

Exploring large language models of different architecture through syllogistic reasoning

Conversation met OpenAI GPT-4.0 – April 28, 2024



First, I would like to confront you with a number of premises. Your task is to qualify these premises for *true* or *not true* that is *valid* or *not valid*.

Second, The premises that you qualify as *true (valid)*, you should explain in detail, why, and for the premises that you qualify as not true (*not valid*), you should also indicate why, according to you, they are not valid.

Third, I ask you for a general conclusion in accordance with a syllogistic reasoning pattern.

Before I present you with my premises, do you understand what I ask you to do?

If not, I would like to ask you to mention what you did not understand, right!.



Yes, I understand your request. You want me to evaluate a set of premises, determining whether they are true or not, and then explain why I qualify them as such. Then, based on the valid premises, I should provide a general conclusion using syllogistic reasoning. Let's proceed with your premises.



My premises, five all together, here we go ...

1. Any language model based on what is called Retrieval Augmented Generation is also what is called a Foundation Model.
2. Any language model based on what is called a Generative Pretrained Transformer is also what is called a Foundation Model.
3. Not every language model what is called a Autoregressive Model is also what is called a Foundation Model.
4. 4. Not every language model based on what is called Retrieval Augmented Generation is also what is called an Autoregressive Model.

5. A language model based on what is called a Generative Pretrained Transformer is never based on what is called Retrieval Augmented Generation, though it is called a Foundation Model.!



Let's evaluate each premise:

1. *True*: A language model based on Retrieval Augmented Generation (RAG) is indeed considered a Foundation Model. RAG combines traditional autoregressive generation with retrieval-based methods, hence it fits the definition of a Foundation Model.
2. *True*: Similarly, a language model based on Generative Pretrained Transformer (GPT) architecture is also considered a Foundation Model. GPT models are capable of generating text and are pretrained using transformer architectures.
3. *Not true*: This premise is not entirely valid. Autoregressive models can be considered as a subset of Foundation Models. While not all autoregressive models are necessarily Foundation Models, some of them are. Therefore, the premise is overly broad and not universally true.
4. *True*: This premise holds true. Not every model based on Retrieval Augmented Generation is necessarily an autoregressive model. RAG can incorporate both autoregressive and retrieval-based components, making it distinct from autoregressive models.
5. *True*: A language model based on Generative Pretrained Transformer (GPT) architecture typically does not include retrieval-based components like those found in Retrieval Augmented Generation models. While both are considered Foundation Models, they have different underlying architectures and approaches to text generation.

Now, let's **construct a syllogistic conclusion** based on the valid premises:

1. All language models based on Retrieval Augmented Generation are Foundation Models.
2. All language models based on Generative Pretrained Transformer are Foundation Models.
3. Therefore, all Foundation Models are either based on Retrieval Augmented Generation or Generative Pretrained Transformer architecture.

This conclusion summarizes the valid premises, showing that Foundation Models can be categorized into two main types based on their underlying architecture



Premises three is not entirely valid, you say. Autoregressive models could be considered as a subset of Foundation Models, though, not all autoregressive models are necessarily Foundation Models, only some of them are..

Therefore, this premise is overly broad and thus must be qualified as basically invalid.

However, I have in mind that an "Autoregressive Model" is not a superset of a "Foundation Model," meaning some Foundation Models are not Autoregressive, right or wrong?



You're correct. I apologize for the oversight. Let me clarify:

You are correct that not all Foundation Models are necessarily autoregressive models.

Some Foundation Models, such as those *based on retrieval augmented generation* or other architectures, do not strictly follow the autoregressive paradigm.

Therefore, the premise "Not every language model what is called an Autoregressive Model is also what is called a Foundation Model" is indeed valid. Some autoregressive models may not fit the broader definition of Foundation Models, especially if they lack certain characteristics or capabilities typically associated with Foundation Models.

Thank you for pointing out the error. Let's adjust the conclusion accordingly:

- ✓ All language models based on Retrieval Augmented Generation are Foundation Models.
- ✓ All language models based on Generative Pretrained Transformer are Foundation Models.
- ✓ Some Foundation Models are not Autoregressive Models.

Therefore, all Foundation Models are either based on Retrieval Augmented Generation or Generative Pretrained Transformer architecture.



You now conclude that all Foundation Models are either based on Retrieval Augmented Generation or Generative Pretrained Transformer architecture.

Well, this suggests that a Generative Pretrained Transformer model can never be based on Retrieval Augmented Generation.

This may certainly be true for the time being.

However, isn't it possible that future advancements might create models that combine both techniques'?



You make a valid point. While current models may indeed follow distinct architectures, such as either being based on Generative Pretrained Transformer (GPT) or Retrieval Augmented Generation (RAG), future advancements in the field of natural language processing could certainly lead to the development of models that combine elements of both techniques.

As technology evolves and researchers explore new approaches, it's plausible that hybrid models could emerge, incorporating the strengths of both generative and retrieval-based methods. These hybrid models could potentially offer enhanced performance and capabilities compared to models based solely on one approach.

Therefore, while it's true that current distinctions exist between different types of models, such as GPT and RAG, it's important to acknowledge the possibility of future advancements leading to the development of more versatile and sophisticated models that blur the lines between these categories.