Vizuara AI Agents Bootcamp Day 2

What exactly are Large Language Models? Let's peek inside the brain of AI Agents

VIZUARA AI
JUN 24, 2025

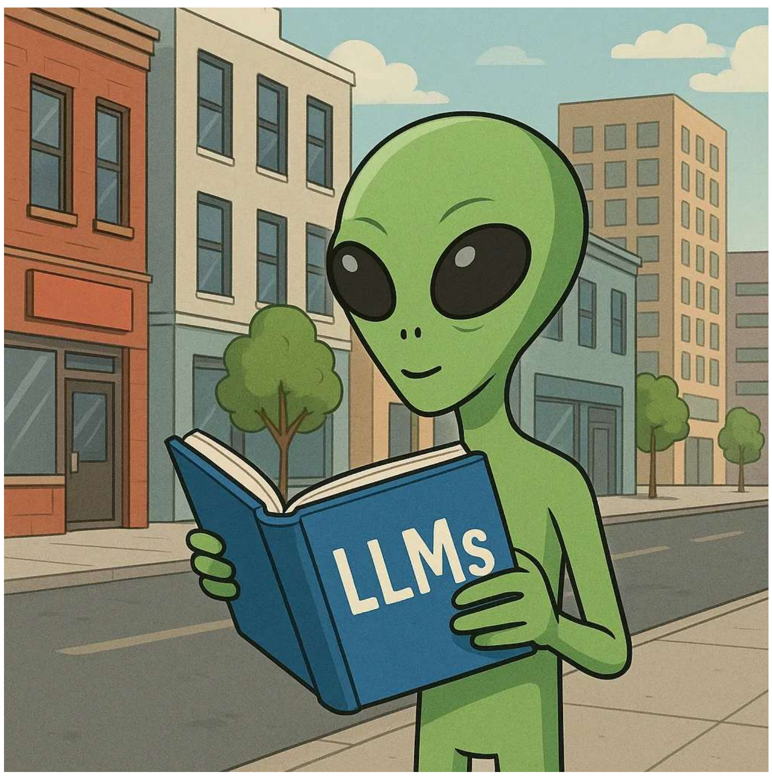
Day 2 of the [Vizuara AI Agents Bootcamp] concluded on 23 June, 2025.

This is the first newsletter which covers the main takeaways from the lecture (*only f*
Pro registered participants).

Table of contents

1. *Alien in town*
2. *Galileo Galilei and the importance of models*
3. *Large Language Models (LLMs)*
4. *How large is large?*
5. *Why do language models need to be so large?*
6. *Stages of training a Large Language Model (LLM)*

1. Alien in town



Imagine you are an alien who knows mathematics and can think.

As a thinking alien, you have access to all books and all internet data every produce by humans.

You know nothing of human language though.

Here's your next task:

You have to predict the next word of a given sentence.

Let's say the sentence is:

"Every effort moves you"

You have to predict the next word of the above sentence.

How will you go about doing this?

You will look for all occurrences of the sequence "Every effort moves you" in your dataset.

You will choose the most frequently appearing next word.

Great!

- What about predict the next 2 words?
- What about predicting the next 20 words?

If there are 40000 words in the English language (let's assume), the number of choic for predicting the next token is 40000.

The number of choices for predicting the next two tokens is 40000*40000 = 1.6 billic

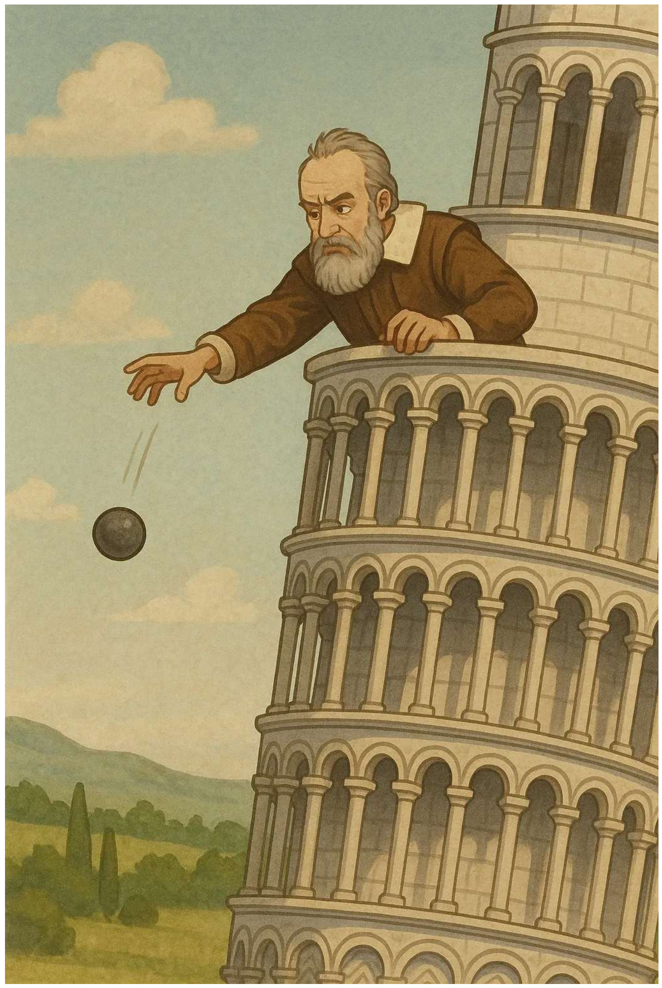
The number of choices for predicting the next three tokens is 40000*40000*40000 = trillion.

The number of choices for predicting the next twenty tokens is more than the number of particles in the universe!

It's impossible to statistically predict the next 20 tokens. Another issue is that you h no solution for input sequences which do not lie in the dataset.

What do we do?

2. Galileo Galilei and the importance of model



Let's learn from our ancestors.

When Galileo Galilei dropped objects from the Leaning Tower of Pisa, he recorded time of fall of these objects.

What can we do next with these experimental observations?

Physicists convert experimental observations into models.

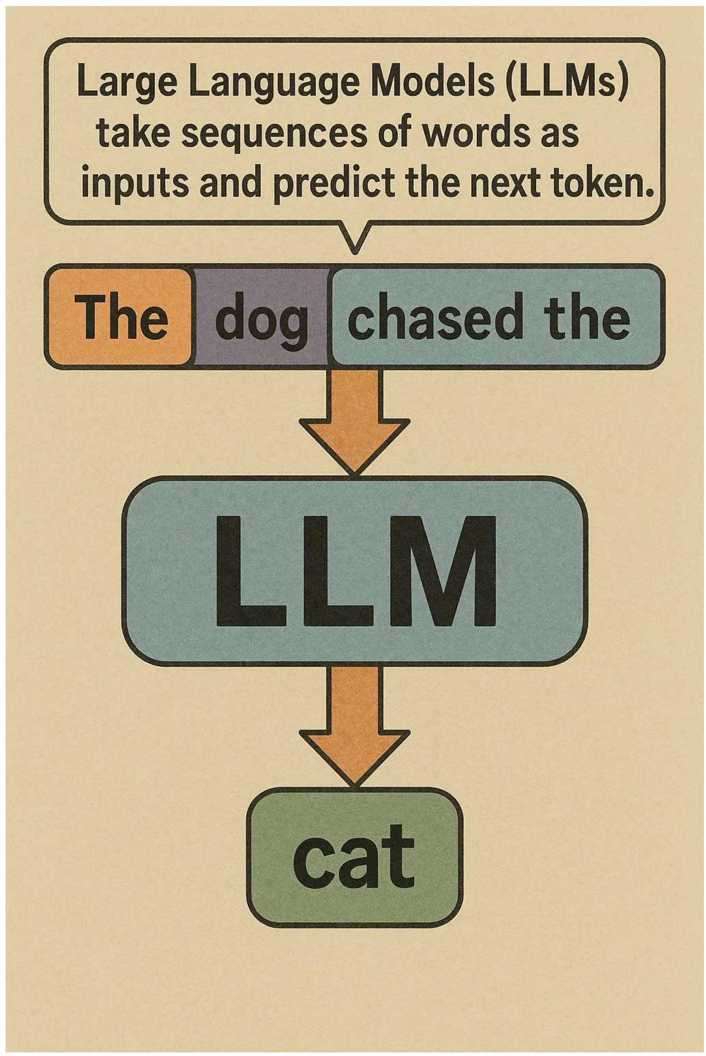
$$t = \sqrt{2h/g}$$

This is the model for time of fall of an object.

Models are powerful.

Even if you don't have experimental data for some heights, you can still find the tim of descent from models.

3. Large Language Models (LLMs)



Returning back to our alien, can we solve the alien's problem by a model?

More specifically: can we create a model which takes in a sequence of words as inpu and outputs the next token in the sequence.

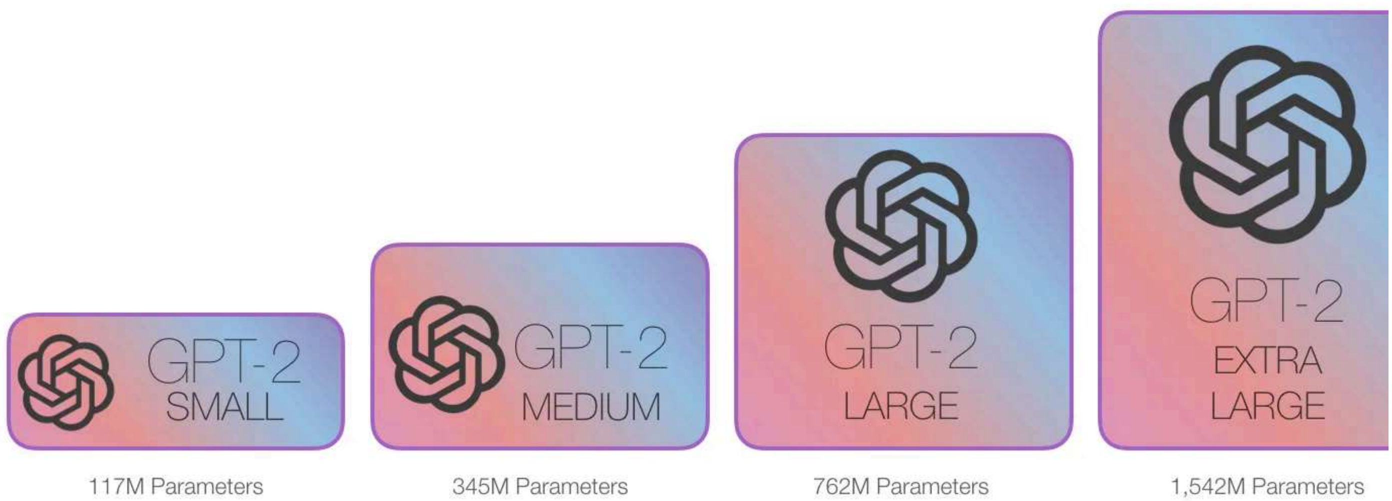
Such a model can be used recursively to predict any number of words in a sequence

Such a model is called a Large Language Model (LLM).

Large Language Models (LLMs) take sequences of words as inputs and predict the r
token.

Even if the input sequence is not present in the underlying data, language models c
still predict the next word.

4. How large is large?



The reason we add the term "large" in "large language models" is that the models h
a huge number of parameters.

Linear models have 2 free parameters.

Quadratic models have 3 free parameters.

Large Language Models have billions of free parameters!

The GPT-3 largest model has 175 billion parameters.

Finally, here is the simplest definition of Large Language Models (LLMs):

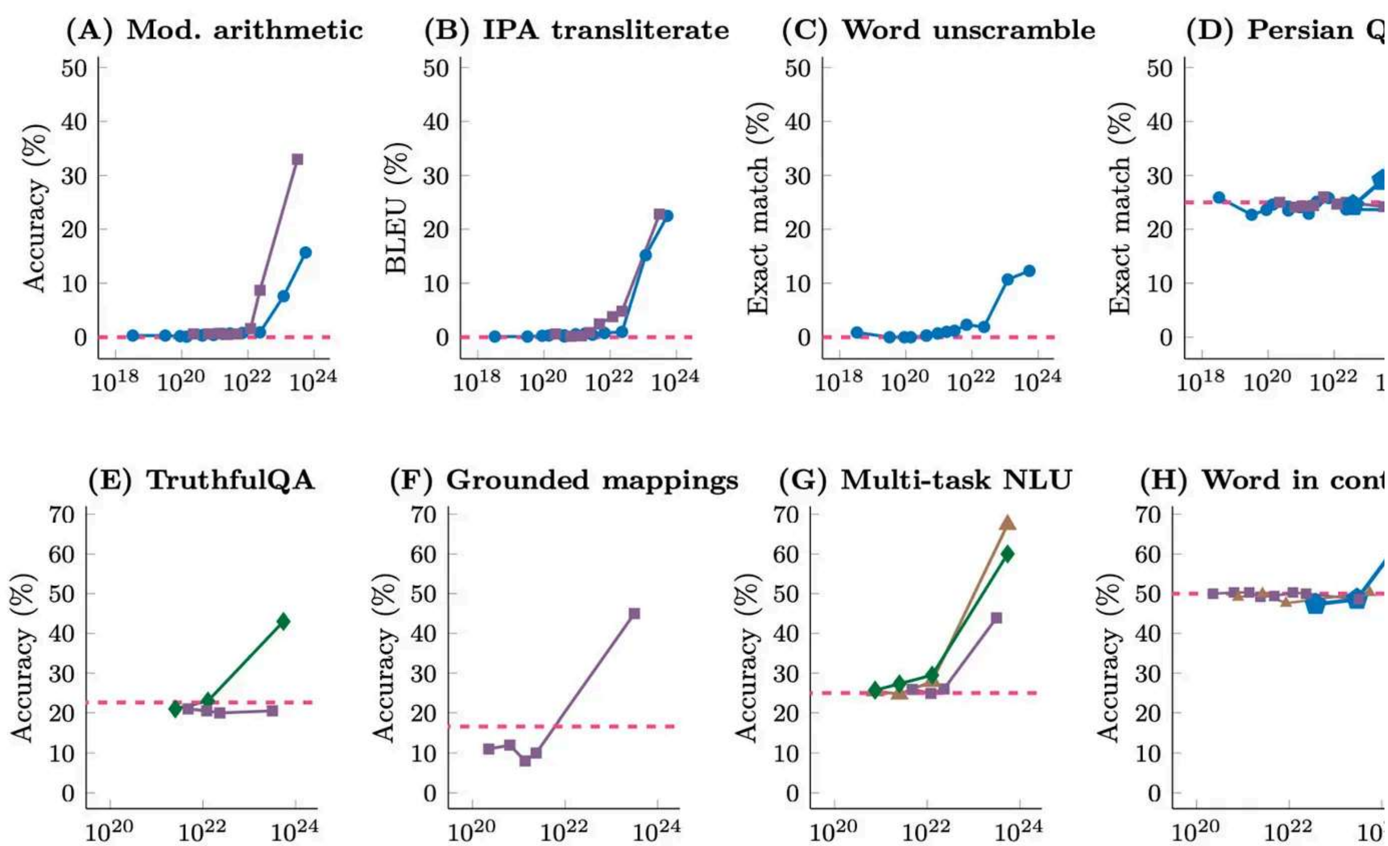
Large Language Models (LLMs) are next token prediction engines with billions of free parameters.

5. Why do language models need to be so large?

Technical explanation:

LLMs have a magical property: they have emergent abilities.

An ability is emergent if it is not present in smaller models, but is present in larger models.



As you can see in the above figure, for many language tasks, language models sudde
become better after their size increases beyond a threshold.

That's why there is such a large push for increasing the size of these models.

Intuitive explanation:

Have you though about this:

If language models are only trained to predict the next token, how do they understa
so much about language itself?

Here is my answer:

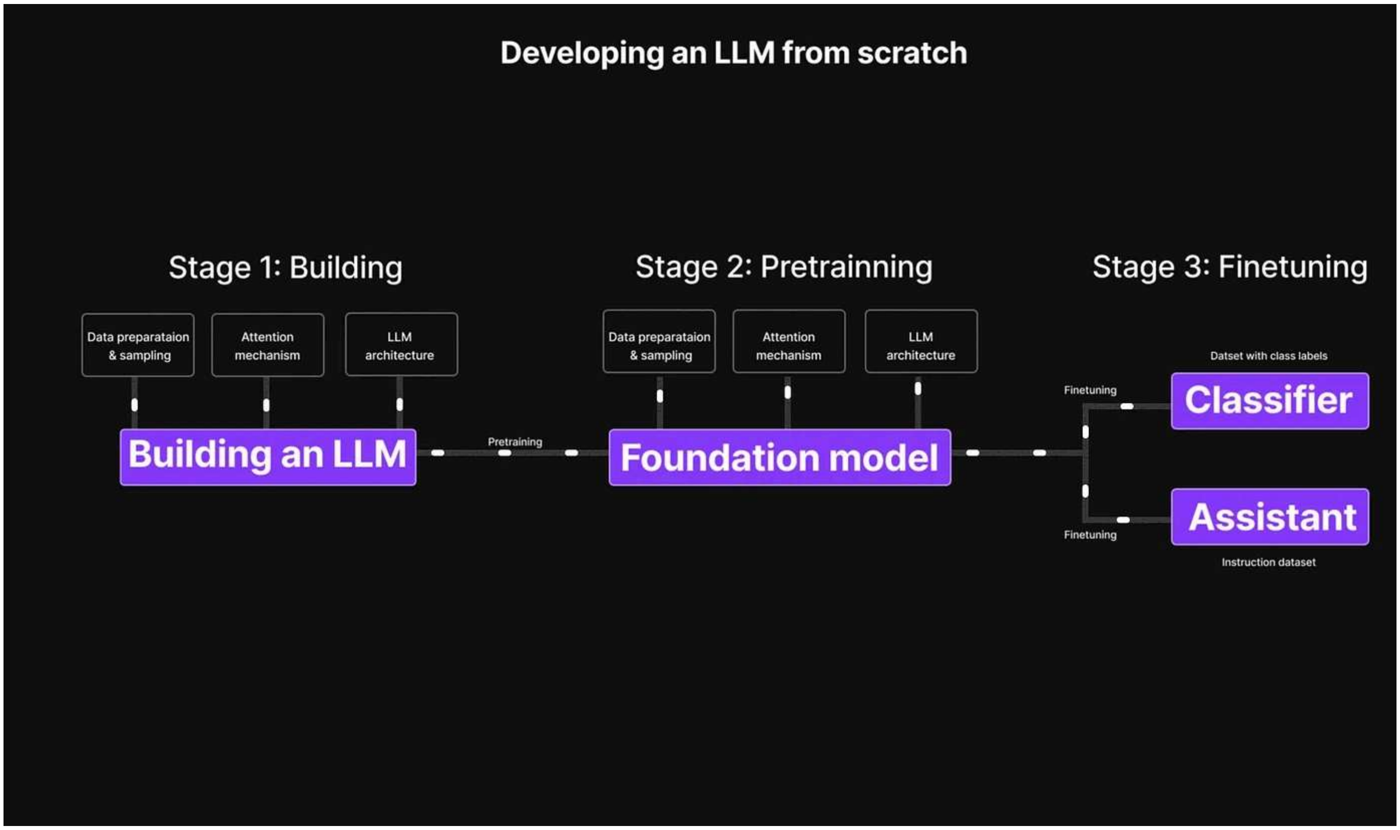
Language models are given the task to predict the next token. The models figure ou
that the most efficient way to do this task is by learning the language itself.

Language means form and meaning.

Language models learn the form and meaning of human language, through their ne
token prediction task.

Learning a language is not easy and that's the reason language models need to have
many parameters.

6. Stages of building language models



Pre-training

Pre-training is the most computationally intensive phase in the development of a Large Language Model (LLM).

The model is exposed to a massive corpus of unlabeled text data: often sourced fron web pages, books, articles, and other diverse domains.

The goal of pre-training is to enable the model to learn the statistical patterns of language, such as grammar, syntax, word associations, and factual knowledge, usin next-token prediction.

This stage relies heavily on the components defined in the building phase: particula the attention mechanism, which allows the model to learn contextual relationships across sequences.

By the end of pre-training, the model becomes a **foundation model**, capable of gene language understanding and generation, but not yet optimized for specific downstream tasks.

Finetuning

Finetuning is the process of adapting the pre-trained foundation model to perform specific tasks more accurately.

Unlike pre-training, which uses general-purpose data, finetuning is done on curate task-specific datasets.

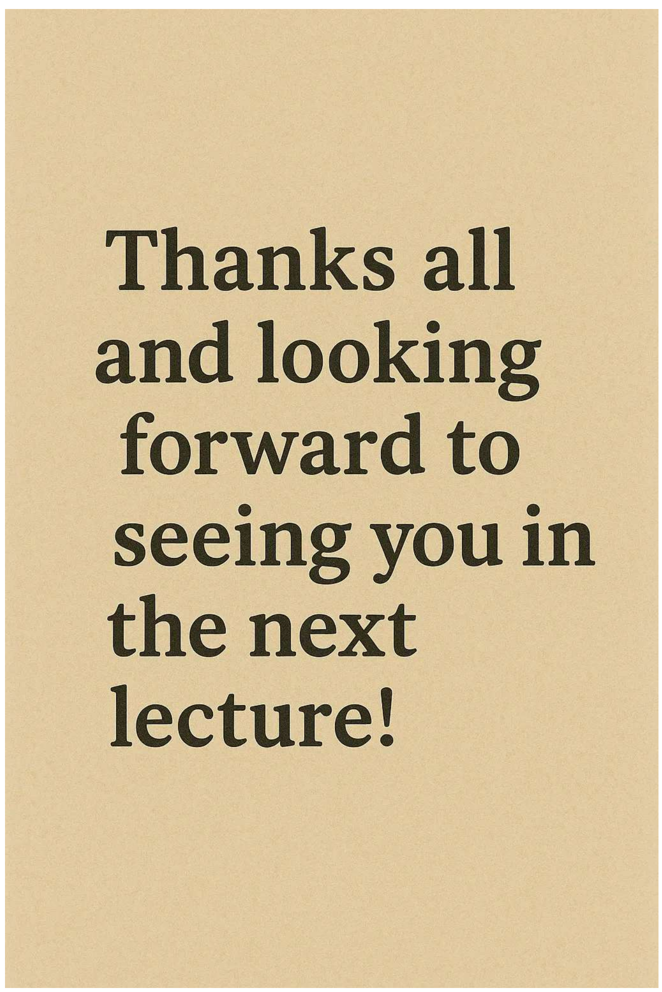
For example, if the goal is to create a sentiment classifier, the model would be finetuned on a dataset containing text samples labeled with sentiments like positiv negative.

If the goal is to build a conversational assistant, the model is trained on an instruct tuned dataset where it learns how to follow human instructions, engage in multi-tu dialogues, and produce helpful, coherent responses.

During this stage, only minor adjustments are made to the model's weights compar to pretraining, allowing it to specialize without losing the broad capabilities it gain earlier. Finetuning turns the foundation model into a practical and targeted application, such as a chatbot, a legal summarizer, or a medical report generator.

Watch the lecture recording here:

Inside the brain of AI Agents: Large Language Models



Subscribe to Vizuara's Substack

Launched 7 months ago

My personal Substack

akshayredekar4441@gmai Subscribe

By subscribing, I agree to Substack's Terms of Use, and acknowledge its Information Collection Notice and Privacy Policy.

6 Likes

Discussion about this post

Comments Restacks

Write a comment...