ای از یک بیماری خودایمنی باشند؟ اگر بله، چه بیماری‌هایی در لیست افتراقی قرار می‌گیرند؟

مرحله ۲: در معاینه بالینی، بثورات پروانه‌ای شکل روی گونه‌ها مشاهده شده و بیمار از حساسیت شدید به نور خورشید شکایت دارد. با توجه به این یافته‌ها، احتمال لوپوس چقدر تقویت می‌شود؟ چه معیارهای تشخیصی باید بررسی شوند؟

مرحله ۳: آزمایش **ANA** مثبت است، **Anti-dsDNA** نیز بالا گزارش شده، و سطح **C3** و **C4** کاهش یافته. لطفاً این یافته‌های آزمایشگاهی را تحلیل کنید و بگویید چقدر با تشخیص لوپوس سازگارند.

مرحله ۴: آیا لازم است ارگان‌های دیگر مثل کليه یا قلب نیز بررسی شوند؟ اگر بله، چه تست‌هایی را پیشنهاد می‌کنید و چرا؟

مرحله ۵: با توجه به اطلاعات فوق، آیا تشخیص لوپوس قطعی است؟ اگر نه، چه بررسی‌های تکمیلی یا تصویربرداری‌هایی را توصیه می‌کنید؟

لطفاً تحلیل نهایی را با ذکر دلایل علمی و بر اساس معیارهای **ACR** یا **SLICC** ارائه دهید.

دو روش ارائه در Least-to-Most Prompting

روش	توضیح	مزایا	معایب
ارائه همه مراحل در یک پرامپت	همه مراحل (از ساده تا پیچیده) به صورت یکجا مطرح می شوند	مدل دید کلی پیدا می کند و می تواند پاسخ منسجم و مرحله ای بدهد	ممکن است مدل از مراحل بپرد یا پاسخ ها رو خلاصه کند (بار شناختی بالا)
ارائه مرحله به مرحله (پرامپت های جداگانه)	هر مرحله بعد از پاسخ به مرحله قبل مطرح می شه	مدل مجبور می شود دقیق تر و عمیق تر فکر کند. (کنترل بیشتری روی روند تحلیل دارد)	زمانی برتر است که نیاز به تعامل بیشتر با مدل هست

- ✓ اگر هدف تحلیل دقیق و استدلال گام به گام است، روش مرحله به مرحله مؤثرتر است.
- ✓ این روش باعث می شود مدل مثل یک پزشک فکر کند، نه فقط مثل یک ماشین پاسخ دهنده.

✓ اما اگر می خواهید مدل یک جمع بندی کامل و سریع بدهد، ارائه همه مراحل در یک پرامپت هم جواب می دهد. به شرطی که ساختار واضحی داشته باشد.

Zero-shot

Generate output with no specific training or examples

Prompt

Translate the following text in French: "Hello, world!"

Output

"Bonjour, le monde !"

Few-shot

Use in-context examples to condition the output

Prompt

Bonjour le monde: french
Brian is in the kitchen: english
Dankeschön: german
Den här koden är hemsk:

Output

swedish

Few-shot

Few-shot prompting allows us to provide exemplars in prompts to steer the model toward better performance

The odd numbers in this group add up to an even number: 4, 8, 9, 15, 12, 2, 1.

A: The answer is False.

The odd numbers in this group add up to an even number: 17, 10, 19, 4, 8, 12, 24.

A: The answer is True.

The odd numbers in this group add up to an even number: 16, 11, 14, 4, 8, 13, 24.

A: The answer is True.

The odd numbers in this group add up to an even number: 17, 9, 10, 12, 13, 4, 2.

A: The answer is False.

The odd numbers in this group add up to an even number: 15, 32, 5, 13, 82, 7, 1.

A: The answer is True.

مثال ۱:

سؤال: بیمار با درد زانو مراجعه کرده ...
پاسخ: احتمال آسیب منیسک...

مثال ۲:

سؤال: بیمار با تورم مچ پا ...
پاسخ: احتمال پیچ خوردگی...

حالا سؤال جدید:

بیمار با درد لگن پس از زمین خوردن...

شما یک مدل زبان هستید که به عنوان دستیار بالینی برای یک متخصص گوش و حلق و بینی عمل می‌کنید. پاسخ‌های شما باید دقیق، مبتنی بر شواهد علمی، و با زبان حرفه‌ای پزشکی ارائه شوند. در ادامه چند نمونه پرسش و پاسخ آورده شده‌اند. پس از آن، به پرسش جدید پاسخ دهید:

نمونه ۱

پرسش: بیمار مرد ۴۵ ساله با شکایت از کاهش شنوایی تدریجی در گوش چپ مراجعه کرده است. در آزمون Rinne، صدای دیاپازون در استخوان بهتر از هوا شنیده می‌شود. آزمون Weber به سمت گوش چپ منحرف شده است. تشخیص احتمالی چیست؟

✓ پاسخ: یافته‌های آزمون‌های Rinne و Weber نشان‌دهنده کاهش شنوایی انتقالی (Conductive Hearing Loss) در گوش چپ هستند. تشخیص‌های افتراقی شامل اوتیت میانی مزمن، اتواسکلروز، یا انسداد مجرای گوش خارجی (مانند جرم گوش) می‌باشند. بررسی‌های تکمیلی شامل اتوسکوپی و تمپانومتري توصیه می‌شود.

نمونه ۲

پرسش: بیمار زن ۳۰ ساله با شکایت از احساس فشار در سینوس‌های پیشانی و درد هنگام خم شدن مراجعه کرده است. علائم از ۱۰ روز پیش شروع شده و با تب خفیف همراه است. درمان پیشنهادی چیست؟

✓ پاسخ: علائم بیمار با سینوزیت باکتریایی حاد سازگار هستند. با توجه به مدت زمان بیش از ۱۰ روز و وجود تب، درمان آنتی‌بیوتیکی توصیه می‌شود. آموکسی‌سیلین یا آموکسی‌سیلین-کلاوولانات به عنوان خط اول درمان مناسب هستند. در صورت عدم پاسخ، تصویربرداری سینوس‌ها با CT ممکن است مفید باشد.

نمونه ۳

❓ پرسش: بیمار کودک ۵ ساله با شکایت از خرخر شبانه، تنفس دهانی، و خواب ناآرام مراجعه کرده است. در معاینه، بزرگی لوزه‌ها و آدنوئید مشاهده شده است. رویکرد درمانی چیست؟

✅ پاسخ: علائم کودک با هیپرتروفی آدنوئید و لوزه‌ها سازگار است که ممکن است منجر به آپنه انسدادی خواب شود. در موارد متوسط تا شدید، آدنوئیدکتومی و تونسیلکتومی توصیه می‌شود. ارزیابی خواب با پلی‌سومنوگرافی در موارد مشکوک به آپنه شدید مفید است.

پرسش جدید

❓ پرسش: بیمار خانم ۲۸ ساله با شکایت از صدای خشن و کاهش کیفیت صدا پس از یک دوره سرماخوردگی مراجعه کرده است. علائم بیش از ۳ هفته ادامه داشته‌اند. در لارنگوسکوپی، اریتم و تورم طناب‌های صوتی مشاهده می‌شود. تشخیص و درمان پیشنهادی چیست؟

✍ پاسخ:

Chain of Thought

Simulate human-like reasoning and decision-making

Prompt

Q: When I was 6 years old, my sister was twice my age. Now I'm 30. How old is my sister?
A: The answer is

Output

×

24

Chain of Thought

Simulate human-like reasoning and decision-making

Prompt

Q: When I was 6 years old, my sister was twice my age. Now I'm 30. How old is my sister?

A: Let's think step by step

Output



Sure, let's go through it step by step:

1. When you were 6 years old, your sister was twice your age. This means your sister was $6 \times 2 = 12$ years old at that time.
 2. The age difference between you and your sister is $12 - 6 = 6$ years.
 3. Now that you are 30 years old, your sister would be $30 + 6 = 36$ years old.
- So, your sister is 36 years old now.

Chain of Thought

Prompting can be further improved by instructing the model to reason about the task when responding

- ❖ This is very useful for tasks that require reasoning
- ❖ You can combine it with few-shot prompting to get better results
- ❖ You can also do zero-shot CoT where exemplars are not available

The odd numbers in this group add up to an even number: 4, 8, 9, 15, 12, 2, 1.

A: Adding all the odd numbers (9, 15, 1) gives 25. The answer is False.

The odd numbers in this group add up to an even number: 15, 32, 5, 13, 82, 7, 1.

A: Adding all the odd numbers (15, 5, 13, 7, 1) gives 41. The answer is False.

Zero-Shot CoT

- Involves adding "**Let's think step by step**" to the original prompt

I went to the market and bought 10 apples. I gave 2 apples to the neighbor and 2 to the repairman. I then went and bought 5 more apples and ate 1. How many apples did I remain with?

11 apples

I went to the market and bought 10 apples. I gave 2 apples to the neighbor and 2 to the repairman. I then went and bought 5 more apples and ate 1. How many apples did I remain with?

Let's think step by step.

First, you started with 10 apples.
You gave away 2 apples to the neighbor and 2 to the repairman, so you had 6 apples left.
Then you bought 5 more apples, so now you had 11 apples.
Finally, you ate 1 apple, so you would remain with 10 apples.

شما یک مدل زبان هستید که به عنوان دستیار بالینی برای یک متخصص جراحی عمومی عمل می‌کنید. لطفاً به پرسش زیر با استفاده از تکنیک **Chain of Thought** پاسخ دهید: ابتدا مسیر استدلال بالینی را مرحله به مرحله شرح دهید، سپس به نتیجه‌گیری نهایی برسید:

؟ پرسش:

بیمار مرد ۶۵ ساله با درد شکمی منتشر، تهوع، و نفخ شدید مراجعه کرده است. سابقه جراحی شکم (کولکتومی چپ) ۵ سال قبل دارد. در معاینه شکم، صداهاى روده‌ای افزایش یافته‌اند و شکم متسع است. بیمار قادر به دفع گاز نیست. در تصویربرداری شکم با اشعه ایکس، سطح مایع-هوا در روده‌ها دیده می‌شود.

✍ پاسخ:

۱. شرح حال اولیه بیمار مرد ۶۵ ساله با درد شکمی منتشر، تهوع، نفخ شدید، و عدم دفع گاز مراجعه کرده است. این علائم به طور کلاسیک با انسداد روده (intestinal obstruction) سازگار هستند.

۲. سابقه جراحی شکم بیمار سابقه کولکتومی چپ دارد. جراحی‌های شکمی قبلی یکی از مهم‌ترین عوامل خطر برای ایجاد چسبندگی‌های داخل شکمی (adhesions) هستند که می‌توانند منجر به انسداد مکانیکی روده شوند.

۳. یافته‌های معاینه فیزیکی

شکم متسع است و صداهاى روده‌ای افزایش یافته‌اند این یافته‌ها معمولاً در مراحل اولیه انسداد مکانیکی دیده می‌شوند، پیش از آن که روده‌ها دچار خستگی و کاهش صدا شوند.

۴. عدم دفع گاز این علامت نشان‌دهنده انسداد کامل یا پیشرفته است، که در افتراق از ایلئوس عملکردی (paralytic ileus) کمک‌کننده است.

۵. یافته‌های تصویربرداری مشاهده سطح مایع-هوا (air-fluid levels) در روده‌ها در تصویربرداری شکم با اشعه ایکس، یکی از نشانه‌های کلاسیک انسداد مکانیکی روده کوچک یا بزرگ است.

نتیجه‌گیری نهایی

با توجه به: علائم بالینی (درد منتشر، تهوع، نفخ، عدم دفع گاز)، سابقه جراحی شکم و یافته‌های فیزیکی و تصویربرداری:

محتمل ترین تشخیص: انسداد مکانیکی روده کوچک (Small Bowel Obstruction) به علت چسبندگی‌های داخل شکمی (post-surgical adhesions) است.

یک بیمار با تب، سرفه و درد قفسه سینه مراجعه کرده. لطفاً
گام به گام فکر کن و تشخیص افتراقی را ارائه بده.

Self-Ask Prompting

Self-Ask Prompting is a progression from Direct and Chain-Of-Thought prompting.

The interesting thing about self-ask prompting is that the LLM reasoning is shown explicitly and the LLM also decomposes the question into smaller follow-up questions.

The LLM knows when the final answer is reached and can move from follow-up intermediate answers to a final answer.

Self-Ask Prompting

Direct Prompting

GPT-3

Question: Who lived longer, Theodor Haecker or Harry Vaughan Watkins?

Answer: Harry Vaughan Watkins.

Question: Who was president of the U.S. when superconductivity was discovered?

Answer: Franklin D. Roosevelt



Chain of Thought

GPT-3

Question: Who lived longer, Theodor Haecker or Harry Vaughan Watkins?

Answer: Theodor Haecker was 65 years old when he died. Harry Vaughan Watkins was 69 years old when he died.

So the final answer (the name of the person) is: Harry Vaughan Watkins.

Question: Who was president of the U.S. when superconductivity was discovered?

Answer: Superconductivity was discovered in 1911 by Heike Kamerlingh Onnes. Woodrow Wilson was president of the United States from 1913 to 1921. So the final answer (the name of the president) is: Woodrow Wilson.



Self-Ask

GPT-3

Question: Who lived longer, Theodor Haecker or Harry Vaughan Watkins?

Are follow up questions needed here: Yes.

Follow up: How old was Theodor Haecker when he died?

Intermediate answer: Theodor Haecker was 65 years old when he died.

Follow up: How old was Harry Vaughan Watkins when he died?

Intermediate answer: Harry Vaughan Watkins was 69 years old when he died.

So the final answer is: Harry Vaughan Watkins

Question: Who was president of the U.S. when superconductivity was discovered?

Are follow up questions needed here: Yes.

Follow up: When was superconductivity discovered?

Intermediate answer: Superconductivity was discovered in 1911.

Follow up: Who was president of the U.S. in 1911?

Intermediate answer: William Howard Taft.

So the final answer is: William Howard Taft.



من یک متخصص ارتوپدی هستم و می‌خواهم از شما درباره یک مورد بالینی سؤال بپرسم.
لطفاً از تکنیک Self-Ask Prompting استفاده کنید: ابتدا سؤال اصلی را به چند زیرسؤال تقسیم کن، سپس به هر کدام پاسخ بده و در پایان نتیجه‌گیری نهایی را ارائه کن.

؟ پرسش اصلی:

بیمار مرد ۷۰ ساله با درد شدید و ناگهانی در ناحیه ران راست پس از زمین خوردن مراجعه کرده است. در معاینه، اندام تحتانی راست کوتاه‌تر و به سمت خارج چرخیده است. بیمار قادر به تحمل وزن نیست. محتمل‌ترین تشخیص چیست؟

1] زیرسؤال اول: آیا مکانیسم آسیب با شکستگی سازگار است؟

بله. زمین خوردن در سالمندان، به ویژه با پوکی استخوان، یکی از شایع ترین مکانیسم های شکستگی های هیپ است.

2] زیرسؤال دوم: آیا علائم فیزیکی با شکستگی هیپ سازگارند؟

بله. کوتاهی اندام و چرخش خارجی پا از علائم کلاسیک شکستگی گردن Femur هستند. عدم توانایی تحمل وزن نیز مؤید آسیب ساختاری جدی است.

3] زیرسؤال سوم: چه نوع شکستگی هایی باید در لیست افتراقی باشند؟

- شکستگی گردن Femur (intracapsular)
- شکستگی بین تروکانتریک (intertrochanteric)
- شکستگی ساب تروکانتریک با توجه به سن بیمار و مکانیسم آسیب، شکستگی گردن Femur یا بین تروکانتریک محتمل ترند.

4] زیرسؤال چهارم: چه بررسی های تصویربرداری باید انجام شوند؟

رادیوگرافی لگن و هیپ در نمای قدامی-خلفی و جانبی. در موارد مشکوک، MRI برای تشخیص شکستگی های مخفی توصیه می شود.

نتیجه گیری نهایی:

با توجه به مکانیسم آسیب، علائم فیزیکی، و سن بیمار، محتمل ترین تشخیص شکستگی بین تروکانتریک Femur راست است. تصویربرداری فوری و ارزیابی برای جراحی تثبیت داخلی توصیه می شود.

Reframing Prompting

بازنویسی سؤال به شکلی که مدل بهتر متوجه شود یا از زاویه‌ای جدید به آن نگاه کند.
✓ کاربرد: وقتی مدل پاسخ ناقص یا سطحی می‌دهد.

به جای: "علت درد زانو چیست؟"
بنویسیم: "چه ساختارهایی در زانو ممکن است باعث درد شوند؟ لطفاً هر کدام را با علائم بالینی توضیح بده."

Role-Based Prompting

مدل را در نقش خاصی قرار می‌دهیم تا پاسخ‌ها تخصصی‌تر و هدفمندتر شوند.

✓ کاربرد: آموزش، مشاوره تخصصی، شبیه‌سازی

فرض کن تو یک متخصص ارتوپدی هستی. به سؤال زیر پاسخ بده ...

Multi-Turn Prompting

استفاده از گفت‌وگوی چندمرحله‌ای برای رسیدن به پاسخ دقیق‌تر، با اصلاح یا تعمیق سؤال در هر مرحله.

✓ کاربرد: تحلیل‌های پیچیده، آموزش تعاملی

مرحله اول: مدل پاسخ می‌دهد

مرحله دوم: کاربر می‌گوید "لطفاً بیشتر توضیح بده" یا مثلاً "اگر بیمار دیابت داشته باشد چه تغییری در تشخیص ایجاد می‌شود؟"

Instruction-Tuning Prompting

استفاده از دستورالعمل‌های واضح و دقیق برای هدایت مدل به سمت نوع خاصی از پاسخ.

✓ کاربرد: تولید محتوا، خلاصه‌سازی، ترجمه

لطفاً پاسخ را در قالب جدول ارائه بده و هر تشخیص را با درصد احتمال بنویس.

مقایسه تکنیک‌ها

تکنیک	نوع تفکر	کاربرد آموزشی	سطح پیچیدگی
Few-Shot	تقلیدی	آموزش الگو	متوسط
CoT	استدلالی	تحلیل بالینی	بالا
Least-to-Most	تدریجی	آموزش مفاهیم	متوسط
Self-Ask	تحلیلی	تفکر مستقل	بالا

Prompt Engineering Tips



Tip #1

Provide clear instructions

Write a two-lines product description for a new water bottle



Write a two-lines product description for a new water bottle that is 100% recycled. Be sure to include that it comes in natural colors with no dyes, and each purchase removes 10 pounds of plastic from our oceans

Tip #2

Provide additional context

```
<insert email here>
```

```
---
```

```
Extract the key points from the above email, and put them in a bulleted list:
```



```
<insert email here>
```

```
---
```

```
Topics I'm very interested in: AI, webinar dates, submission deadlines
```

```
Extract the key points from the above email, and put them in a bulleted list:
```

Tip #3

Provide cues

Write a join query to get customer names with purchases in the past 30 days between tables named orders and customer on customer ID.



Write a join query to get customer names with purchases in the past 30 days between tables named orders and customer on customer ID.

SELECT

Tip #4

Define output format

```
<insert text here>
---
Extract the sentiment of text
```



```
<insert text here>
---
Extract the sentiment of text using this JSON format:
{
  "sentiment": "positive" | "neutral" | "negative",
  "aggressiveness": 1-10
}
```

Tip #5

Provide examples

```
<insert question here>
```

```
---
```

```
Generate 3 very brief follow-up questions that the user would likely ask next.
```

Example:

```
<Can I invite friends for a party?>
```

```
<How can I ask for a refund?>
```

```
<Who should I contact if I break something?>
```

Tip #6

Break down complex tasks

What sport is easiest to learn but hardest to master?



What sport is easiest to learn but hardest to master?
Give a step by step approach of your thoughts, ending in your answer

Example 1 – Class Description

Description of Class *Without Prompt Engineering*

Create a short description of a class on using stethoscope

Certainly! Here's a short description for your class on using a stethoscope:

Class Title: Mastering the Stethoscope: A Comprehensive Guide

Description: Dive into the world of auscultation with our hands-on class, "Mastering the Stethoscope: A Comprehensive Guide." This course is designed for healthcare professionals and enthusiasts eager to enhance their diagnostic skills. Participants will learn the fundamentals of stethoscope anatomy, proper handling techniques, and the nuances of interpreting heart, lung, and abdominal sounds. Through interactive demonstrations and practical sessions, you will gain the confidence and expertise to make accurate clinical assessments. Join us to unlock the full potential of this indispensable medical tool and elevate your patient care!

Does this meet your needs, or would you like any adjustments? 😊

With Prompt Engineering

Create a short description of a class on using a stethoscope. The audiences are nursing students at a medical university who are concerned about the different types of diagnoses with the stethoscope. The aim is to motivate the student to sign up for this elective course.

Certainly! Here's an engaging description tailored for nursing students:

Class Title: Stethoscope Mastery for Nursing Students: Unlocking Diagnostic Potential

Description: Are you ready to elevate your diagnostic skills and gain confidence in using one of the most essential tools in healthcare? Join our elective course, "Stethoscope Mastery for Nursing Students: Unlocking Diagnostic Potential," designed specifically for nursing students eager to master the art of auscultation. In this comprehensive class, you will explore the different types of diagnoses that can be made with a stethoscope, from heart murmurs to lung sounds and beyond.

Through hands-on practice sessions, interactive demonstrations, and expert guidance, you'll learn to discern the subtle differences in sounds and make accurate clinical assessments. This course aims to equip you with the knowledge and skills to excel in your nursing career and improve patient care. Don't miss this opportunity to enhance your diagnostic abilities and stand out as a skilled healthcare professional. Sign up now and take the first step toward becoming a stethoscope expert!

Example 2 – Social Media Post

0

Social Media Post Without Prompt Engineering

Create a social post for www.tums.ac.ir

Sure! Here's a social post for TUMS (Tehran University of Medical Sciences):

🌟 **Join the Future of Medical Excellence at TUMS!** 🌟

Are you passionate about healthcare and innovation? 🏥 ✨ Tehran University of Medical Sciences (TUMS) is where your dreams take flight! With over 250 majors, 16 hospitals, and more than 1,600 faculty members, TUMS is a hub of knowledge and opportunity 1.

👩👨 Whether you're a student, researcher, or healthcare professional, TUMS offers a world-class education and cutting-edge research facilities. Join our diverse community of over 1,600 international students and become part of a legacy of excellence that spans 173 years 1.

🌍 📖 Apply now and be part of the change you want to see in the world of medicine! Visit us at tums.ac.ir for more information.

Social Media Post With Prompt Engineering

Create a Facebook post for www.tums.ac.ir to encourage people to apply for graduation at this university. This post should be fun and lighthearted and show the valuable position of TUMS.

Absolutely! Here's a fun and lighthearted Facebook post to encourage people to apply for graduation at Tehran University of Medical Sciences (TUMS):

🎓✨ **Ready to Take Your Medical Journey to the Next Level?** ✨🎓

Hey future healthcare heroes! ✨ Are you dreaming of a top-notch medical education with a touch of excitement? Look no further! TUMS (Tehran University of Medical Sciences) is where your dreams become reality. 📖🌍

Join us at TUMS and be part of a vibrant community that values innovation, excellence, and a whole lot of fun! 🏢🍌 From cutting-edge research to amazing extracurricular activities, we've got it all. And guess what? We're waiting for **YOU** to take the next step and apply for graduation. 🍌👥

Why TUMS? Because we're not just a university; we're a family. ❤️ With world-class faculty, state-of-the-art facilities, and a legacy of excellence, TUMS is the place to be for aspiring medical professionals.

So, what are you waiting for? ✨ Dive into a world of opportunities and make your mark on the future of healthcare. Visit us at tums.ac.ir and apply today! 🎓✍️

Let's make your medical dreams come true together! ✨💪 #TUMS #MedicalExcellence #FutureHealthcareHeroes #JoinTUMS #ApplyNow

Example 3 – Questions without PE

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what are the top interview questions?

Here are some of the top interview questions that you might encounter:

1. **Tell me about yourself.**
2. **Why do you want to work here?**
3. **What are your strengths and weaknesses?**
4. **Can you describe a challenging situation and how you handled it?**
5. **Why should we hire you?**
6. **What is your greatest achievement?**
7. **How do you handle stress and pressure?**
8. **What are your salary expectations?**
9. **Where do you see yourself in five years?**
10. **Do you have any questions for us?**

Preparing thoughtful and honest answers to these questions can help you make a great impression during your interview. Do you have a specific interview coming up that you're preparing for?

Example 3 – Questions with PE

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what are the top interview questions? The interviewees are faculty members of medical school and the interview is the first phase of a qualitative research about their motivations for excellent teaching.

Given the context of interviewing medical school faculty members for a qualitative research study on their motivations for excellent teaching, here are some tailored interview questions:

1. **Can you describe your teaching philosophy and how it has evolved over your career?**
2. **What motivated you to pursue a career in medical education?**
3. **How do you define 'excellent teaching' in the context of medical education?**
4. **Can you share a specific experience or moment that reinforced your commitment to teaching?**
5. **What strategies do you use to engage and inspire your students?**
6. **How do you balance your responsibilities as a teacher with your research and clinical duties?**
7. **What challenges have you faced in your teaching career, and how have you overcome them?**
8. **How do you measure the impact and effectiveness of your teaching?**
9. **What role do you believe technology plays in enhancing medical education?**
10. **What advice would you give to new faculty members who aspire to excel in**



aeen_mohammadi@tums.ac.ir

