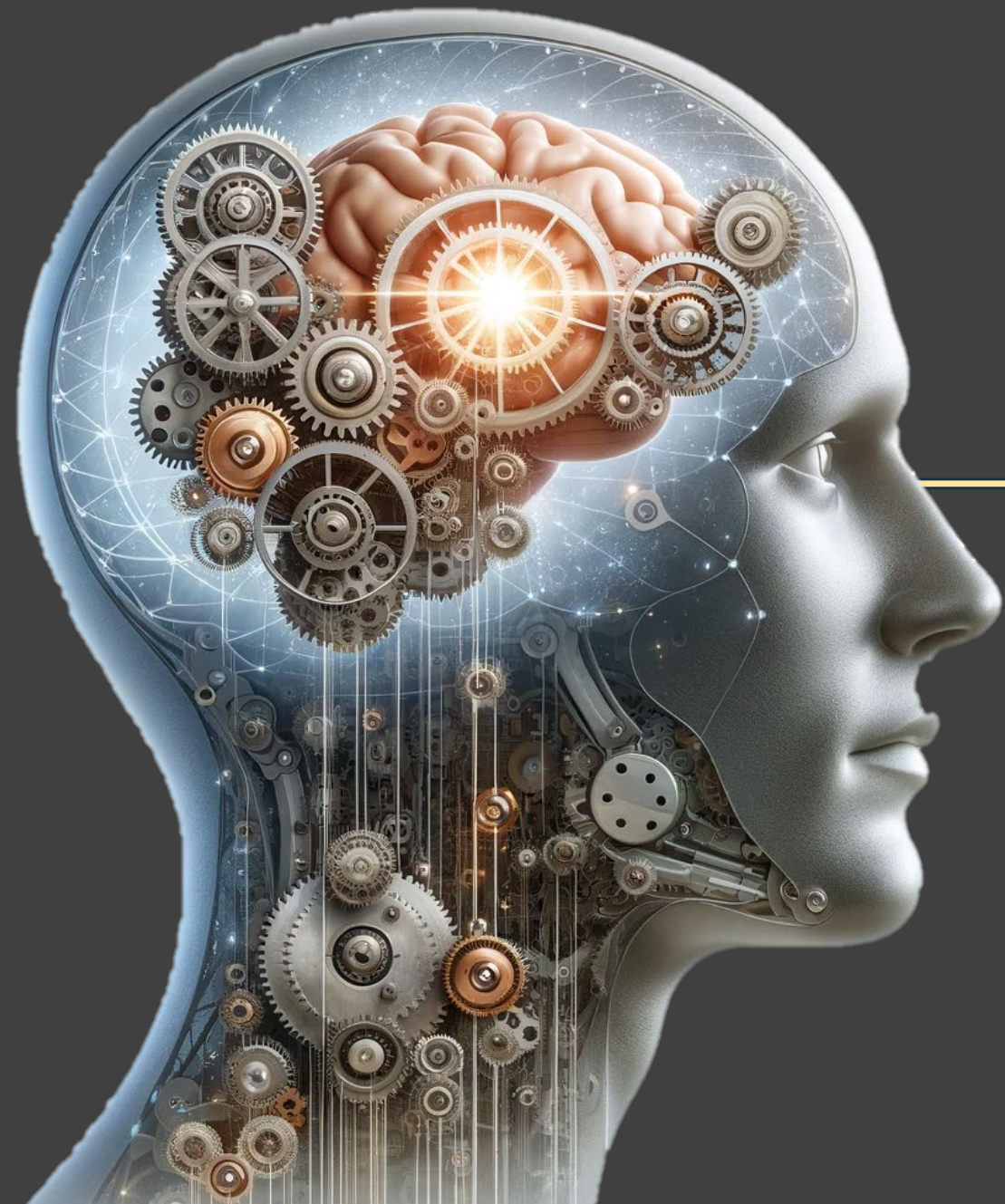


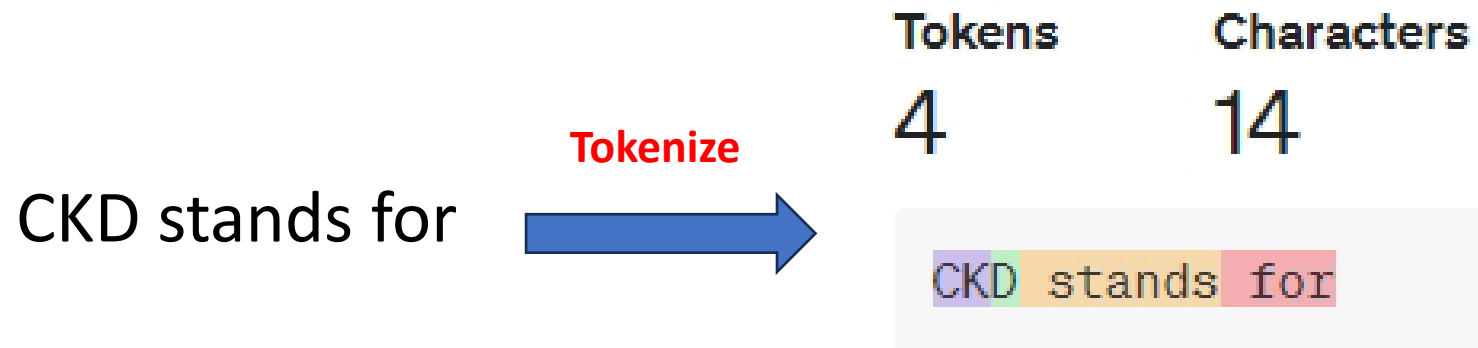


PROMPT ENGINEERING

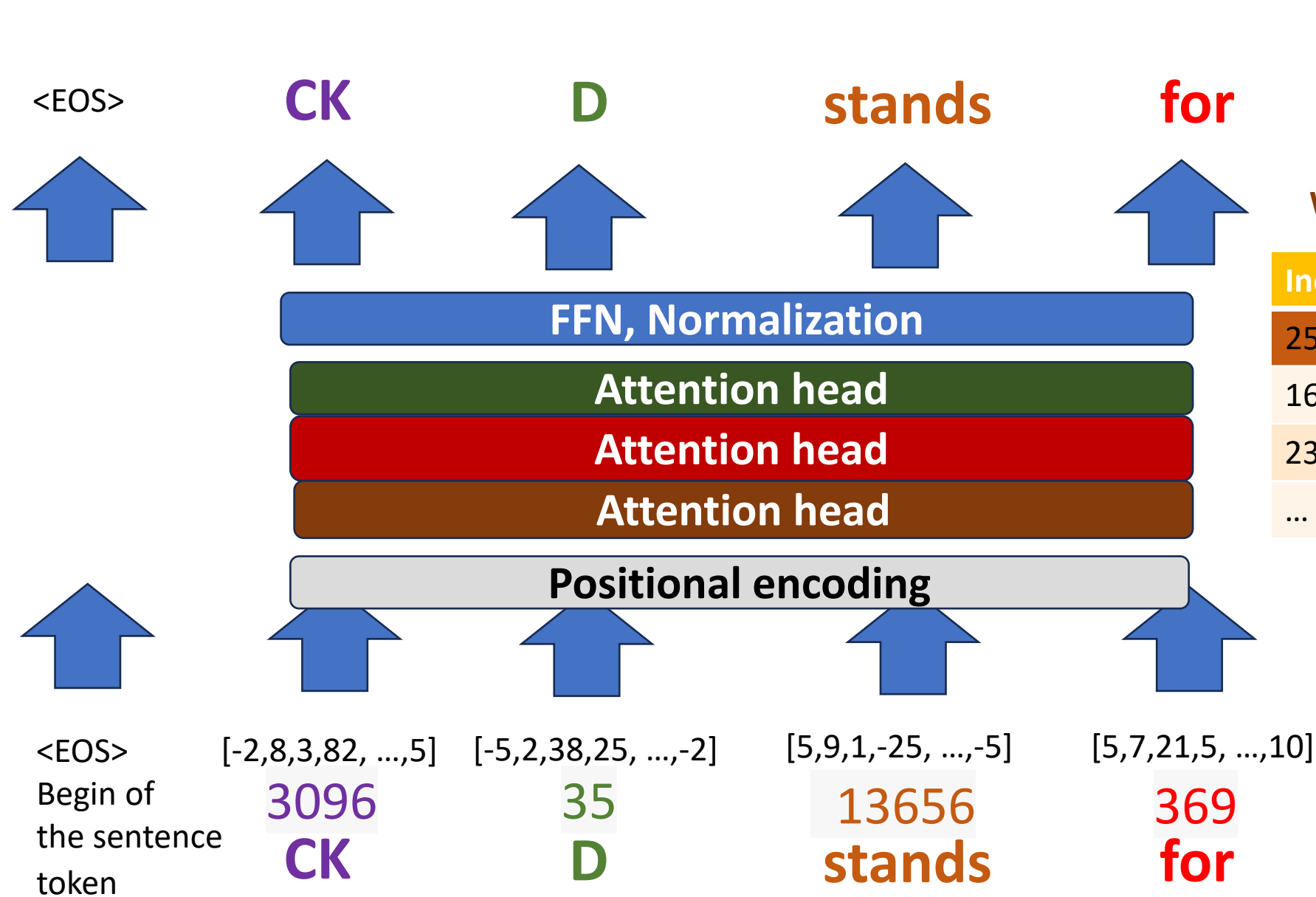
Cholatid R.

What is LLM?

- A large language model (LLM) is a type of artificial intelligence (AI) program that can recognize and generate text, among other tasks. LLMs are trained on huge sets of data

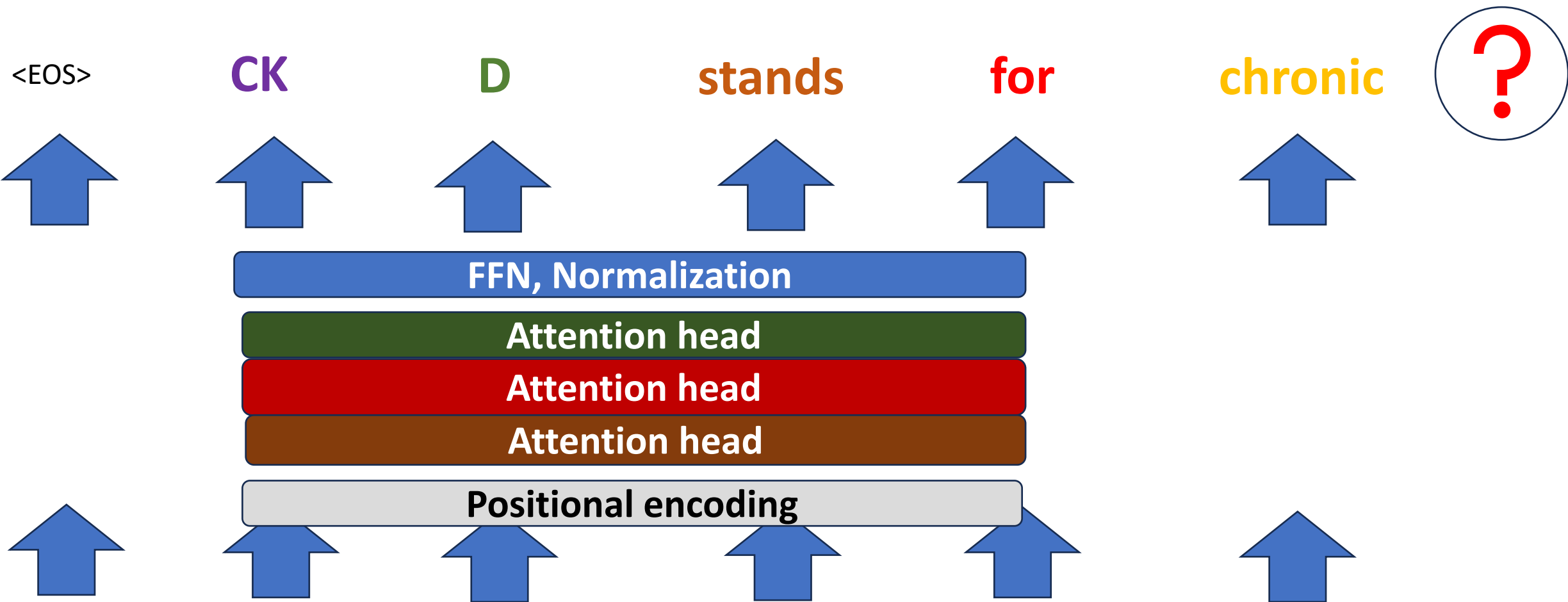


CK	3096	[2,8,3,82, ...,5]
D	35	[5,2,38,25, ...,2]
stands	13656	[5,9,1,25, ...,5]
for	369	[5,7,21,5, ...,10]



What should be a next token?

Index	Text	Prob.
2568	chronic	0.358
166	acute	0.133
23351	renal	0.012
...		





ChatGPT



128,000 Tokens

December 2023

Text ,Image

Gemini



128,000 Tokens
(up to 1 M)

Online

Text ,Image, Video



Claude 3

ANTHROPIC

200,000 Tokens
(up to 1 M)

August 2023

Text ,Image

Prompt Engineering

- The art of crafting inputs for AI tools that will produce optimal outputs.

Zero-Shot Prompting

- Basic for using LLM
- Do not give any example of output



You

What is Diabetes Mellitus?



ChatGPT

Diabetes mellitus is a chronic metabolic disorder characterized by high levels of sugar (glucose) in the blood. This condition arises when the body either doesn't produce enough insulin (a hormone produced by the pancreas that regulates blood sugar) or when the body's cells don't respond effectively to insulin.

Zero-Shot Prompting

- Basic for using LLM
- Do not give any example of output

Instruction Triage patient who visited a hospital after working hour.

Data: A male 40-year-old patient visited the hospital due to chest pain.

His vital signs are normal

Triage level :

Response: Given the patient's presentation of chest pain and normal vital signs, this indicates a potential cardiac issue, though it could also be caused by a variety of other conditions. However, chest pain is considered a high-risk symptom requiring urgent evaluation.

Given that the patient has visited the hospital after working hours, there might be limited resources or staffing available depending on the hospital's policies.

In a typical triage scenario, this patient would likely be considered a high priority, possibly triaged as "urgent" or "emergent" depending on the hospital's triage system.

Few-Shot Prompting

- Giving LLM sample(s) of answers

C

You

Q : Hypertension

A : ACEI, ARB, CCB, BB, HTCZ

Q : DM type 2

A : Insulin analog, Biguanide, Sulfonylureas

Q : Heart failure

A :

Few-Shot Prompting

C You

Q : Hypertension

A : ACEI, ARB, CCB, BB, HTCZ

Q : DM type 2

A : Insulin analog, Biguanide, Sulfonylureas

Q : Heart failure

A :



ChatGPT

For heart failure, treatment options typically include:

1. **ACE Inhibitors (ACEIs) or Angiotensin Receptor Blockers (ARBs):** These medications help relax blood vessels, lower blood pressure, and improve blood flow, reducing the workload on the heart.
2. **Beta-Blockers (BB):** Beta-blockers slow down the heart rate and reduce blood pressure, which can improve heart function and symptoms of heart failure.
3. **Diuretics:** Diuretics such as furosemide or spironolactone help reduce fluid buildup in the body, which is common in heart failure patients and can alleviate symptoms like swelling and shortness of breath.
4. **Aldosterone Antagonists:** Medications like spironolactone or eplerenone can help reduce the effects of the hormone aldosterone, which can contribute to fluid retention and heart damage.
5. **Digoxin:** This medication can help improve heart function and symptoms in some heart failure patients, particularly those with atrial fibrillation.
6. **Sacubitril/Valsartan (Entresto):** This medication is a combination of a neprilysin inhibitor and an angiotensin receptor blocker. It's used in patients with chronic heart failure and reduced ejection fraction to reduce the risk of cardiovascular death and hospitalization for heart failure.

Few-Shot Prompting

 **You**
answer in short, do not give any detail.

Q : Hypertension
A : ACEI, ARB, CCB, BB, HTCZ

Q : DM type 2
A : Insulin analog, Biguanide, Sulfonylureas

Q : Heart failure
A :

< 2 / 2 >

 **ChatGPT**
ACEI, ARB, BB, Loop diuretics, Aldosterone antagonists

Chain of thought Prompting

Chain of thought Prompting

SYSTEM 1

Intuition & instinct

95%

Unconscious
Fast
Associative
Automatic pilot

SYSTEM 2

Rational thinking

5%

Takes effort
Slow
Logical
Lazy
Indecisive



Source: Daniel Kahneman

Chain of thought Prompting

SYSTEM 1

Intuition & instinct

$$1 + 1 = 2$$

SYSTEM 2

Rational thinking

$$851 \times 156 = ?$$



Source: Daniel Kahneman

Chain of thought Prompting

SYSTEM 1

Intuition & instinct

Model Input

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: The answer is 11.

Q: The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?

Model Output

A: The answer is 27. ❌

SYSTEM 2

Rational thinking

Model Input

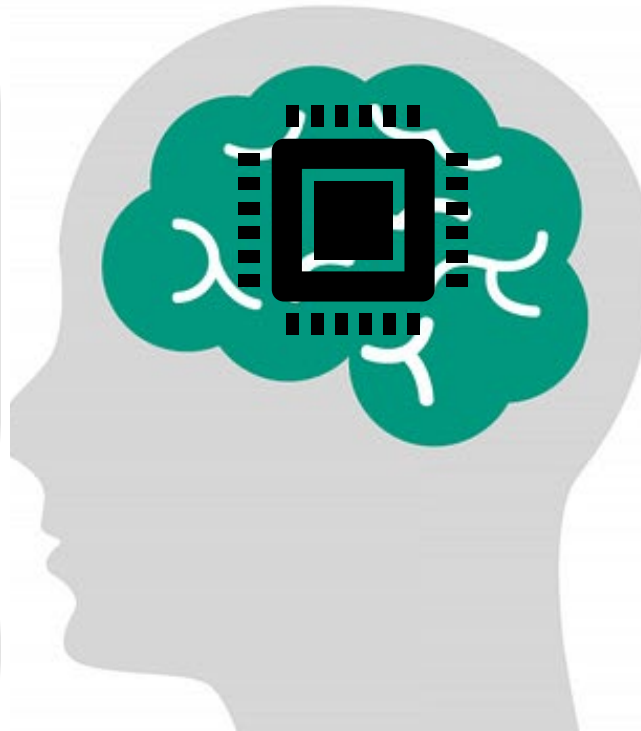
Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: Roger started with 5 balls. 2 cans of 3 tennis balls each is 6 tennis balls. $5 + 6 = 11$. The answer is 11.

Q: The cafeteria had 23 apples. If they used 20 to make lunch and bought 6 more, how many apples do they have?

Model Output

A: The cafeteria had 23 apples originally. They used 20 to make lunch. So they had $23 - 20 = 3$. They bought 6 more apples, so they have $3 + 6 = 9$. The answer is 9. ✅



(a) Few-shot

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: The answer is 11.

Q: A juggler can juggle 16 balls. Half of the balls are golf balls, and half of the golf balls are blue. How many blue golf balls are there?

A:

(Output) The answer is 8. **X**

(b) Few-shot-CoT

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: Roger started with 5 balls. 2 cans of 3 tennis balls each is 6 tennis balls. $5 + 6 = 11$. The answer is 11.

Q: A juggler can juggle 16 balls. Half of the balls are golf balls, and half of the golf balls are blue. How many blue golf balls are there?

A:

(Output) The juggler can juggle 16 balls. Half of the balls are golf balls. So there are $16 / 2 = 8$ golf balls. Half of the golf balls are blue. So there are $8 / 2 = 4$ blue golf balls. The answer is 4. **✓**

(c) Zero-shot

Q: A juggler can juggle 16 balls. Half of the balls are golf balls, and half of the golf balls are blue. How many blue golf balls are there?

A: The answer (arabic numerals) is

(Output) 8 **X**

(d) Zero-shot-CoT (Ours)

Q: A juggler can juggle 16 balls. Half of the balls are golf balls, and half of the golf balls are blue. How many blue golf balls are there?

A: **Let's think step by step.**

(Output) There are 16 balls in total. Half of the balls are golf balls. That means that there are 8 golf balls. Half of the golf balls are blue. That means that there are 4 blue golf balls. **✓**

Elements of a prompt

- **Instruction** – what do you want LLM to do?
- **Context** – external information or additional context
- **Input data** – give LLM input /question to find
- **Output** – desired output(format, type)

You are a nephrologist expert. Please answer this following question:
What food/fruit should be avoid in CKD patient?
Write in bullets.



You

You are a nephrologist expert. Please answer this following question:
What food/fruit should be avoid in CKD patient?Write in bullets.



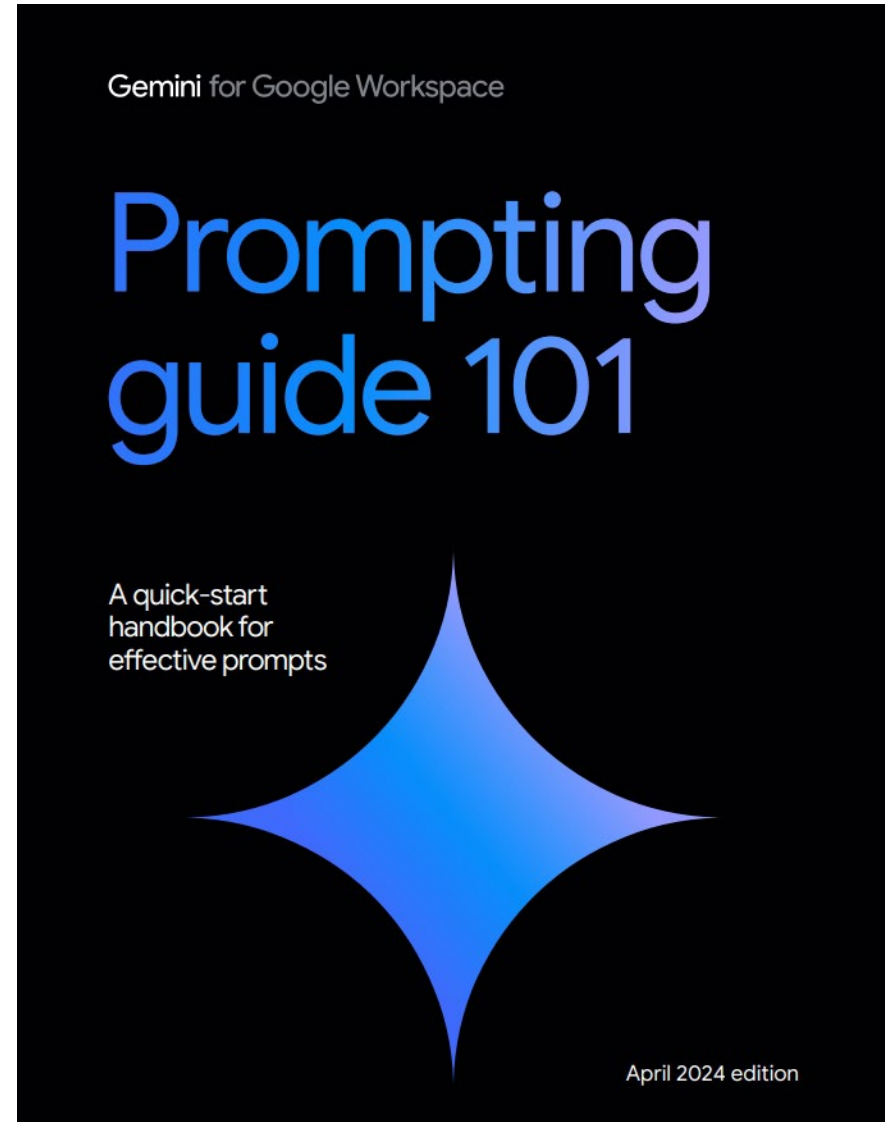
ChatGPT

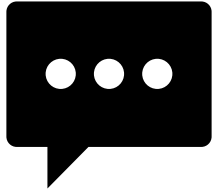
Certainly! In Chronic Kidney Disease (CKD), certain foods and fruits should be limited or avoided to help manage the condition and prevent further kidney damage. Here are some key points:

- **High-phosphorus foods:** Foods high in phosphorus should be limited because impaired kidneys have difficulty filtering phosphorus from the blood, leading to imbalances. Examples include processed meats, cheese, nuts, seeds, and whole grains.
- **High-potassium fruits:** Potassium levels can build up in the blood in CKD, leading to complications like irregular heartbeat or muscle weakness. Fruits high in potassium, such as bananas, oranges, kiwis, and dried fruits, should be eaten in moderation or avoided.
- **High-sodium foods:** Sodium can contribute to fluid retention and high blood pressure, which are detrimental in CKD. Processed foods, canned soups, fast food, and salty snacks should be limited.
- **High-protein foods:** Excessive protein intake can strain the kidneys, so it's essential to moderate protein consumption. This includes meats, poultry, fish, dairy, and plant-based protein sources like beans and lentils.
- **High-oxalate foods:** Oxalates can contribute to the formation of kidney stones, which can exacerbate CKD symptoms. Foods high in oxalates include spinach, beets, chocolate, nuts, and tea. Moderation is key for these foods.

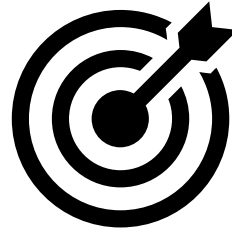
How to formulate a prompt

- Persona
- Task
- Context
- Format

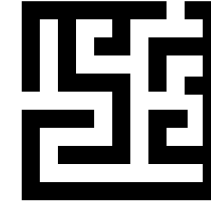




**Use natural language
Make it a conversation**



Be specific and iterate.



**Be concise and avoid complexity.
Break it up if several tasks**

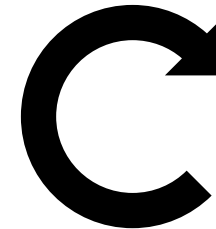


**Assign a role
(Both you and AI)
, Consider tone**



1 page

Give constraints.



**Try again, you can do it better
(use other methods)**

Elements of a prompt

- **Instruction** – what do you want LLM to do?
- **Context** – external information or additional context
- **Input data** – give LLM input /question to find
- **Output** – desired output(format, type)

You are a nephrologist expert talking to a patient. Please answer this following question:

What food/fruit should be avoid in CKD patient?

Write in bullets which fit in half A4.



You

You are a nephrologist expert talking to a patient. Please answer this following question:
What food/fruit should be avoid in CKD patient? Write in bullets which fit in half A4.



ChatGPT

Certainly, here's a concise list of foods and fruits that should be avoided by patients with Chronic Kidney Disease (CKD):

- High-potassium fruits: bananas, oranges, kiwis, and melons
- High-phosphorus foods: dairy products, nuts, seeds, and processed meats
- High-sodium foods: canned soups, processed meats, fast food, and salty snacks
- High-protein foods: red meat, poultry, fish, and eggs
- Foods high in added sugars: sugary drinks, desserts, and candies

These foods can exacerbate kidney function decline and lead to complications in CKD patients. It's essential for patients to work closely with a dietitian to create a personalized meal plan that suits their specific needs and stage of kidney disease.





C You

A farmer and a sheep are standing on one side of a river. There is a boat with enough room for one human and one animal. How can the farmer get across the river with the sheep in the fewest number of trips?

< 1/4 >

ChatGPT

To get across the river with the sheep using the fewest number of trips, the farmer can follow these steps:

1. The farmer takes the sheep across the river in the boat.
2. The farmer leaves the sheep on the other side and returns alone to the original side.
3. The farmer then crosses the river again by himself, since there is no other animal or object to bring back.

Thus, the farmer only needs to make three trips: across with the sheep, back alone, and across again alone. This is the minimum number of trips needed to get both the farmer and the sheep across the river.

🔊 📄 ↺ 🗨️ ⚙️

Wolf, Sheep And Cabbage Tips

Solution to the Problem

Move the sheep to the left



Move the wolf to the left



Move the sheep back to the right



Move the cabbage to the left



wolf sheep and cabbage game



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Tools

Download

Online

Free

Riddle

TikTok

Rules

About 1,050,000 results (0.30 seconds)

Get an AI overview for this search?

Generate



Novel Games

<https://www.novelgames.com> > All Games

Wolf, Sheep and Cabbage

Don't leave the quarry behind with the predators! Your goal in this **game** is to transfer the **wolf**, the **sheep** and the **cabbage** to the opposite shore by boat.

★★★★★ Rating: 5 · 1 vote · Free · Game



ProProfs Games

<https://www.proprofsgames.com> > wolf-sheep-and-cabba...

Wolf, Sheep And Cabbage Game

Move the **wolf**, **sheep** and **cabbage** to the opposite shore using the boat. Each time the boat can only take one item and so multiple crosses is necessary.



Internet Archive

<https://archive.org> · 3 years ago

Wolf Sheep & Cabbage : Plastelina Logic Games

Wolf Sheep & Cabbage. by: Plastelina Logic Games. Publication date: 2002. Topics: Flash, Flash Games. Language: English. Classic algorithm **game**.



You

First question : There's two people. Both wants to travel to another city by car. The car fits two. How many trips does it take to go to another city?

Second question: A farmer and a sheep are standing on one side of a river. There is a boat with enough room for one human and one animal. How can the farmer get across the river with the sheep in the fewest number of trips?

< 4 / 6 >



ChatGPT

First question: If there are two people and a car that fits both of them, it only takes one trip for both to travel to another city together.

Second question: The farmer can get across the river with the sheep in just one trip if the boat has enough room for one human and one animal, as stated. They can both board the boat, cross the river, and disembark on the other side in a single trip.

< 1 / 2 > 🔊 📄 ↺ 🗨️ ✨ ⌵

RAG

Step0 : Indexing – compress document/chunk into the vector database

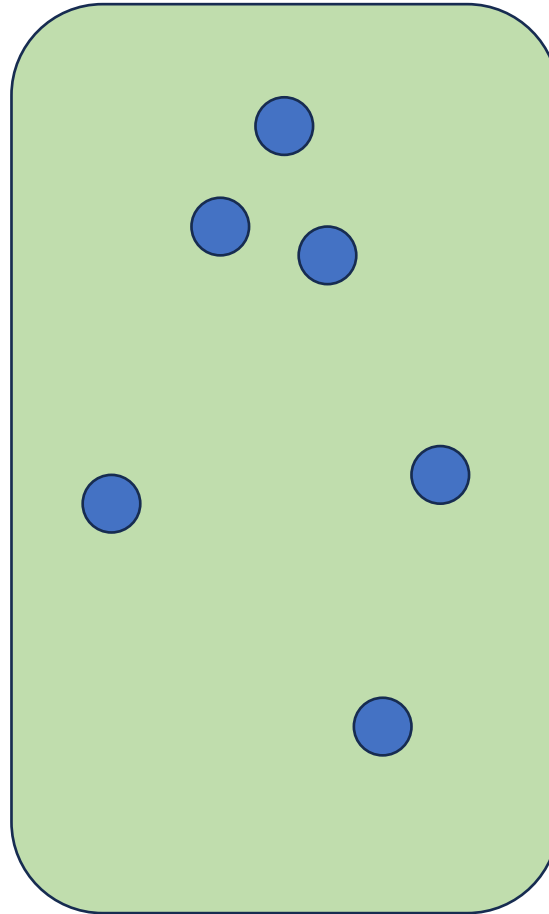
- **R**etrieval – retrieve the data from vector database
- **A**ugmentation – use the retrieved data to augment prompt for LLM
- **G**eneration – LLM generate the output/answer

Indexing



Our private documents

Document
embedding
model



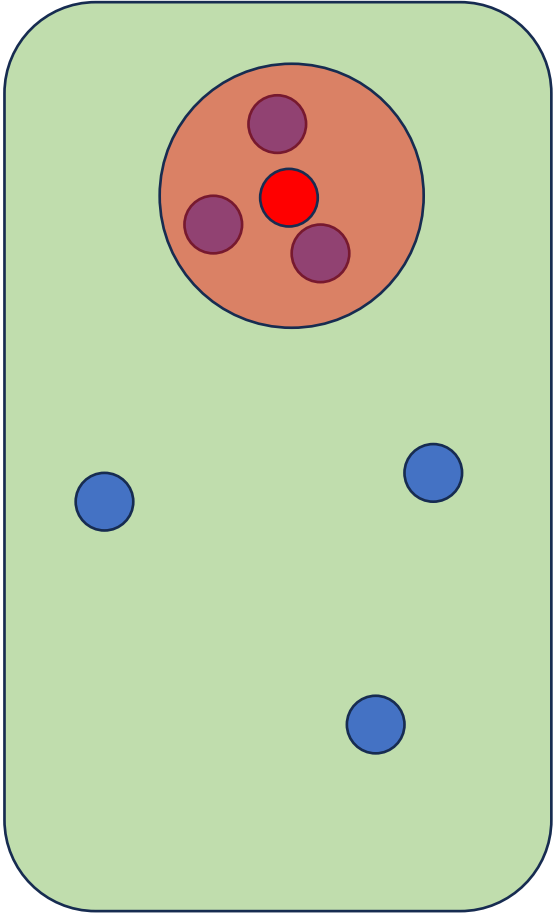
Vector Database

Index	Text	Vector
1	T2DM is an insulin-resistance...	[1,-2,22,...,94]
2	Treatment of T2DM are...	[-4,-9,2,...,4]
3	Complication of T2DM are...	[2,1,7,...,9]
4	Chronic kidney disease is ...	[1,9,-3,...,1]
5	Hypertension is the most...	[-2,1,5,...,7]
6	Heart failure is a complex...	[3,5,9,...,5]

Retrieval

“**Summary** about
diabetes mellitus type 2”

Document
embedding
model



Vector Database

Index	Text	Vector
1	T2DM is an insulin-resistance...	[1,-2,22,...,94]
2	Treatment of T2DM are...	[-4,-9,2,...,4]
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Retrieval

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6	Heart failure is a complex...	[3,5,9,...,5]

Prompt for LLM

Summary about diabetes mellitus type 2

Knowledge:

[1st Document] T2DM is an insulin-resistance...

[2nd Document] Treatment of T2DM are...

[3rd Document] Complication of T2DM are...

Write about 500 words for medical student from above knowledge.

Augmentation

Prompt for LLM

Summary about diabetes mellitus type 2

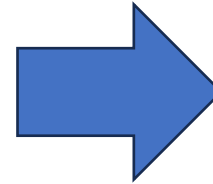
Knowledge:

→ [1st Document] T2DM is an insulin-resistance...

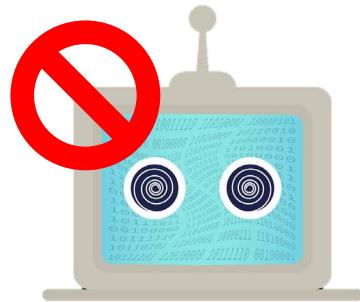
→ [2nd Document] Treatment of T2DM are...

→ [3rd Document] Complication of T2DM are...

Write about 500 words for medical student from above knowledge.



Generation



Less hallucination



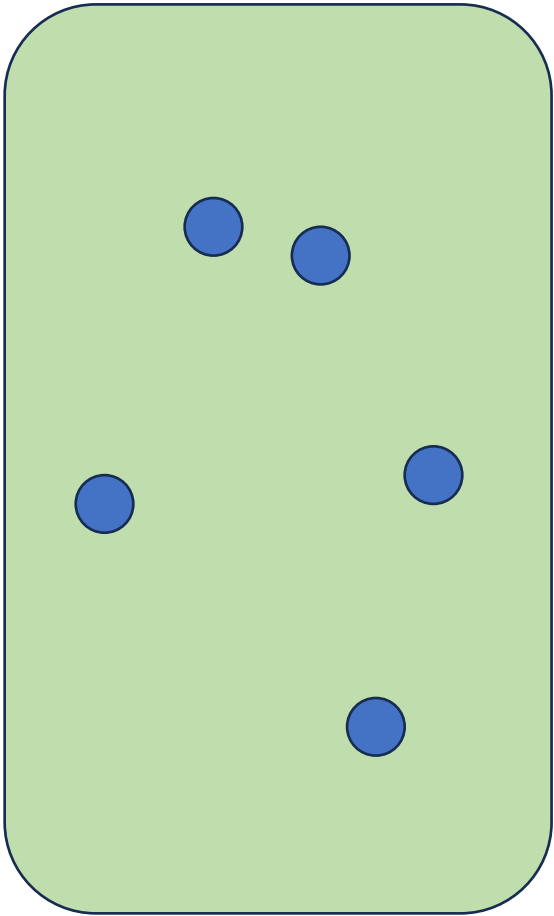
Private document



Fine-tune is no need



Document
embedding
model



Vector Database

Index	Text	Vector
1	T2DM is an insulin resistance	[1, 2, 3, ..., 4]
2	Treatment of T2DM are...	[-4,-9,2,...,4]
3	Complication of T2DM are...	[2,1,7,...,9]
4	Chronic kidney disease is ...	[1,9,-3,...,1]
5	Hypertension is the most...	[-2,1,5,...,7]
6	Heart failure is a complex...	[3,5,9,...,5]
7	Update T2DM in 2024 are...	[2,5,2,...,4]

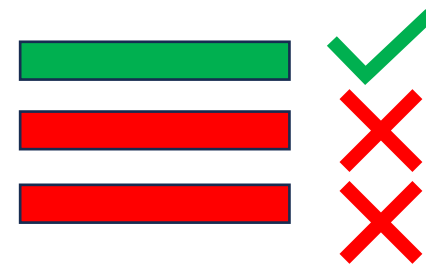
Drawdown of naïve RAG



**Irrelevant/missing
information retrieval**



Hallucination



Single task/question

The next step of RAG

