

# The rise of LLMs in the AI landscape

LARGE LANGUAGE MODELS (LLMs) CONCEPTS



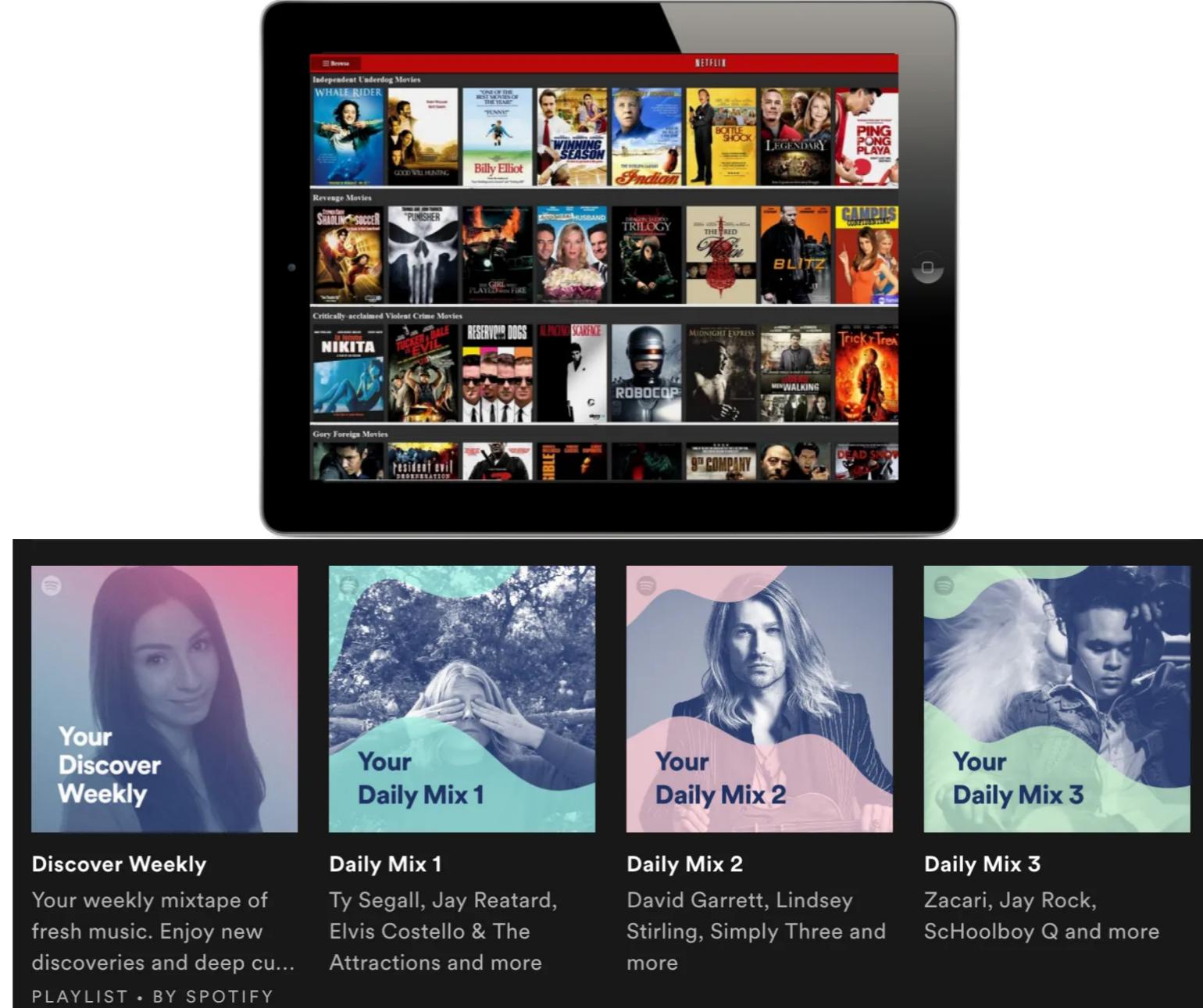
**Vidhi Chugh**  
AI strategist and ethicist

# Rapid developments in AI



<sup>1</sup> Freepik, Tesla Youtube Channel

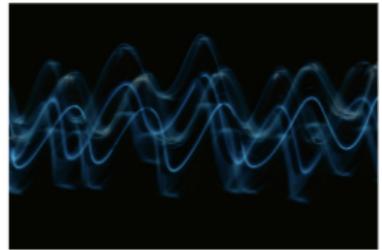
# AI-powered recommendations



<sup>1</sup> Netflix blog, Medium

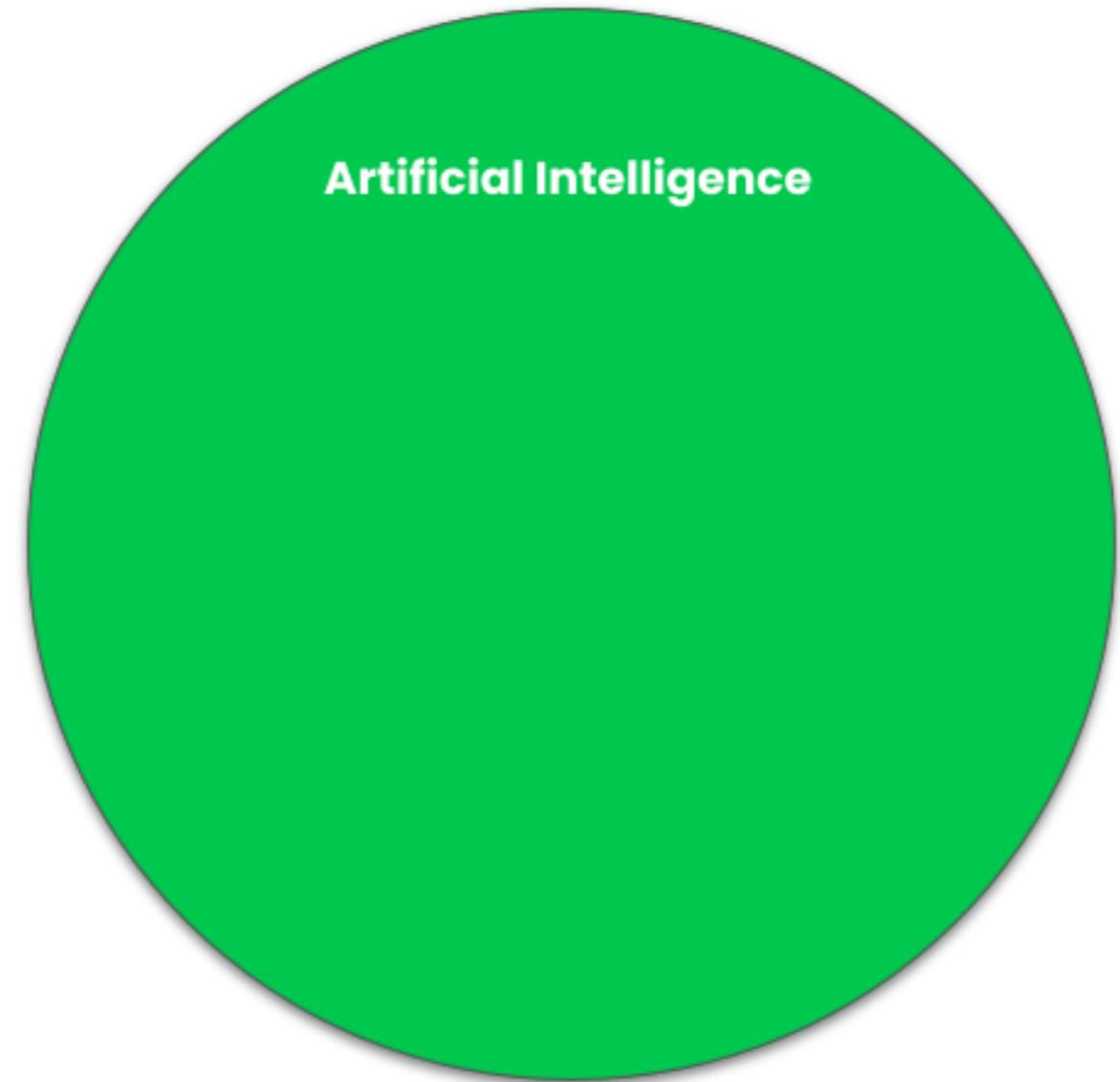
# AI and data-driven tasks

- Sentiment analysis, fraud detection, and more
- Still, lacked human-like interaction
- Enter Large Language Models

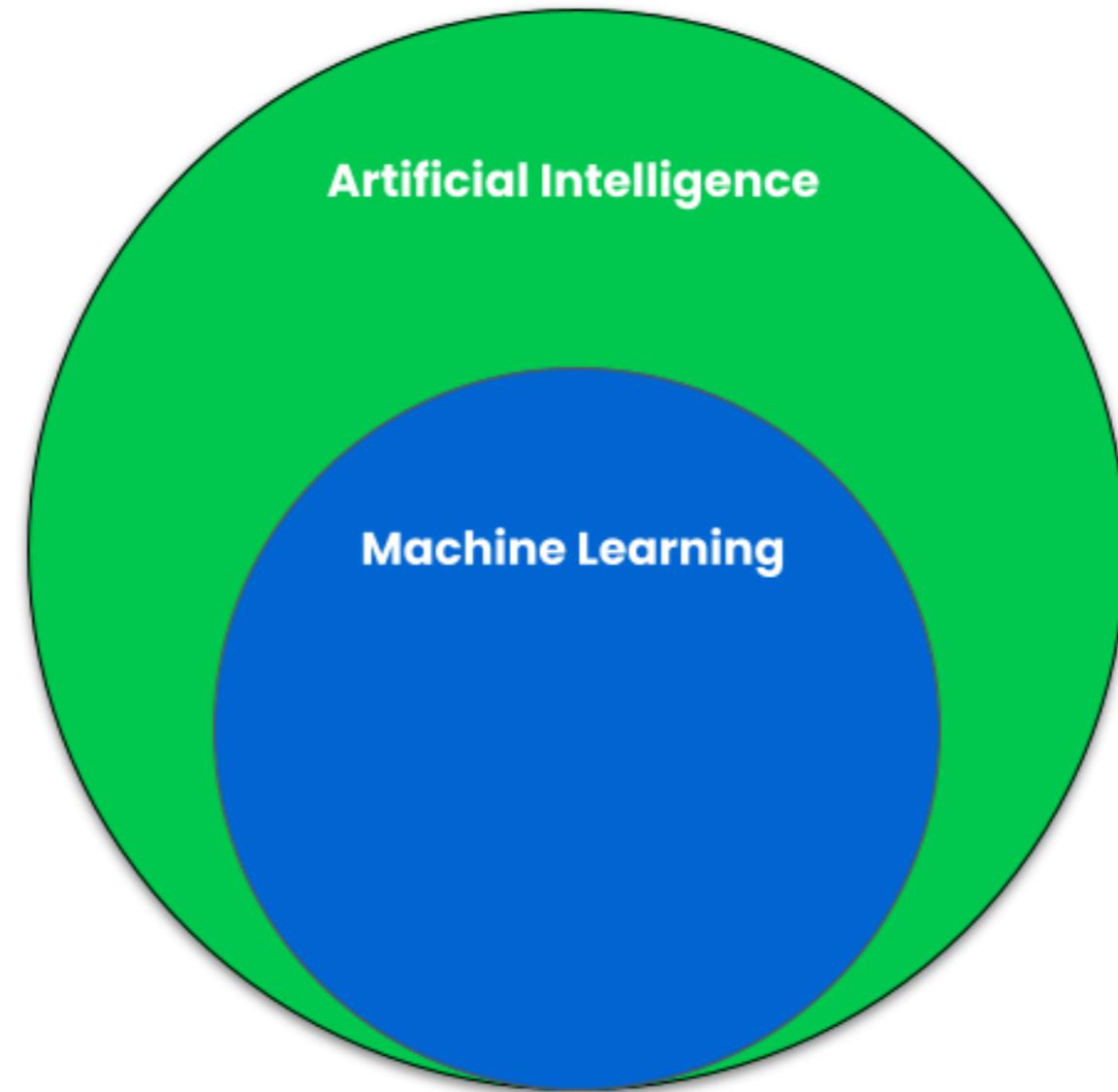


<sup>1</sup> Unsplash

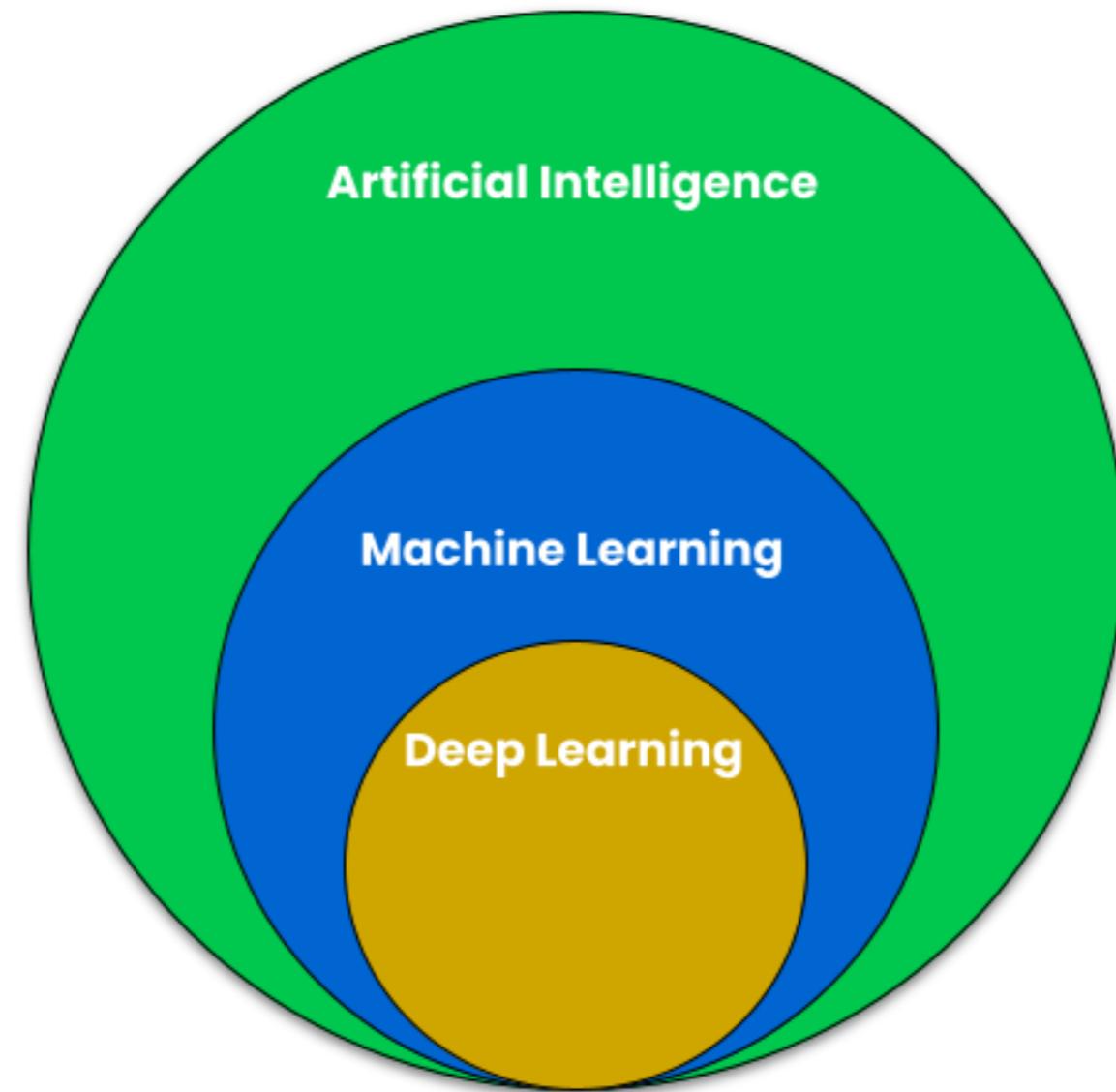
# The AI landscape



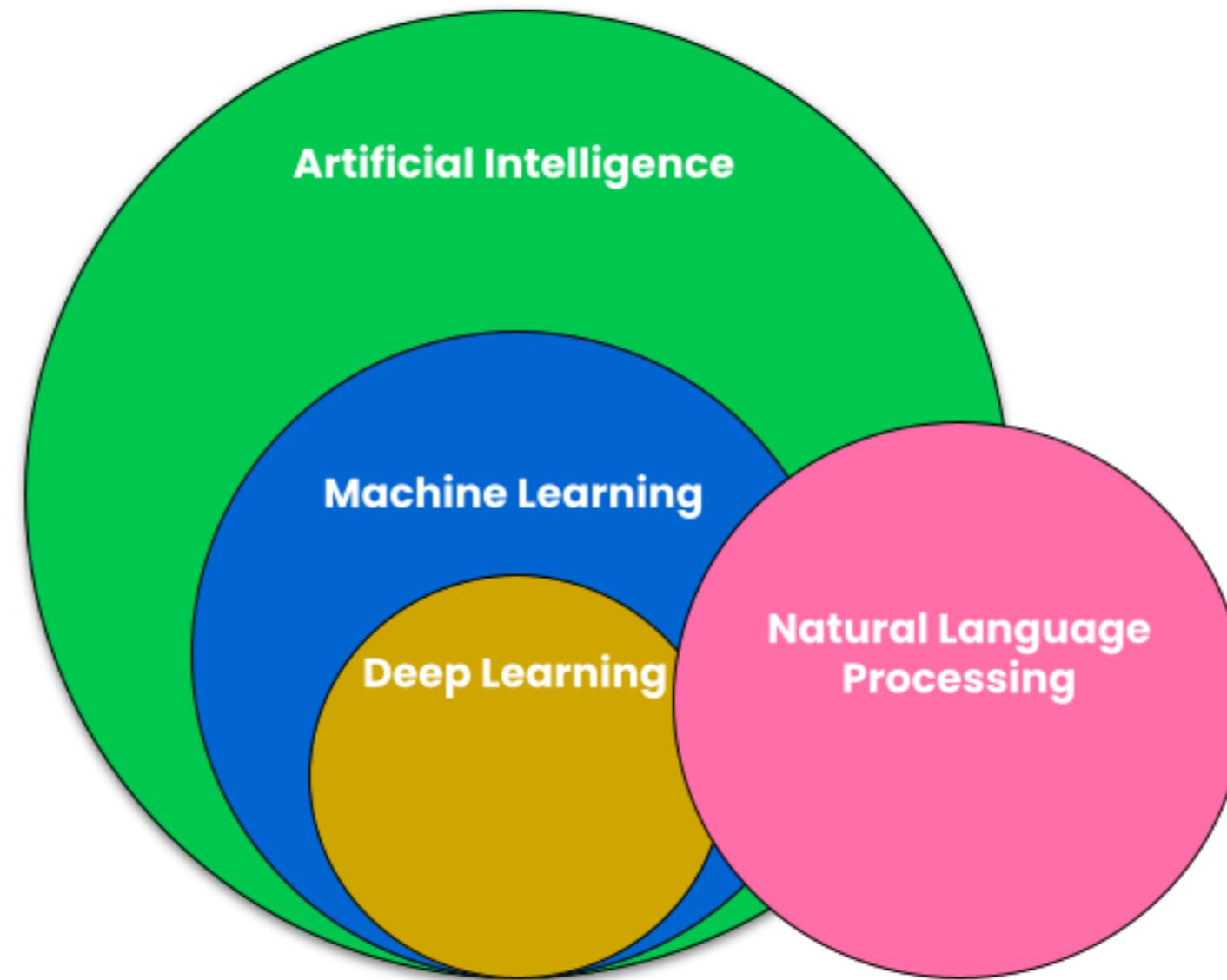
# The AI landscape



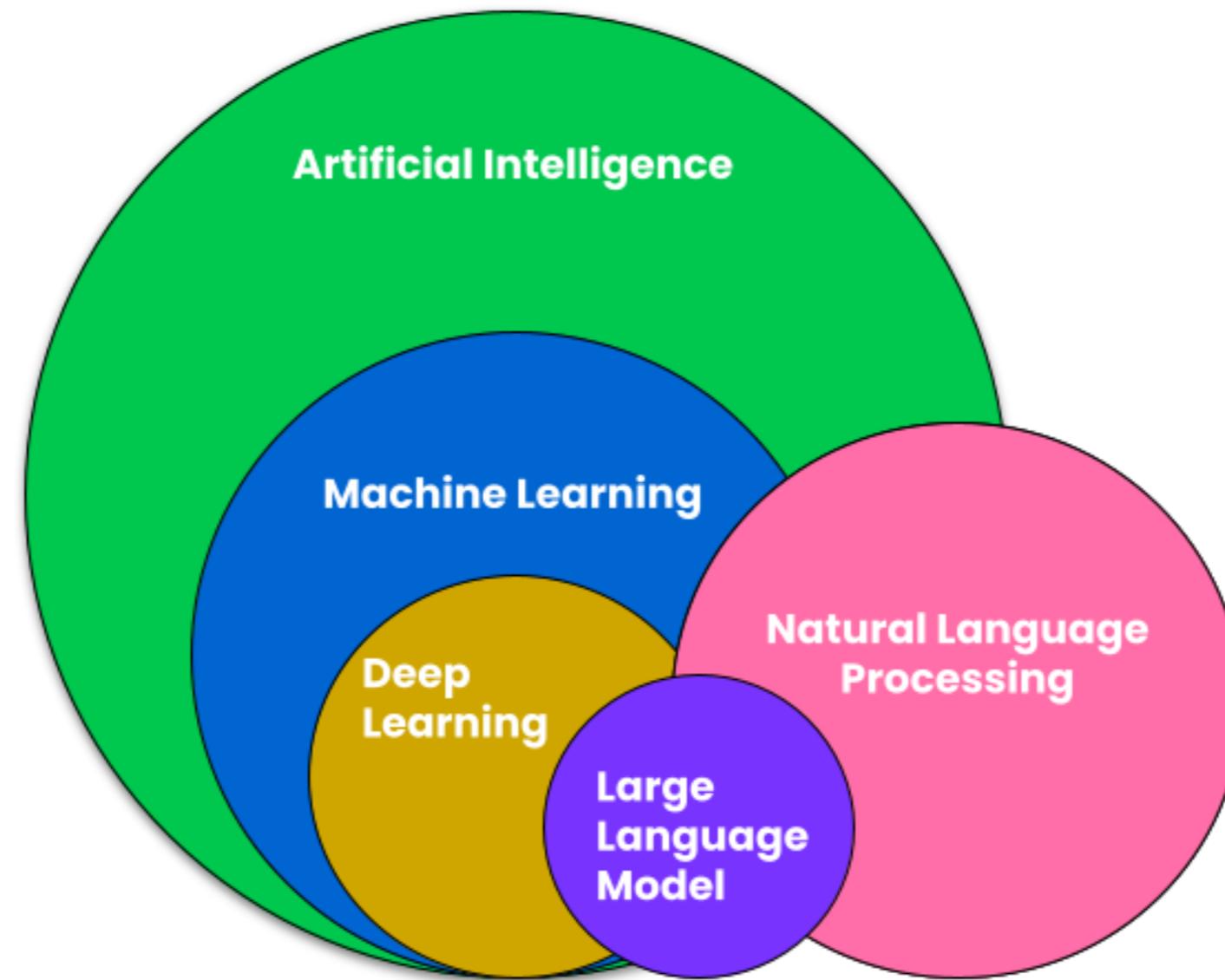
# The AI landscape



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# The AI landscape



# Definition of LLMs

- **Large**
  - Training data and resources



<sup>1</sup> Freepik

# Definition of LLMs

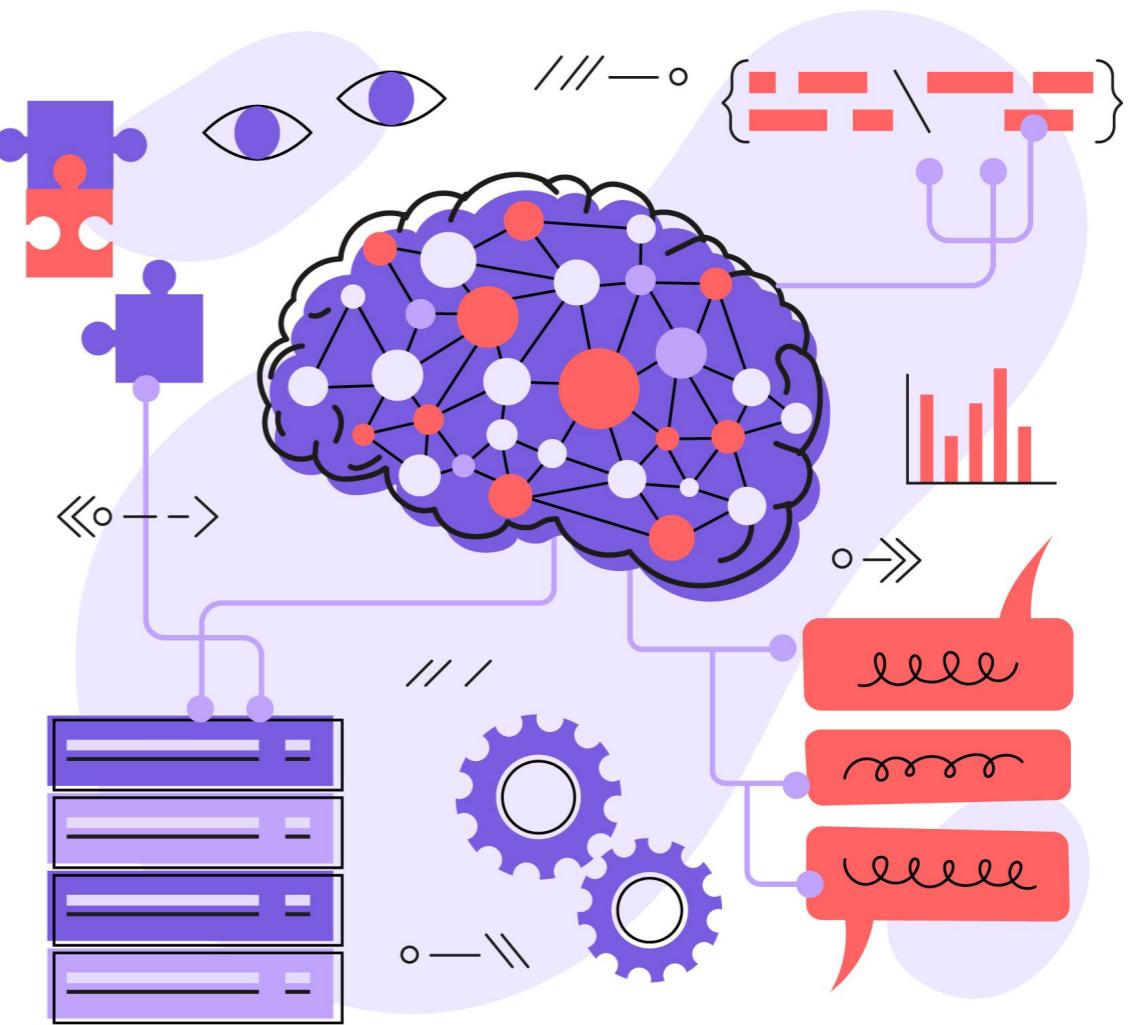
- **Large**
  - Training data and resources
- **Language**
  - Human-like text



<sup>1</sup> Freepik

# Definition of LLMs

- **Large**
  - Training data and compute power
- **Language**
  - Human-like text
- **Models**
  - Learn complex patterns using text data



<sup>1</sup> Freepik

# The defining moment

**Artificial intelligence is on the brink of an 'iPhone moment' and can boost the world economy by \$15.7 trillion in 7 years, Bank of America says**

## Large Language Models Will Define Artificial Intelligence

**Large language models broaden AI's reach in industry and enterprises**

"We are at a defining moment - like the internet in the '90s - where Artificial Intelligence (AI) is moving towards mass adoption, with large language models like ChatGPT finally enabling us to fully capitalize on the data revolution," they said.

# Popular language generators

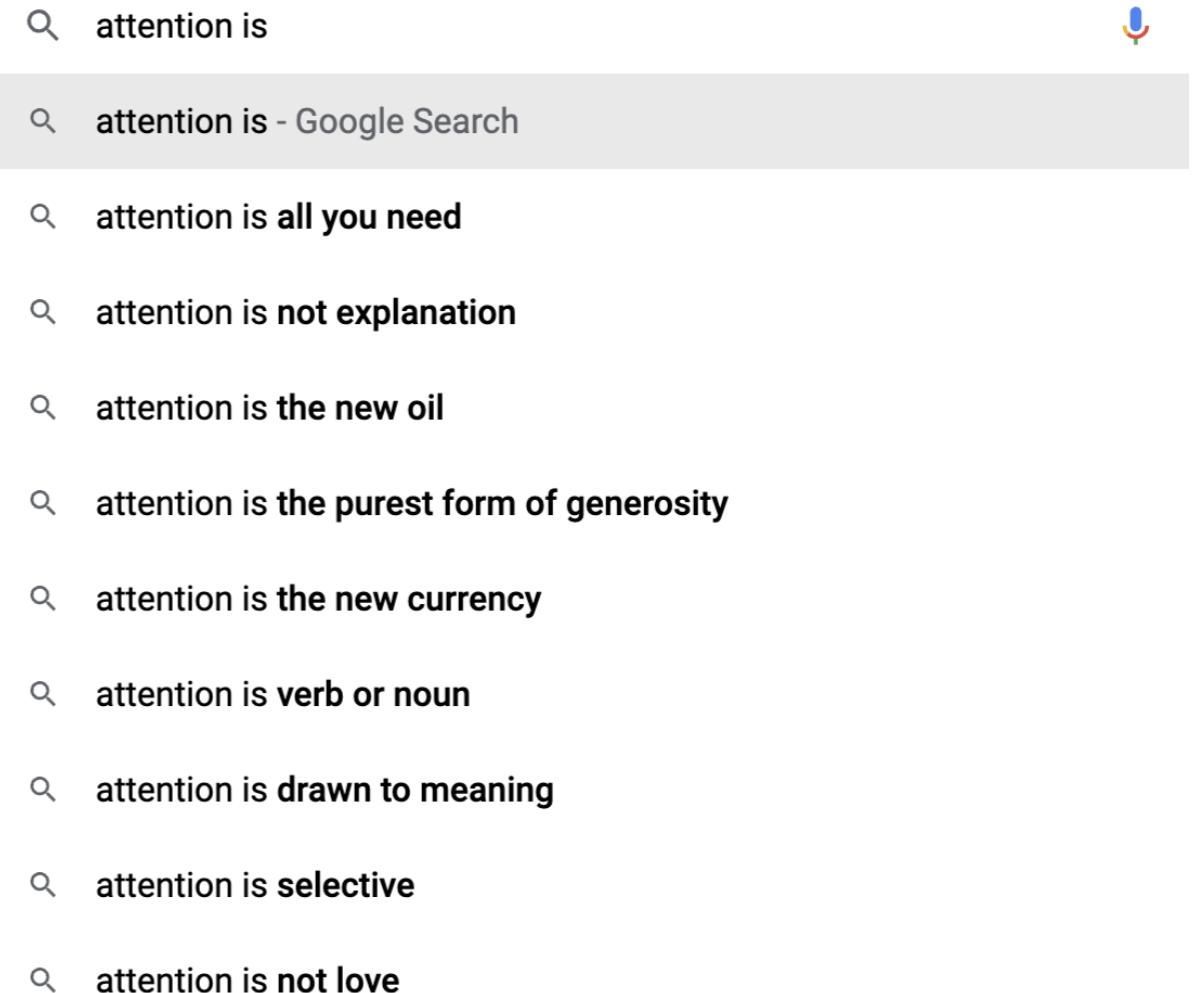
## The best AI chatbots

- **The leader:** [ChatGPT](#)
- **The runner-up:** [Google Bard](#)
- **Open source:** [HuggingChat](#)
- **Internet-connected:** [Microsoft Bing AI](#), [Perplexity](#), [YouChat](#),  
[KoalaChat](#)
- **For content writing:** [Jasper Chat](#), [Chat by Copy.ai](#), [ChatSonic](#),  
[ZenoChat](#)
- **For messaging:** [Personal AI](#)
- **For tinkering:** [OpenAI playground](#), [Poe](#)
- **For fun:** [AI Test Kitchen](#), [Character.AI](#)
- **For coding auto-complete:** [GitHub Copilot](#), [Amazon CodeWhisperer](#)
- **Up-and-coming:** [Claude](#)
- **Build your own AI chatbot with no-code:** [Zapier Interfaces](#)

<sup>1</sup> <https://zapier.com/blog/best-ai-chatbot/>

# Applications

- Sentiment analysis
- Identifying themes
- Translating text or speech
- Generating code
- Next-word prediction



attention is

attention is - Google Search

attention is all you need

attention is not explanation

attention is the new oil

attention is the purest form of generosity

attention is the new currency

attention is verb or noun

attention is drawn to meaning

attention is selective

attention is not love

# What shall this course cover?



- Conceptual understanding of LLMs
- Training data considerations
- Ethical, privacy and environmental concerns
- The future of LLMs

# **Let's practice!**

**LARGE LANGUAGE MODELS (LLMS) CONCEPTS**

# Real-world applications

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# Business opportunities

## Benefits

- Automate tasks
- Improve efficiency
- Create revenue streams
- Enable new capabilities
- The possibilities are endless!

NEWS

### Microsoft launches AI-powered Security Copilot

Microsoft Security Copilot is an AI assistant for infosec professionals that combines OpenAI's GPT-4 technology with the software giant's own cybersecurity-trained model.

TECH

### Bloomberg plans to integrate GPT-style A.I. into its terminal

### Stripe and OpenAI collaborate to monetise ChatGPT and other technologies

Snapchat released its AI persona, My AI, that allows users to prompt it for recipe suggestions, gift ideas, and content inspiration. It runs off of OpenAI's ChatGPT.

# Transforming finance industry

Investment outlook



Annual reports



News articles



Social media posts



- Unstructured data or text: data that lacks definition and is presented free-form

<sup>1</sup> Freepik

# Transforming finance industry

Investment outlook



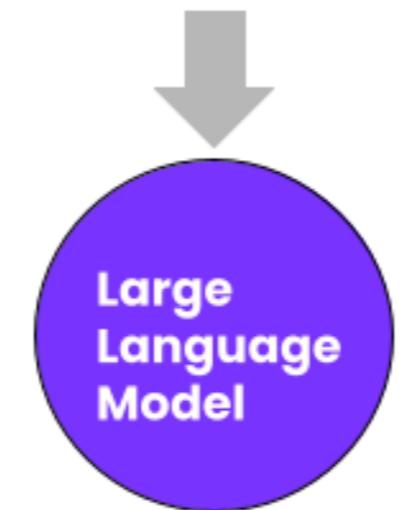
Annual reports



News articles



Social media posts



# Transforming finance industry

Investment outlook



Annual reports



News articles



Social media posts



Market analysis

Portfolio management

Investment opportunities

# Challenges in healthcare

Doctors' notes:

- Jargon
- Abbreviations
- Domain expertise
- Varying writing style
- Varied text data and acronyms

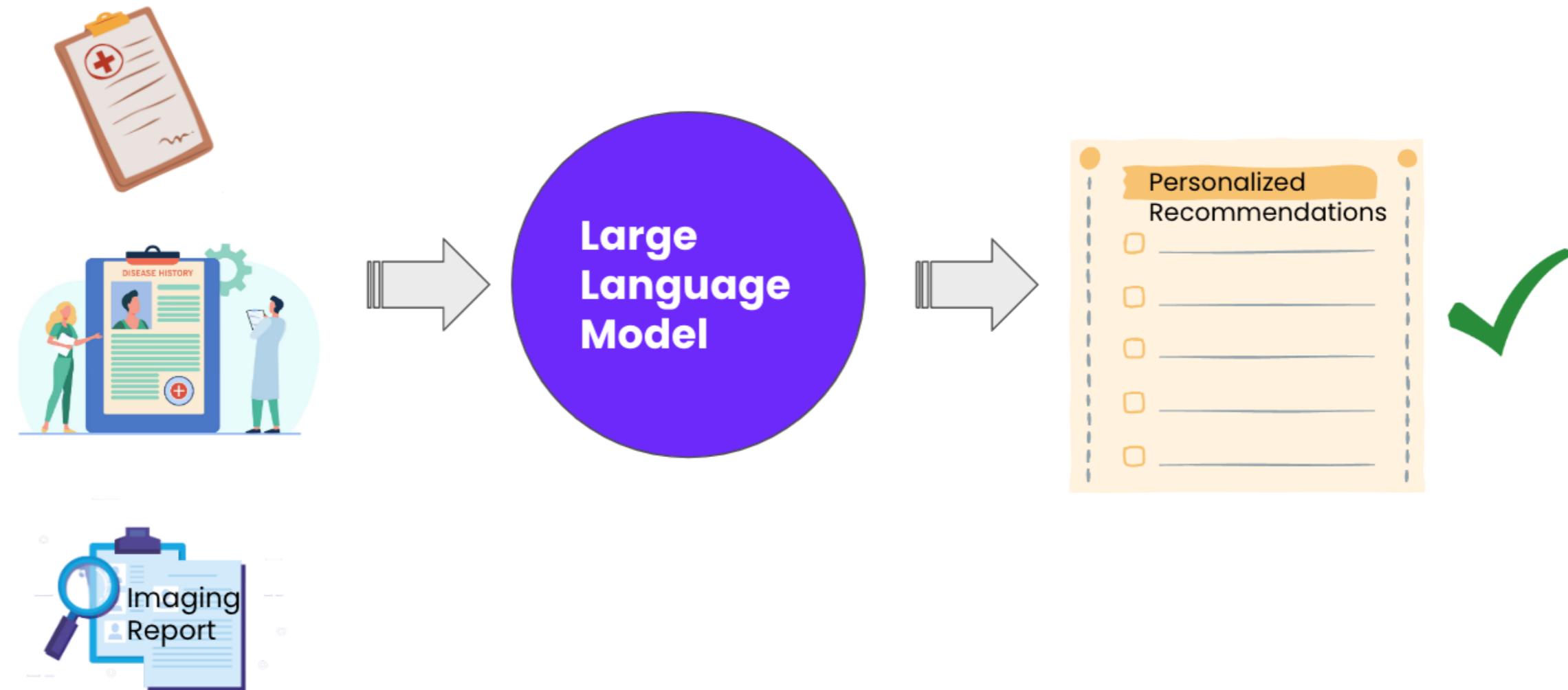
Challenges:

- Hard to understand terms
- Difficult to interpret
- Difficult to describe patient files



# Revolutionizing healthcare sector

- Analyze patient data to offer personalized recommendations
- Must adhere to privacy laws



<sup>1</sup> Freepik

# Education

- Personalized coaching and feedback
- Interactive learning experience
- AI-powered tutor
  - Ask questions
  - Receive guidance
  - Discuss ideas



<sup>1</sup> Freepik

# Personalizing education: text generation



explain why pluto is not considered a planet to a 5 year old.



Alright kiddo, so you know how we have planets like Earth, Mars, and Jupiter in our big solar system, right? Well, a long time ago, people thought Pluto was a planet just like those. But then, some scientists learned more about space and decided that to be a real planet, you have to follow some special rules.

Pluto followed some of these rules, but not all of them. One rule it didn't follow was making sure its path around the Sun was all clear and tidy. Because of this, scientists decided to call Pluto a "dwarf planet" instead of a regular planet. But don't worry, Pluto is still out there in space, and it's an important part of our solar system!



now explain this to a astronomy expert.



As an astronomy expert, you are undoubtedly familiar with the reclassification of Pluto as a dwarf planet. This change was a result of the International Astronomical Union's (IAU) decision in 2006 to establish a more precise definition of a planet. According to the IAU, a celestial body must meet three criteria to qualify as a planet:

1. Orbit the Sun
2. Possess sufficient mass for self-gravity to overcome rigid body forces, thereby achieving hydrostatic equilibrium and a near-spherical shape
3. Clear its orbit of other debris

Pluto satisfies the first two criteria; however, it fails to meet the third requirement. Its highly elliptical and inclined orbit intersects with Neptune's, and it shares its orbital region with numerous Kuiper Belt objects. Consequently, the IAU designated Pluto as a dwarf planet—a classification that, while distinct from a traditional planet, does not undermine Pluto's significance within our solar system.

# Defining multimodal

## Multimodal

- Many types of processing or generation



## Non-multimodal

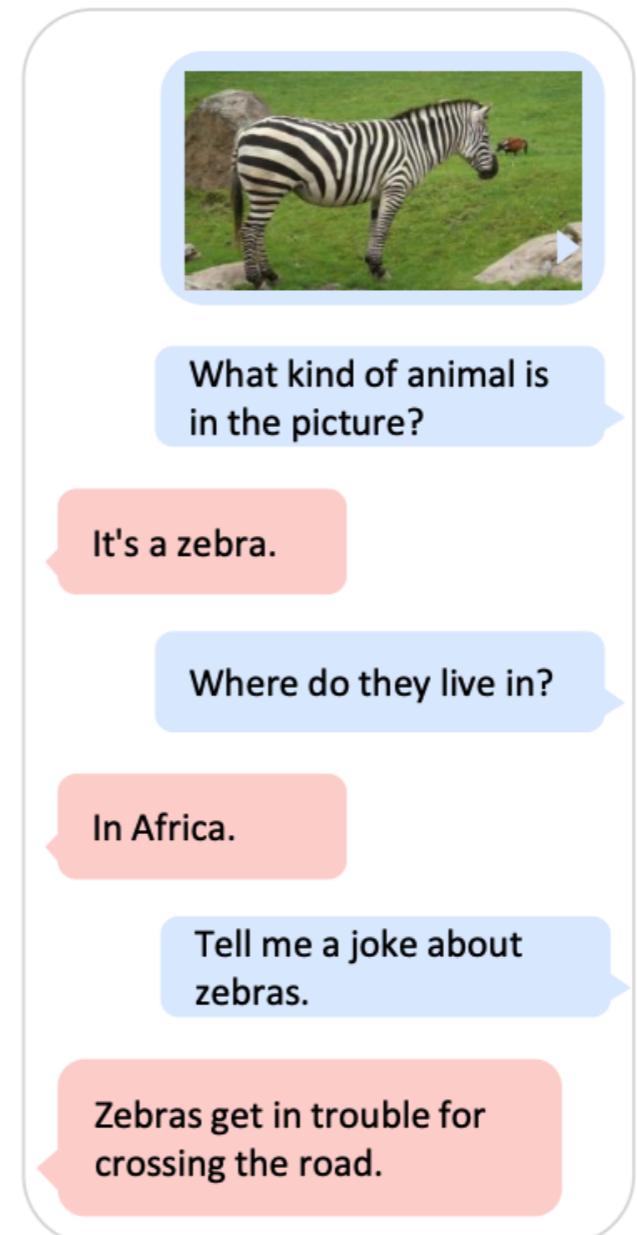
- One type of processing or generation



<sup>1</sup> Freepik

# Visual question answering

- Answers to questions about visual content
- Object identification & relationships
- Scene description
- Recognizes the zebra image
- Responds with additional information
- Makes a joke



<sup>1</sup> <https://arxiv.org/abs/2302.14045>

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# Challenges of language modeling

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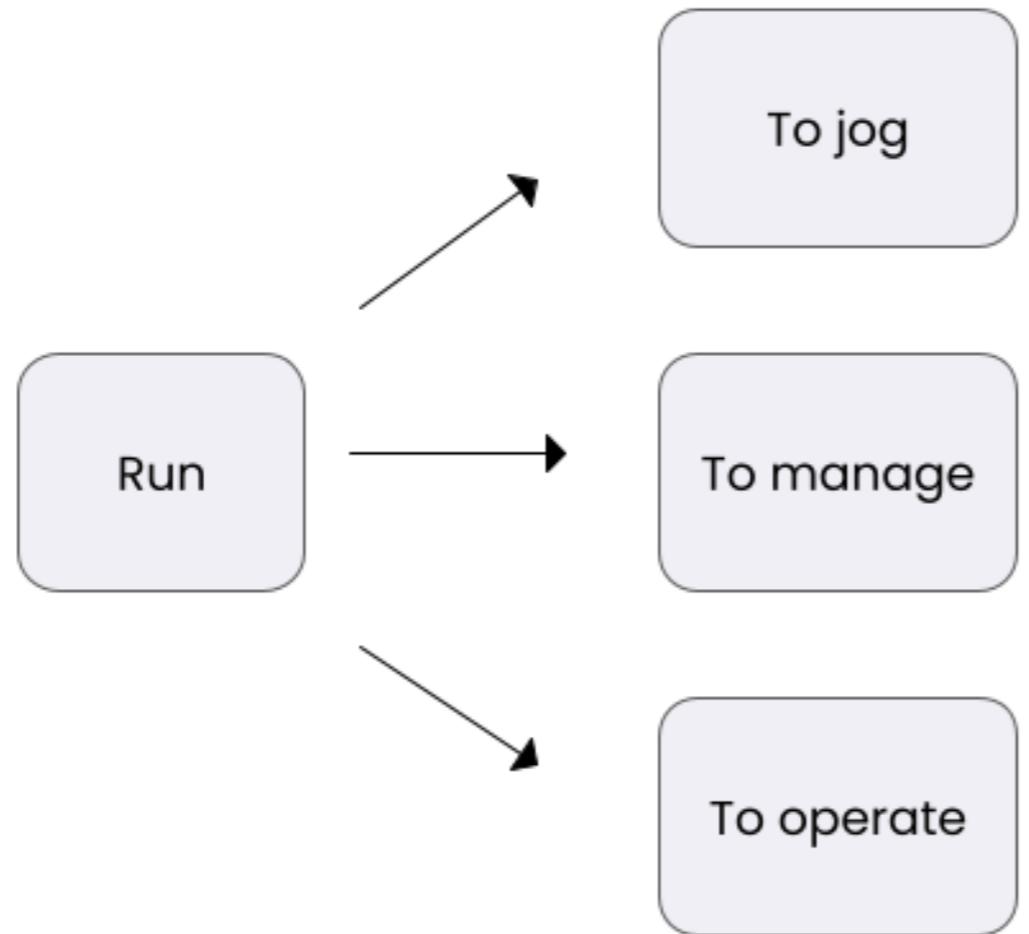
# Sequence matters!

- I only follow a healthy lifestyle.
- Only I follow a healthy lifestyle.
- Different positions = different meanings

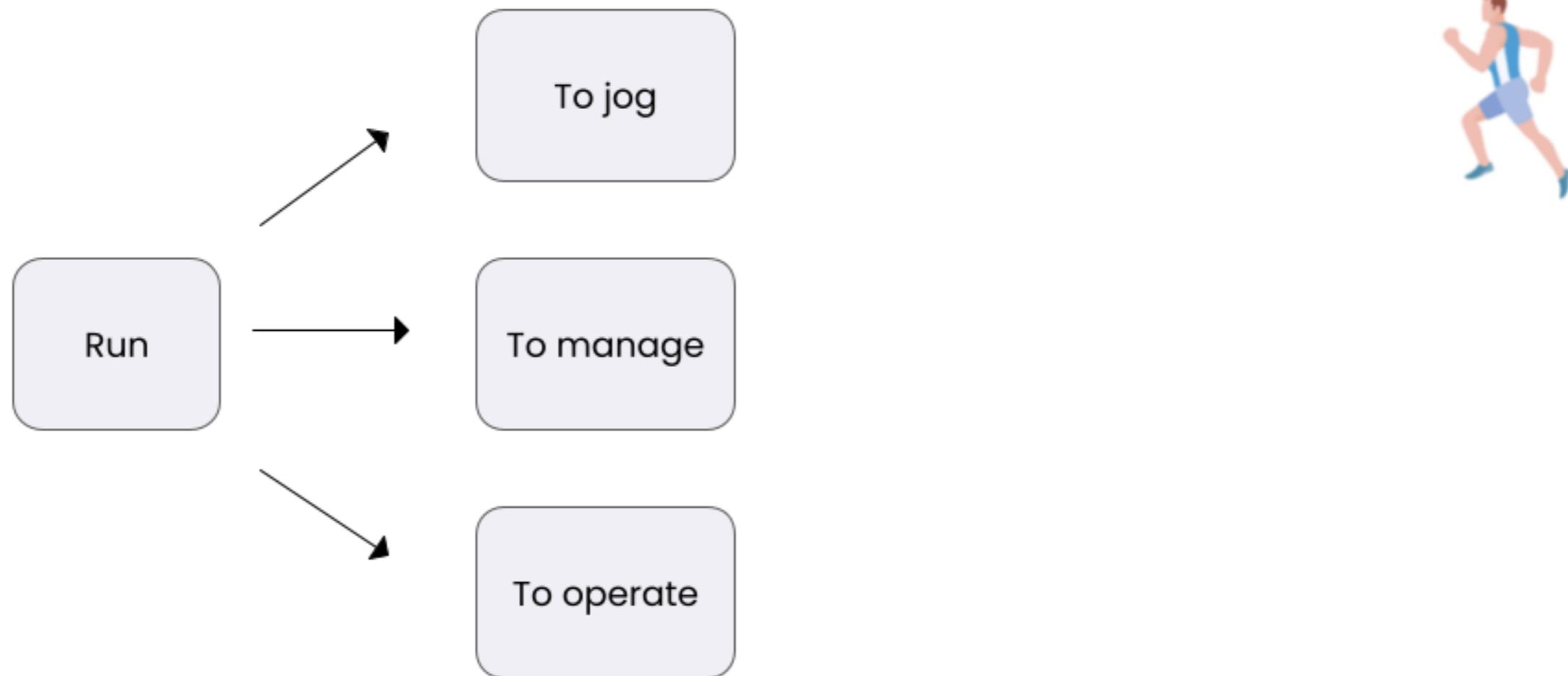


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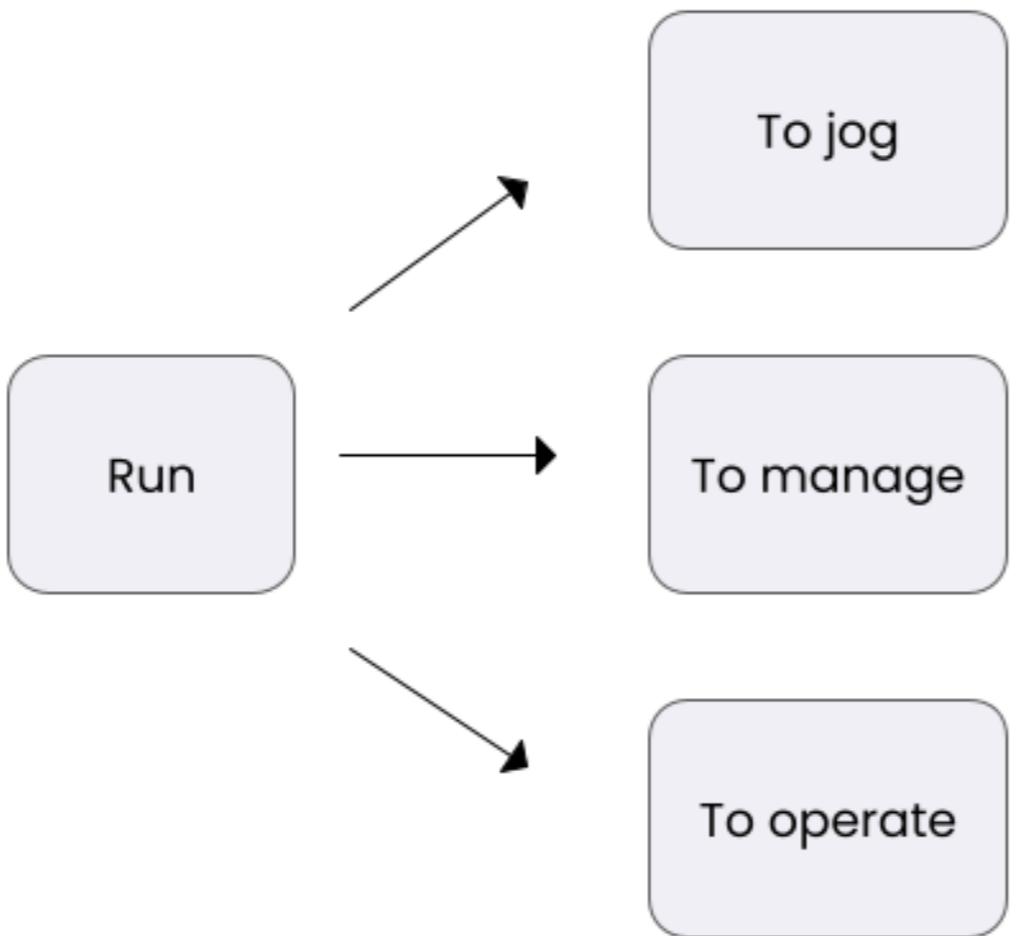
# Context modeling



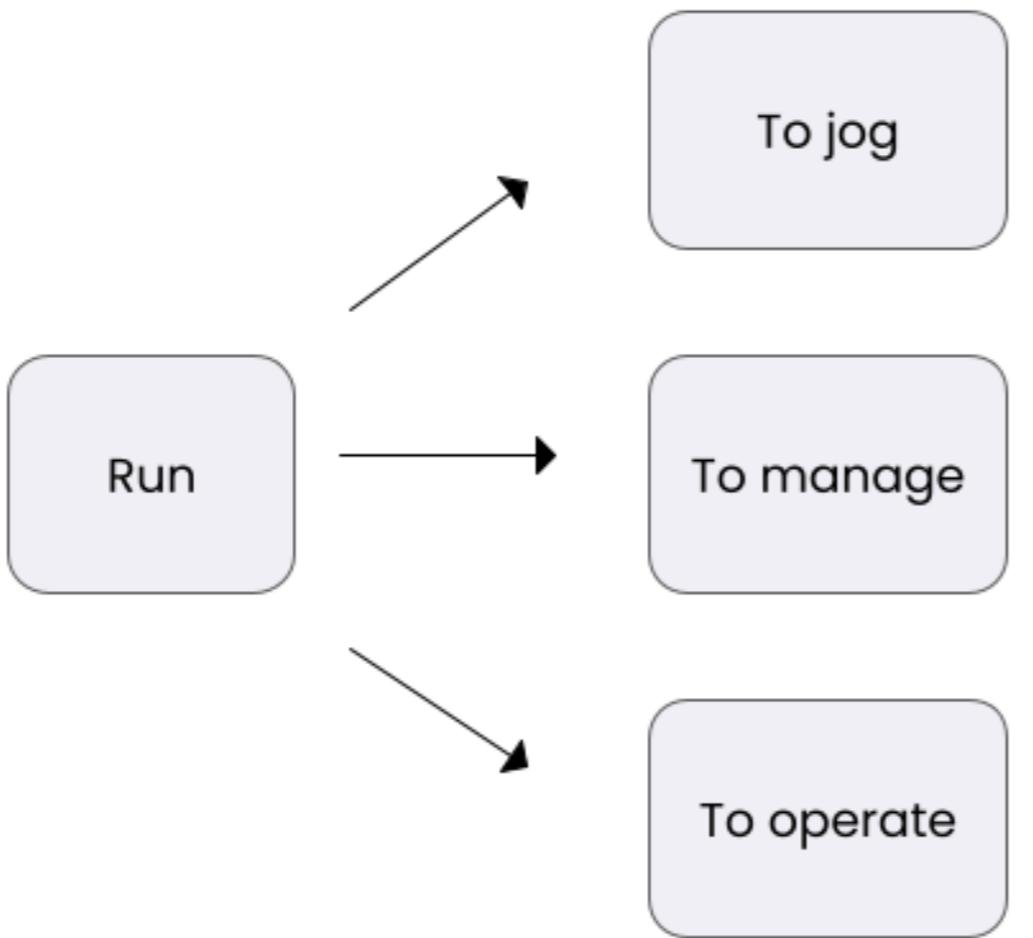
# Context modeling



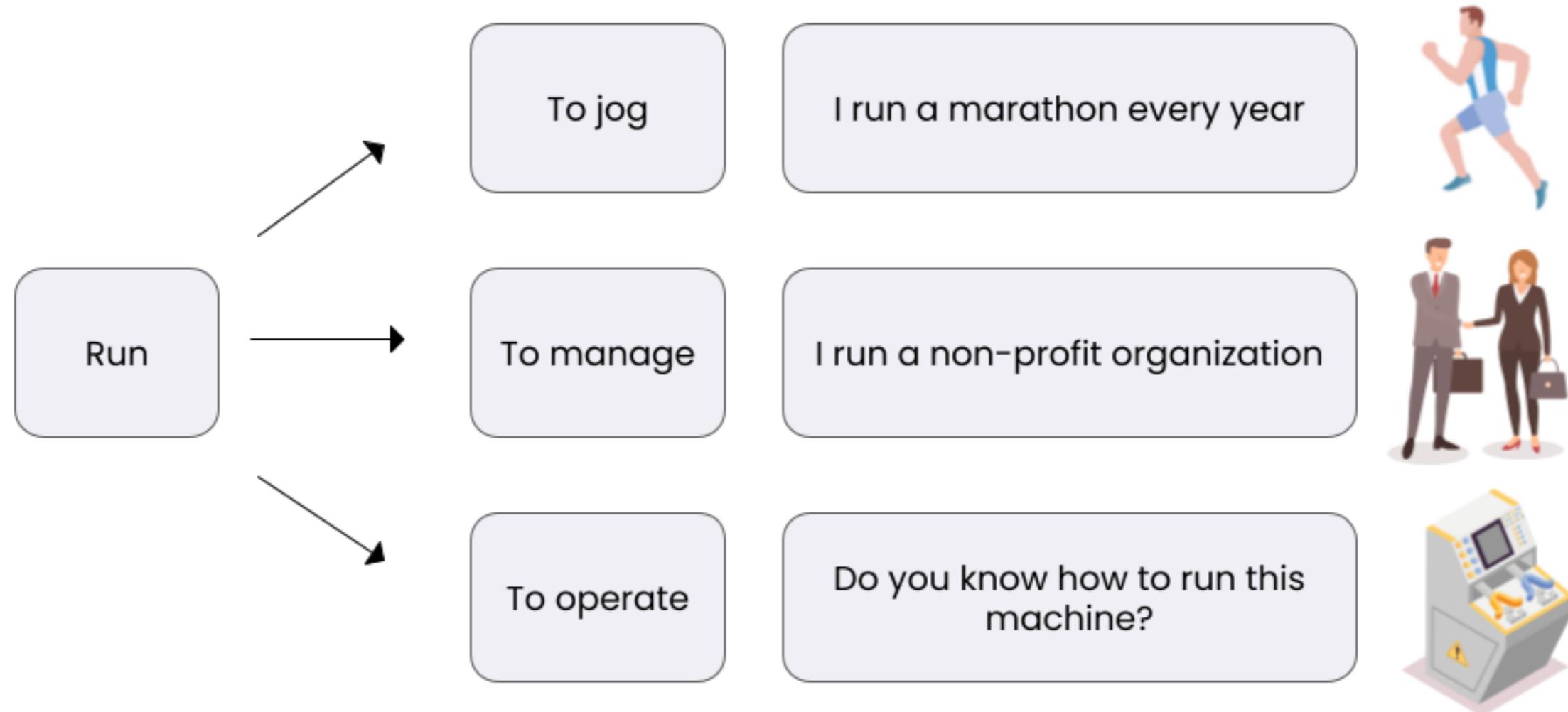
# Context modeling



# Context modeling



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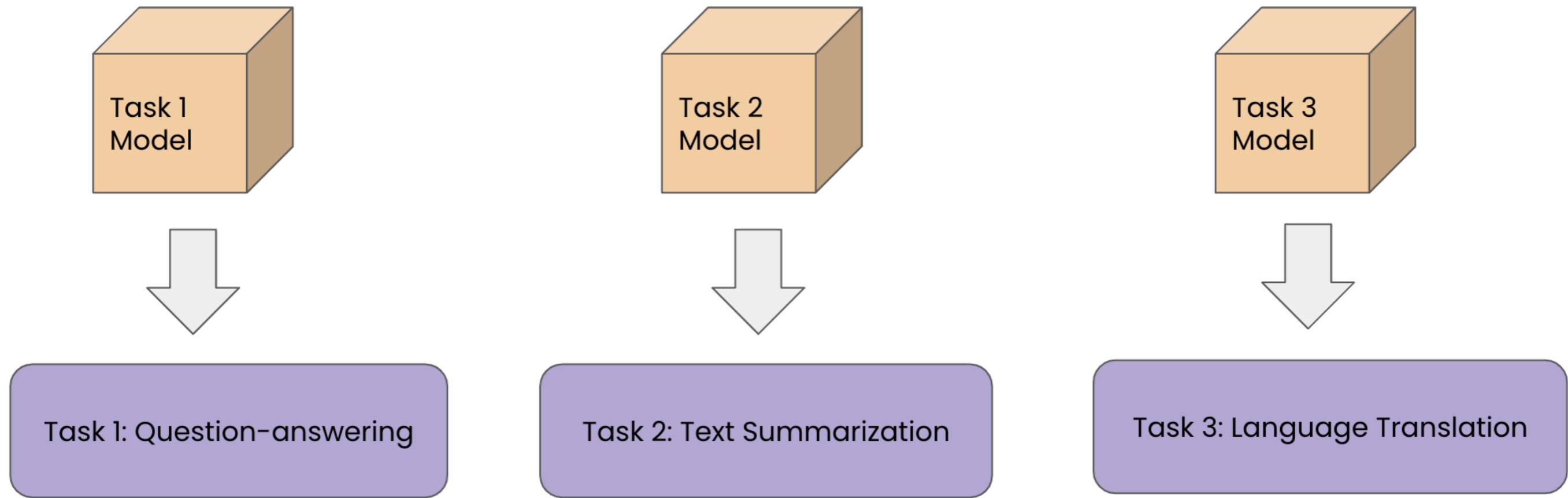


# Long-range dependency

- Recognize and connect distant words in a sentence
- Challenging for traditional language models

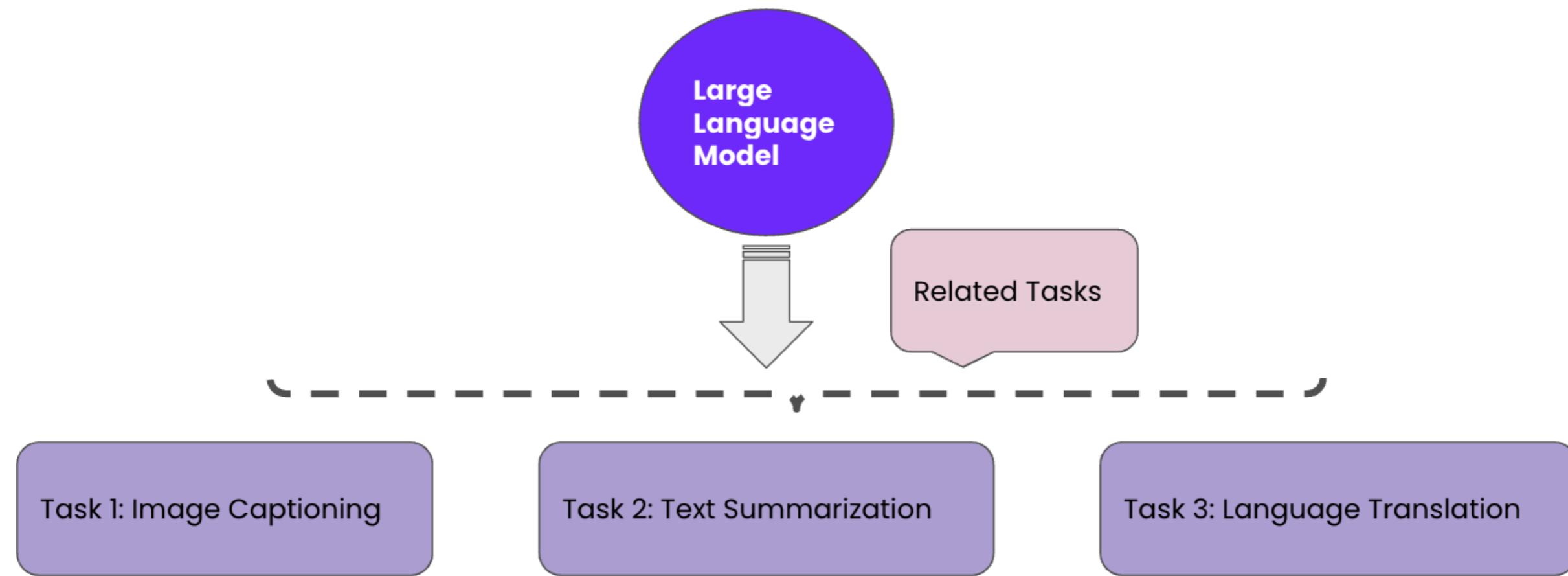
The **book** that the young girl, who had just returned from her vacation, carefully placed on the shelf **was quite heavy**.

# Single-task learning



- Time and resource expensive
- Less flexible compared to modern LLMs

# Multi-task learning



- Improved performance on each individual task
- Might impact accuracy and efficiency
- Less training data needed because data is shared

# To recap

## Challenges of language modeling:

- Word sequences
- Understanding context
- Long-range dependency

### Single-task learning:

- Task-specific
- Less flexible
- Traditional models and early LLMs

### Multi-task learning:

- Versatile
- Multiple tasks
- More developed LLMs

# **Let's practice!**

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