

Prompt Engineering & Plug-ins

Mohannad Elhamod – IS883

Recap

We have used...



- To query OpenAI's pre-trained language model using their API
- No model is stored locally.



Hugging Face

- To create and fine-tune a language model of our choice on your own data.
- The model is stored locally.



- To create an online service that hosts our solution.
- Makes our solution accessible to others.

Prompt Engineering vs Fine-Tuning

Let's say you have a pre-trained model:

- If the model has not already been trained on the knowledge/patterns you wish to query, you probably need to fine-tune it.
- If it has been, but it is not giving the right answer, then you probably need to better engineer your prompt to extract the knowledge.

Prompt Engineering vs Fine-Tuning

Prompt engineering

- More suitable for open-source data
- No need to update the model.
- May cost more in terms of queries

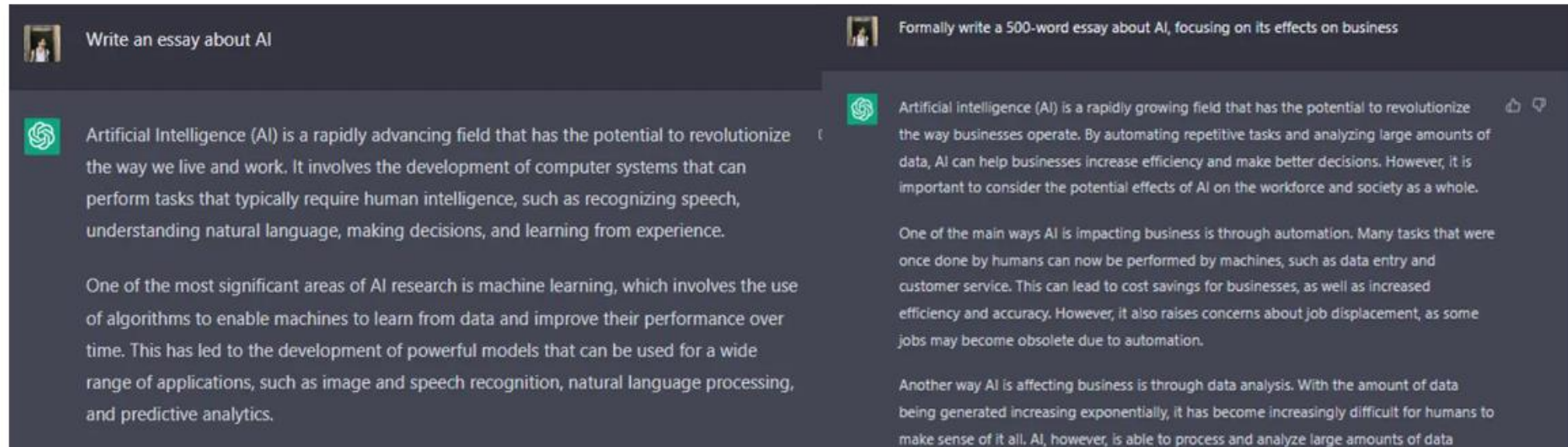
Fine-tuning

- More suitable when your data is sensitive/not open source.
- Requires more expertise
- May have significant training computational cost upfront.

General Examples of Prompt Engineering

- Writing in certain style.
- Prompting for a specific output type.
- Providing the model some examples.
- Asking the model to use certain tools.
- ...

The prompt makes a big difference!



The image shows a side-by-side comparison of ChatGPT's responses to two different prompts. On the left, the prompt is "Write an essay about AI", and the response is a general overview of AI. On the right, the prompt is "Formally write a 500-word essay about AI, focusing on its effects on business", and the response is a more detailed, structured essay focusing on business impacts.

Prompt	Response
Write an essay about AI	<p>Artificial Intelligence (AI) is a rapidly advancing field that has the potential to revolutionize the way we live and work. It involves the development of computer systems that can perform tasks that typically require human intelligence, such as recognizing speech, understanding natural language, making decisions, and learning from experience.</p> <p>One of the most significant areas of AI research is machine learning, which involves the use of algorithms to enable machines to learn from data and improve their performance over time. This has led to the development of powerful models that can be used for a wide range of applications, such as image and speech recognition, natural language processing, and predictive analytics.</p>
Formally write a 500-word essay about AI, focusing on its effects on business	<p>Artificial Intelligence (AI) is a rapidly growing field that has the potential to revolutionize the way businesses operate. By automating repetitive tasks and analyzing large amounts of data, AI can help businesses increase efficiency and make better decisions. However, it is important to consider the potential effects of AI on the workforce and society as a whole.</p> <p>One of the main ways AI is impacting business is through automation. Many tasks that were once done by humans can now be performed by machines, such as data entry and customer service. This can lead to cost savings for businesses, as well as increased efficiency and accuracy. However, it also raises concerns about job displacement, as some jobs may become obsolete due to automation.</p> <p>Another way AI is affecting business is through data analysis. With the amount of data being generated increasing exponentially, it has become increasingly difficult for humans to make sense of it all. AI, however, is able to process and analyze large amounts of data</p>

[dataconomy](#)

Things to keep in mind when prompting...

- The more specific the prompt is, the better.
- Ask for the desired data formatting.
- Ask for a specific response length.
- Always be aware of previous context.

ChatGPT prompt engineering

[Link](#)

WHAT YOU SHOULD KNOW

- ChatGPT is a Language Model**
Developed to respond to text input and generate human-like text.
- Prompt-Based Interaction**
You provide a prompt (a text input or question), and it generates a response based on that input.
- Clear and Concise Prompts**
The more specific your prompts, the better the response. Avoid vague or ambiguous questions.
- Context Matters**
ChatGPT's responses depend on context. It remembers previous parts of the conversation, so maintaining context can lead to more coherent interactions.

CHATGPT CHEAT SHEET

Act as a **role**, in a **format** using a **tone**.

The main objective is to **objective**, don't use **restriction**.

ROLES	TASKS	FORMAT	TOPE	OBJECTIVE	RESTRICTION
Marketing Manager	Drafting an email campaign	Bullet Points	Engaging + Informative Tone	Inform customers about a new product launch	Jargon or technical terms.
Human Resources Specialist	Writing a job description	A List	Clear + Professional Tone	Attract qualified candidates for a software developer position	Discriminatory language.
Financial Advisor	Preparing a presentation	A Slide Deck Format	Reassuring + Authoritative Tone	Educate clients about the benefits of long-term investments	Fear tactics.
Customer Support Representative	Scripting a response to customer complaints	Paragraph Form	Calm + Empathetic Tone	Address concerns and offer solutions	Blame or defensive language.
Product Manager	Writing a product roadmap	A Flow Chart Format	Optimistic + Forward-Looking Tone	Showcase the future developments of a mobile app	More than 500 characters.
A Health and Safety Officer	Creating a safety manual	Step-by-step Instructions	Serious + Direct Tone	Ensure employees follow safety protocols in a factory setting	Vague or ambiguous terms.

KEY FEATURES FOR WORK OR BUSINESS

- Natural Language Processing (NLP)**
Advanced NLP capabilities allow it to understand and generate human-like text. This makes it ideal for customer support, content generation, and answering queries in real-time.
- Integration with Business Tools**
With plugins like Zapier, ChatGPT can integrate with over 20,000+ business apps, automating tasks such as data entry, lead generation, and more.
- Data Analysis and Computation**
ChatGPT can perform complex calculations, data analysis, and provide insights on various business-related topics, from finance to market research.
- Customization and Training**
Businesses can fine-tune ChatGPT to cater to their specific needs, ensuring that the model aligns with their industry terminology and requirements.
- Scalability**
ChatGPT can handle a large number of queries simultaneously, making it suitable for businesses of all sizes. Whether it's handling customer inquiries or generating reports, ChatGPT can scale according to demand.

TOP 15 PLUG-INS

OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins
OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins
OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins
OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins
OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins	OpenAI Plugins

UNDERSTANDING CHATGPT FOR BUSINESS

WHAT IS CHATGPT	BUSINESS APPLICATIONS	IMPLEMENTATION BEST PRACTICES
<ul style="list-style-type: none">Developed by open AICapable of understanding and generating human-like textAdvanced NLPIntegration with various plugins	<ul style="list-style-type: none">Customer SupportContent GenerationData Analysis and InsightsAutomation and Integration	<ul style="list-style-type: none">Training and CustomizationEthical ConsiderationFeedback and IterationSecurity and Privacy

POWERFUL PROMPTS

- PRIORITY CONTENT PLANNING FOR SERVICE-BASED BUSINESS**
Help me create a list of content for [insert niche/industry]. My niche is [insert niche or topic you discuss].
- LEARN A NEW SKILL IN "X" DAYS**
I want to learn [insert skill]. Can you guide me on the best approach and resources, and produce a [insert number] day plan to take me from beginner to advanced?
- MAKE CHATGPT YOUR BRAINSTORMING BUDDY**
I'm looking for fresh ideas on how to [insert topic]. Can you help me brainstorm [insert no. of different approaches or concepts]?
- ASK CHATGPT TO GENERATE YOUR PROMPTS**
I want to learn [insert topic]. I need a list of advanced prompts that will enable someone in my occupation to be more productive and work faster.
- SUPERCHARGE YOUR DECISION MAKING**
What are the advantages and disadvantages of [option A] compared to [option B]? I need insights to make an informed decision.

5 CHATGPT BUSINESS IDEAS

- Chatbot for Businesses using ChatGPT**
 - Conduct market research to identify the industries most in need of conversational AI solutions.
 - Develop a working prototype and offer a limited free trial to gather user feedback.
 - Form partnerships with B2B platforms to widen reach.
- Consulting for ChatGPT Integration**
 - Offer a free consultation or assessment to lure businesses.
 - Build case studies showcasing successful integrations.
 - Leverage LinkedIn and industry events to network and find clients.
- AI-Generated Blog Articles**
 - Create a portfolio using articles in various niches.
 - Offer the first article free as a lead magnet.
 - Network with blog owners and pitch through content marketing platforms like Medium.
- E-commerce Copy with ChatGPT**
 - Start with a niche focus, like tech products or fashion.
 - Offer package deals, including product descriptions, FAQs, and reviews.
 - Advertise via e-commerce platforms and forums.
- Personal Assistant App**
 - Develop a feature-rich MVP focusing on task management and CRM.
 - Launch on crowdfunding platforms to test market fit.
 - Partner with existing productivity app companies to offer your personal assistant as an add-on service.

TOP 12 EXTENSIONS

YouTube Summary with ChatGPT & Claude	YouTube Summary with ChatGPT & Claude
Twitter ChatGPT meeting summary	Twitter ChatGPT meeting summary
Resume Generator (Claude and ChatGPT)	Resume Generator (Claude and ChatGPT)
Text Reader that Summarizes PDF to Read	Text Reader that Summarizes PDF to Read
Engage AI - OpenAI GPT For LinkedIn	Engage AI - OpenAI GPT For LinkedIn
Human AI Chat powered by GPT-4 Claude, Llama	Human AI Chat powered by GPT-4 Claude, Llama
ChatGPT for Google	ChatGPT for Google
Visualize ChatGPT	Visualize ChatGPT
JourneyFlow - Free AI draw	JourneyFlow - Free AI draw
OpenAI Plugins	OpenAI Plugins

TOOL REPORT

Using Plug-ins

Plug-ins behind the scene



Who is Mohannad Elhamod



Used WebPilot

REQUEST TO WEBPILOT

```
{
  "link": "https://www.google.com/search?q=Mohannad+Elhamod",
  "lp": false,
  "ur": "Who is Mohannad Elhamod?",
  "l": "en",
  "rt": false
}
```

Plug-ins behind the scene

```

RESPONSE FROM WEBPILOT

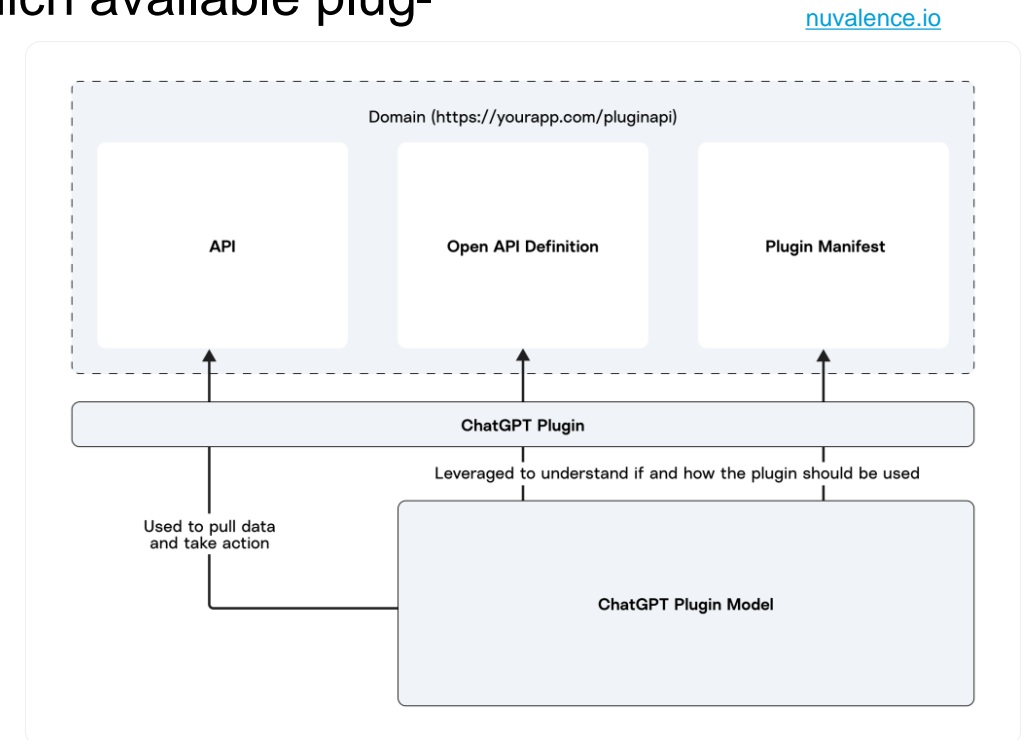
{
  "meta": {
    "og:locale": "en_US",
    "og:site_name": "Mohannad Elhamod",
    "og:title": "Mohannad Elhamod",
    "og:type": "website",
    "og:url": "https://wordpress.cs.vt.edu/elhamod/"
  },
  "title": "",
  "content": "Mohannad Elhamod\nHOME\nRESEARCH\nTEACHING\nRESUME\nBLOGS\nTALKS AND INTERVIEWS\nHome\nMail\nGoogle\nLinkedIn\nTwitter\nMy name is Mohannad Elhamod. I am a doctoral candidate in Computer Science at Virginia Tech (VT). I am a member of the Science-Guided Machine Learning group, supervised by professor Anuj Karpatne. I have earned an M.Eng degree in Electrical and Computer Engineering at McGill University under the supervision of professor Martin D. Levine. I had also earned a B.S. degree in Computer Engineering at Jordan University of Science and Technology. I have also gained industry experience as a software engineer at Microsoft for over six years.\nMy research is interdisciplinary and at the intersection of machine learning and scientific discovery in several domains, such as physics and biology. In my research, I work on bridging the gap between machine learning approaches and human knowledge. This effort is quintessential for ensuring that machine learning models, which have pervaded all aspects of life, do not violate priors established by experts. Such effort safeguards the integration of machine learning into science and society. I am also interested in machine learning visualization and explainability. This research direction advocates for machine learning models that are more transparent with their decision-making process, and thus less susceptible to incorporating social biases, and more trustworthy to scientists and experts.\nI have always valued my relationships with my teachers and mentors. Over the years, I have strived to take advantage of all teaching opportunities I have come across, including being a teaching assistant for four graduate and undergraduate classes, and being the instructor of record for a capstone senior undergraduate class. My teaching philosophy is centered around engaging with my students at an intellectually stimulating level, and arousing their curiosity to explore.\nIn my free time, I have enjoyed participating in the community, including serving as a board member of the Computer Science Graduate Council, hosting talks about the struggles of graduate students, doing stand-up comedy, and capturing the beauty in people and places around me with my camera.\n© 2023 Mohannad Elhamod. All rights reserved.\nTheme by MOOZ Themes Powered by WordPress",
  "extra_search_results": [
    {
      "title": "Mohannad Elhamod - Data Analytics Mentor on MentorCruise",
      "link": "https://mentorcruise.com/mentor/mohannadelhamod/",
      "snippet": "Mohannad Elhamod is a Engineering & Data mentor who provides personalized mentorship in Data Analytics, Machine Learning, Deep Learning, Python, ..."
    },
    {
      "title": "Mohannad Elhamod - Google Scholar"
    }
  ]
}

```

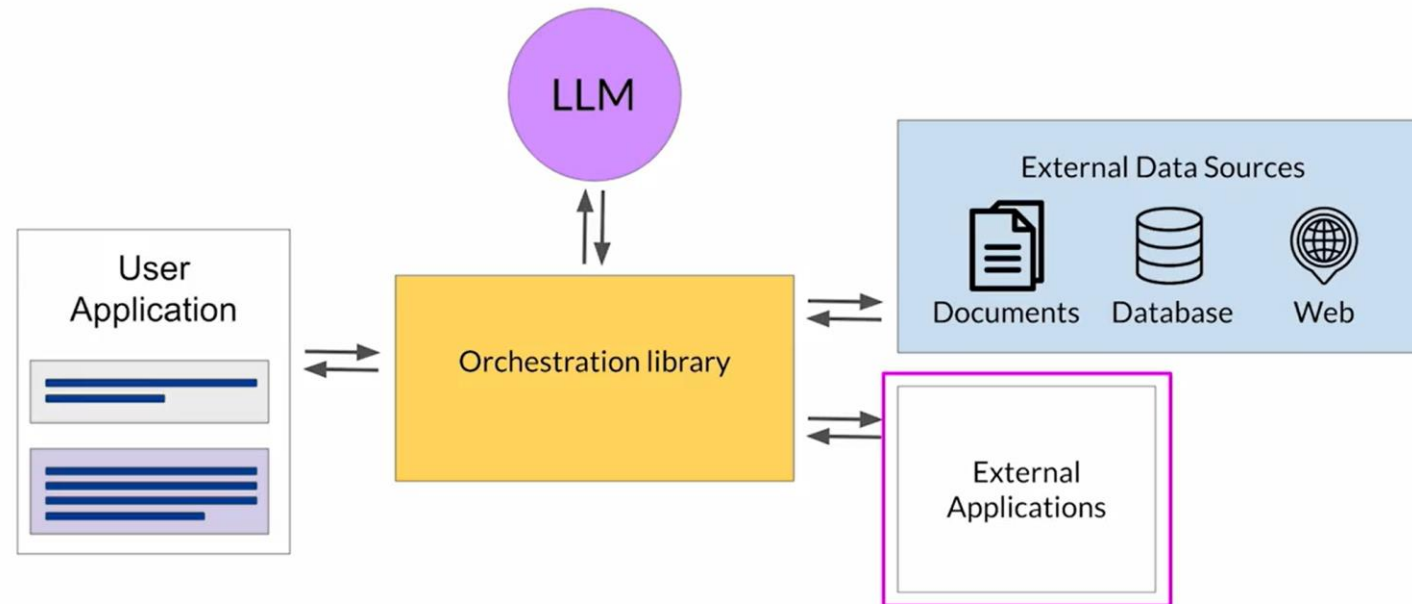
Regenerate

How do these plug-ins work?

- Each Plug-in has a description.
- When faced with a prompt, Chat GPT determines which available plug-in is most suitable.
- ChatGPT invokes the plug-in (e.g., through an API).
- ChatGPT processes the returned response.
- The cycle is repeated, as necessary.



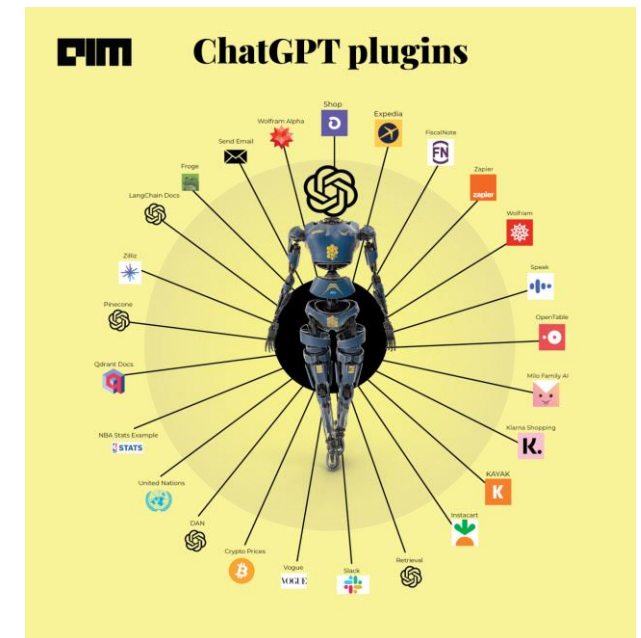
How do these plug-ins work?



[coursera](#)

Let's look at it live

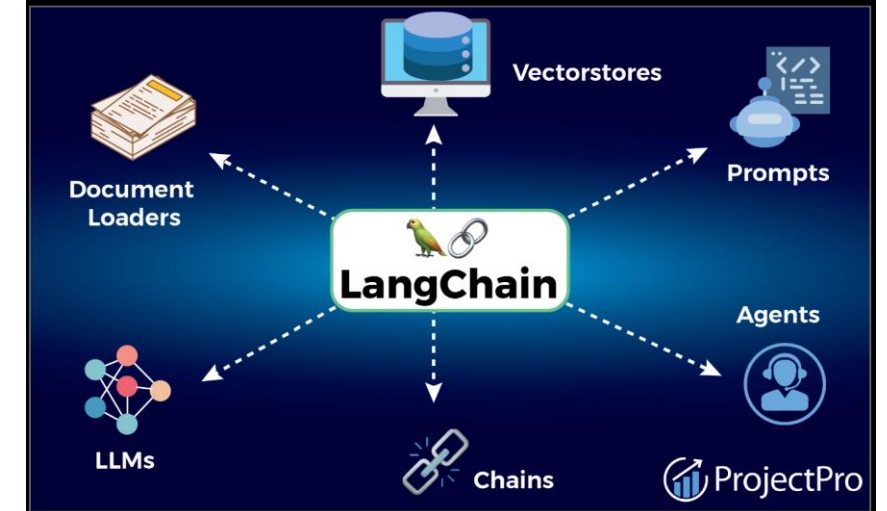
Demo

analyticsindiamag.com

LangChain

What is LangChain?

A framework/package that simplifies the use of LLMs (e.g., OpenAI API) by providing functionality for document reading, chatbots, summarization, etc.



Let's see how it works.

[Demo](#)

Roles in OpenAI API

System role

The system role also known as the system message is included at the beginning of the array. This message provides the initial instructions to the model. You can provide various information in the system role including:

- A brief description of the assistant
- Personality traits of the assistant
- Instructions or rules you would like the assistant to follow
- Data or information needed for the model, such as relevant questions from an FAQ

You can customize the system role for your use case or just include basic instructions. The system role/message is optional, but it's recommended to at least include a basic one to get the best results.

Messages

After the system role, you can include a series of messages between the **user** and the **assistant**.

 Copy

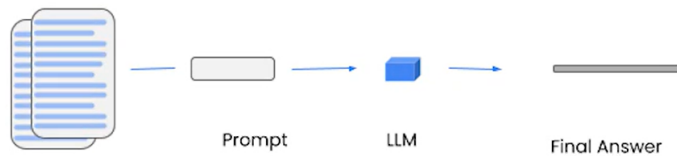
```
{"role": "user", "content": "What is thermodynamics?"}
```

To trigger a response from the model, you should end with a user message indicating that it's the assistant's turn to respond. You can also include a series of example messages between the user and the assistant as a way to do few shot learning.

Q: What to do if document is too long

It is not going to fit in one context window

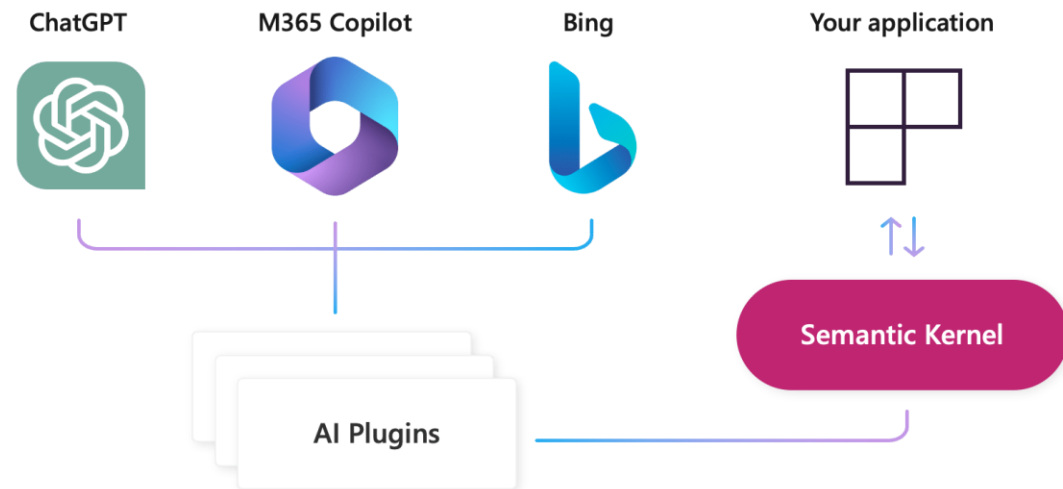
Stuff method



Microsoft Semantic Kernel

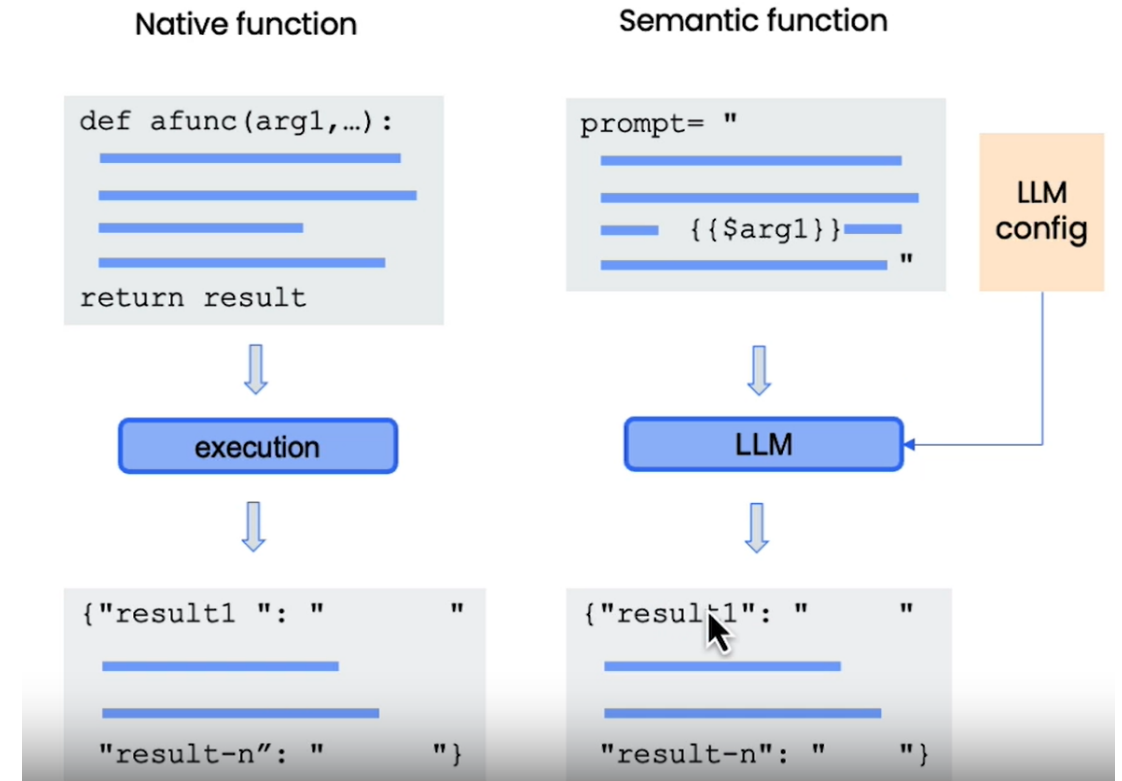
Semantic Kernel

- Another framework for developing plugins.



Semantic Kernel

- Mostly used for “semantic” functions.



Example 1: SWOT analysis

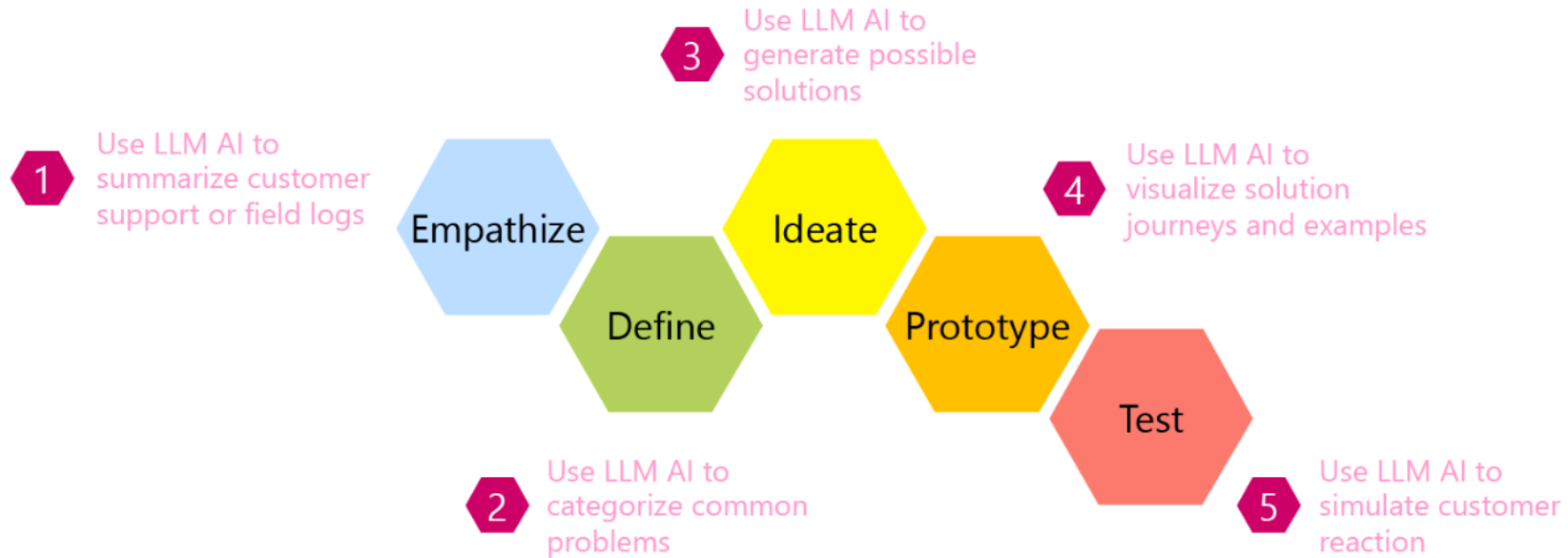
A business strategy tool:

- Strengths
- Weaknesses
- Opportunities
- Threats

SWOT ANALYSIS



Example 2: Design Thinking



deeplearning.ai

Demo

https://github.com/elhamod/IS883/blob/main/Semantic_Kernel.ipynb