


Faculty of Economics Commerce and Management Sciences

Finance and Accounting Department

# Introduction to Artificial Intelligence

## Chapter 05

Applications of Large Language Models (LLMs)

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# 01 – Introduction About ChatGPT, Google Gemini, and Claude

Large language models are advanced AI systems that process and generate naturel language, or human-like text, using data they have been trained on through deep learning techniques.



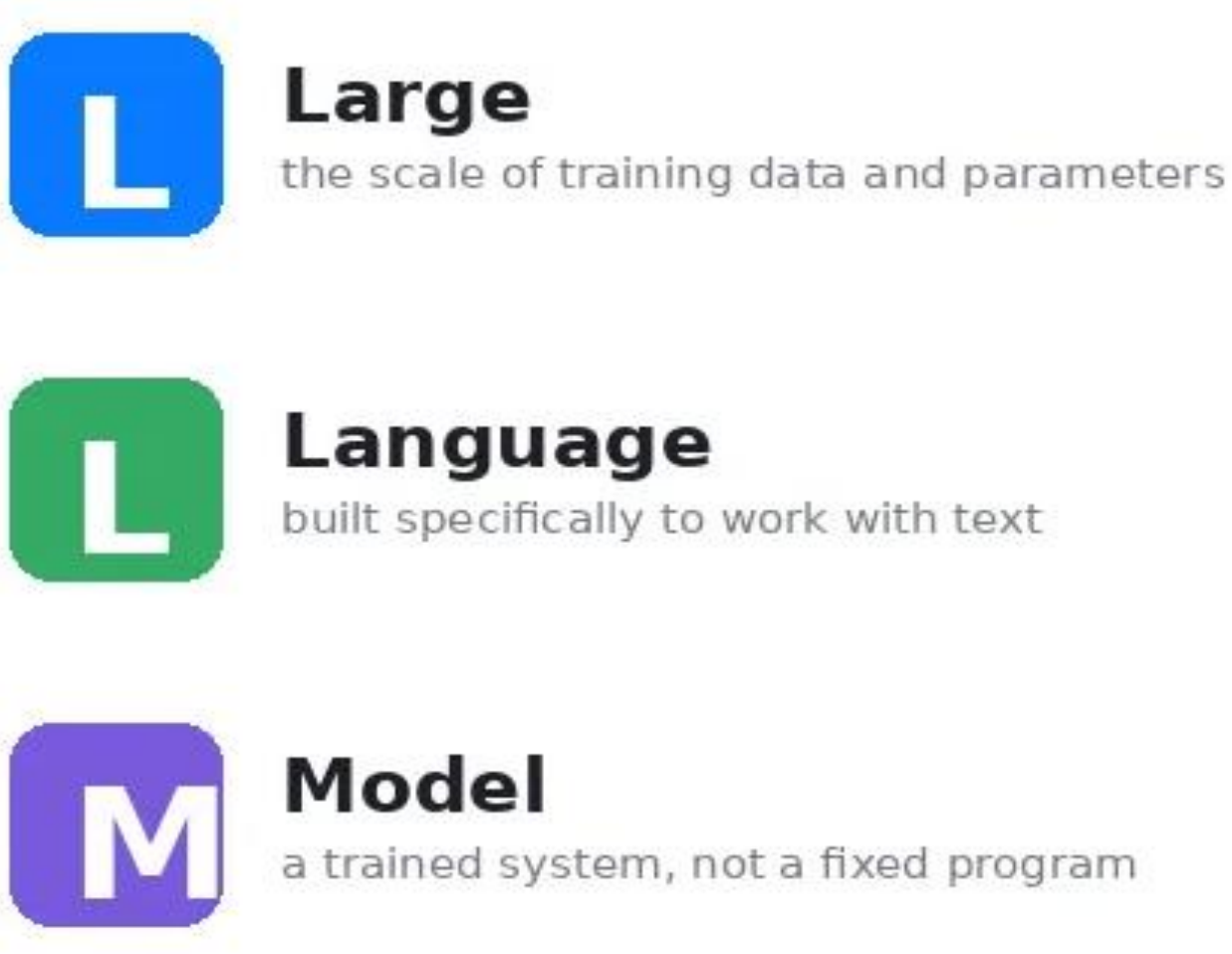
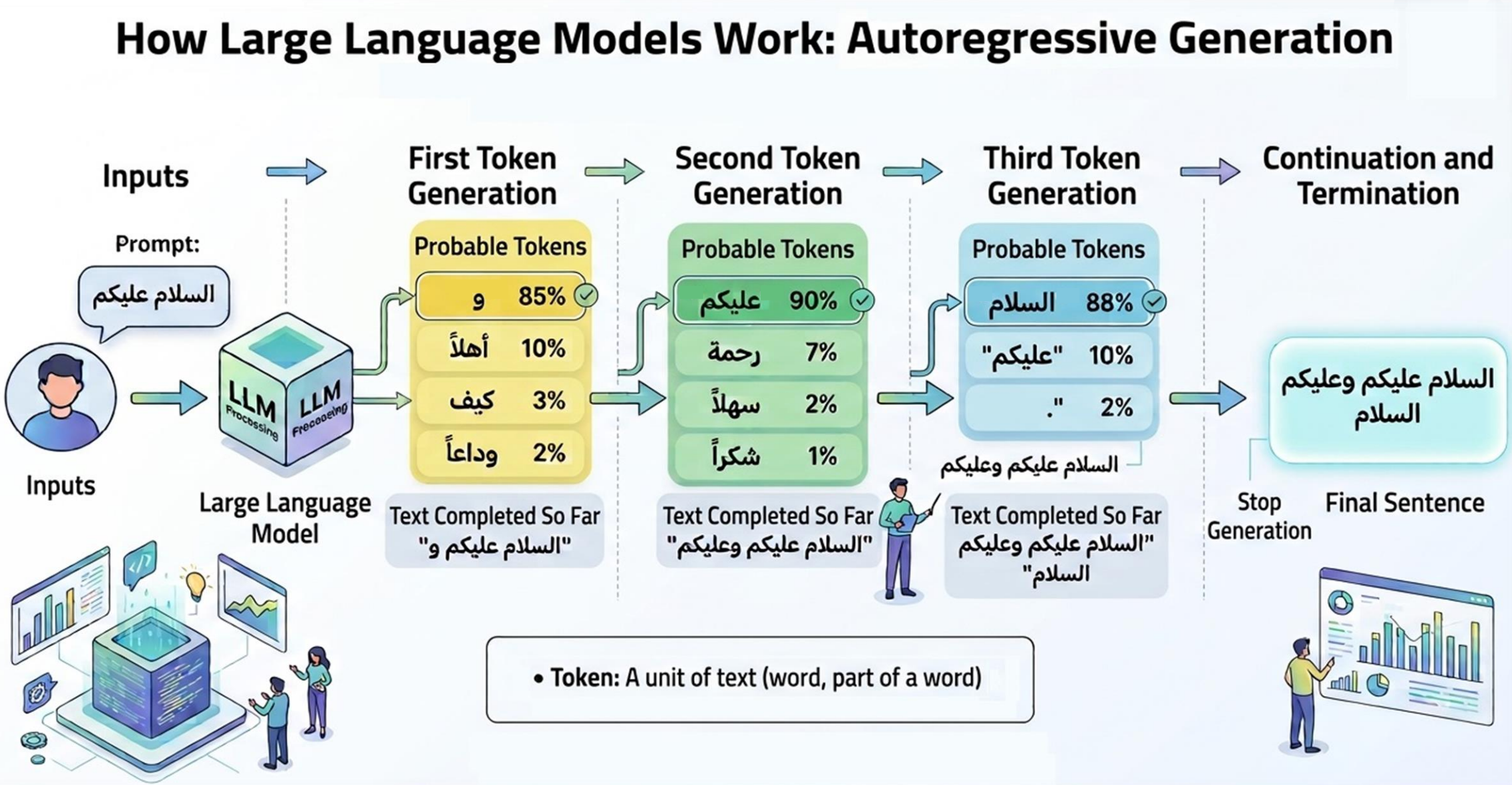



**Figure 01:** The detailed meaning of “Large Language Model”.

## How Large Language Models Works:

The task of LLMs is to predict the next word in a sentence based on what came before, a process known as “Autoregressive Generation”.
Example:
If you type “السلام عليكم” into a language model, its response might appear as one or two complete sentences, but in reality, it generates the response token by token, as follows:


How Large Language Models Work: Autoregressive Generation
Inputs
First Token Generation
Second Token Generation
Third Token Generation
Continuation and Termination
Prompt:
السلام عليكم
Inputs
LLM Processing
Large Language Model
Probable Tokens
و 85%
أهلاً 10%
كيف 3%
وداعاً 2%
Text Completed So Far
"السلام عليكم و"
Probable Tokens
عليكم 90%
رحمة 7%
سهلاً 2%
شكراً 1%
Text Completed So Far
"السلام عليكم وعليكم"
Probable Tokens
السلام 88%
"عليكم" 10%
." 2%
السلام عليكم وعليكم
Text Completed So Far
"السلام عليكم وعليكم السلام"
السلام عليكم وعليكم السلام
Stop Generation
Final Sentence
• Token: A unit of text (word, part of a word)

Many language models and systems that provide their services have emerged, and ChatGPT, Google Gemini, and Claude are the most popular ones. They provide services from writing and programming to research and image generation

ChatGPT, created by OpenAI an American artificial intelligence company, was first released on November 2022. ChatGPT is an acronym composed of:

- Chat: It refers to the possible conversation between the user and the tool.
- GPT: Short for Generative Pre-trained Transformer, meaning it is a trained generative model uses the transformer architecture.



Google Gemini, developed by Google DeepMind, an AI Laboratory, first released in December 2023. It's considered as the second largest GenAI after ChatGPT.

Gemini is trained on multiple data types, enable it to process and generate text, code, images, audio, and video simultaneously.



Claude, developed by Anthropic, an American company founded by former OpenAI researchers, was first released on March 2023.

Claude is known for his ability to analyze accurately, his skillful writing style, and his outstanding performance in the field of programming.



# 02 – Uses of Large Language Models in Education, Marketing, and Scientific Research.

## In Education:

The use of LLMs in education is a promising field due to their multiple uses, which include:

- Proposes morphological and grammatical corrections and machine translation which develop reading and writing skills.
- Provides students with explanations and analyses of complex texts which develop reading comprehension skills.
- Provides students by explanations and a step-by-step solutions for complex problems, which develop solving problems skills.
- Helps teachers preparing lessons plans and activities, in addition to exercises, and problems.

## In Marketing:

The use of LLMs is increasing in the field of marketing, we mention their most important uses:

- LLM's Chatbots answer questions about products, shipping, returns, and inventory in natural language, which provide an enhanced customer interaction.
- Analyze purchases and preferences to create appropriate suggestions and additional sales offers for the customer.
- Assisting marketers by creating product descriptions, ad copy, social media posts, and marketing campaign edits.
- Analyze performance, diagnose problems, and recommend practical actions to the marketer.

## In Scientific Research:

LLMs are significantly transforming the course of scientific research by:

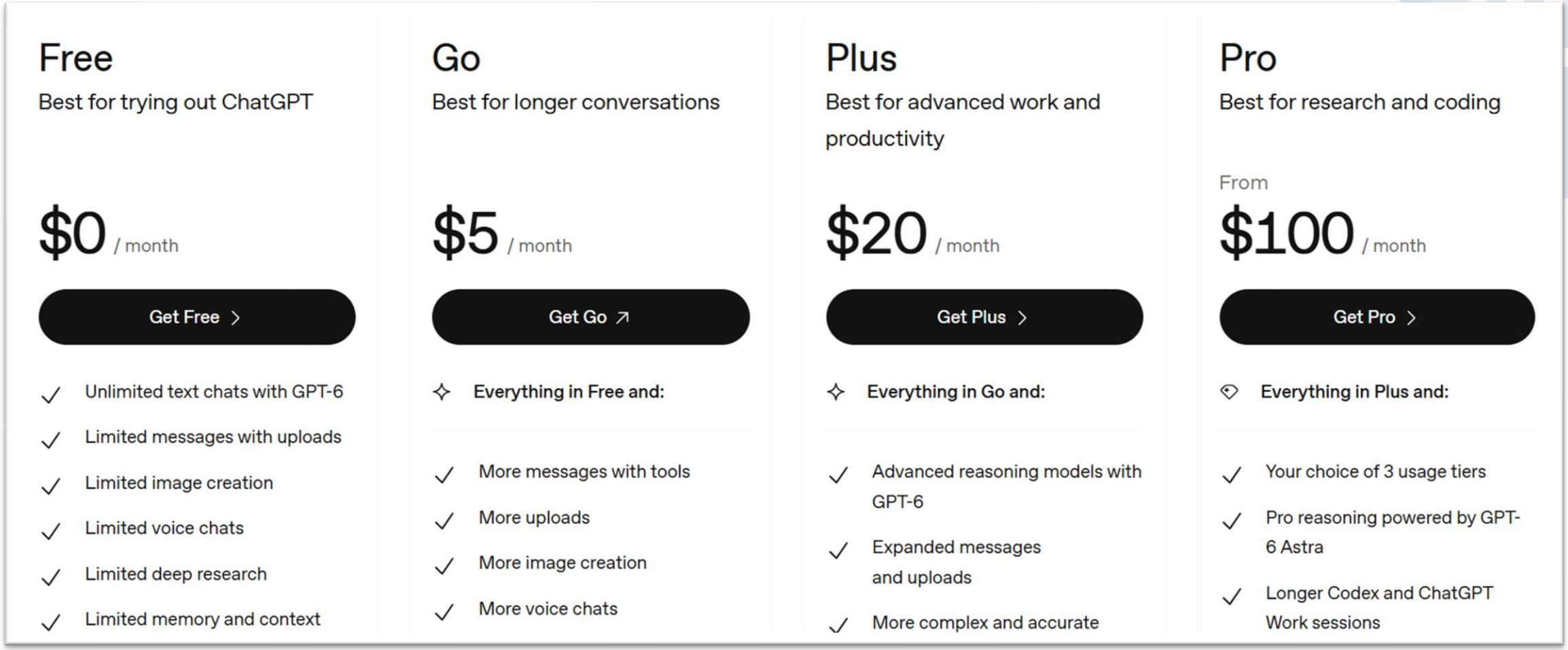
- Collecting, analyzing, and discovery of contradiction when doing literature review.
- Support the generation of hypotheses and the planning of multi-step experiments in the field of generating initial ideas.
- Enhancing scientific communication through automated summarization and assistance in drafting publications.
- Enhancing the speed of discovery.

# 03 – Comparison of the Most Prominent Current Models

ChatGPT, Google Gemini, and Claude are among the most prominent and widely used language models. All these models share similarities, most notably:

- Text analysis, summarization, and translation.
- The use of user-generated data and prompts in model training, unless this feature is disabled.
- The need to pay for additional features not available in the free version, such as generating a large number of images, providing in-depth answers, or conducting in-depth research.

These models differ in their strengths and weaknesses.



## Free

Best for trying out ChatGPT

$0 / month

Get Free >

- Unlimited text chats with GPT-6
- Limited messages with uploads
- Limited image creation
- Limited voice chats
- Limited deep research
- Limited memory and context

## Go

Best for longer conversations

$5 / month

Get Go ↗

Everything in Free and:

- More messages with tools
- More uploads
- More image creation
- More voice chats

## Plus

Best for advanced work and productivity

$20 / month

Get Plus >

Everything in Go and:

- Advanced reasoning models with GPT-6
- Expanded messages and uploads
- More complex and accurate

## Pro

Best for research and coding

From $100 / month

Get Pro >

Everything in Plus and:

- Your choice of 3 usage tiers
- Pro reasoning powered by GPT-6 Astra
- Longer Codex and ChatGPT Work sessions

**Figure 01:** ChatGPT monthly special offers prices.

| The side | ChatGPT | Gemini | Claude |
|---|---|---|---|
| **Strengths** | - Use in everyday tasks.<br>- Photo and video tools. | - Integration with Google, allowing the model to be found in all its tools such as: Gmail, Sheets, Docs<br>- Direct search functionality using the Google search engine.<br>- Multimodal: In-depth understanding of video, audio, and images. | - Programming.<br>- Precise and detailed writing.<br>- Long-form context analysis. |
| **Weaknesses** | - It may be prone to excessive agreement.<br>- It needs daily training because it lacks search engine functionality. | - Hallucinations and factual errors: He may confidently fabricate false connections and information. | - It cannot generate images or videos.<br>- It needs daily training because it lacks search engine functionality. |

**Table 1:** Comparing ChatGPT, Gemini, and Claude in terms of their strengths and weaknesses.

## References:


- Ishii. (2025). Best Use Cases of Large Language Models (LLMs) in Science.
- Kasneci, Sessler, Kchemann and Others. (2023). Is ChatGPT Useful? On the Opportunities and Challenges of Big Language Models in Education.