```
1 !pip install -q langchain google-generativeai huggingface_hub transformers spacy torch lan
2 !python -m spacy download en_core_web_sm
```

```
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 42.0/42.0 kB 2.0 MB/s eta 0:00:00
Collecting en-core-web-sm==3.8.0
  Using cached https://github.com/explosion/spacy-models/releases/download/en_core_web_sm-
✔ Download and installation successful
You can now load the package via spacy.load('en_core_web_sm')
⚠ Restart to reload dependencies
If you are in a Jupyter or Colab notebook, you may need to restart Python in
order to load all the package's dependencies. You can do this by selecting the
'Restart kernel' or 'Restart runtime' option.
```

```
1 import spacy
2 import torch
3 from transformers import pipeline
4 from huggingface_hub import InferenceClient
5 from langchain_google_genai import ChatGoogleGenerativeAI
6 from langchain.schema import HumanMessage
7 from IPython.display import Image as IPyImage, display
8 import os
```

HuggingFace Login

```
1 from google.colab import userdata
2
3 from huggingface_hub import login
4 login(token=userdata.get("HUGGINGFACE_TOKEN"))
5
```

Load spaCy and sentiment models

```
1 nlp = spacy.load("en_core_web_sm")
2 sentiment_analyzer = pipeline("sentiment-analysis")
```

```
No model was supplied, defaulted to distilbert/distilbert-base-uncased-finetuned-sst-2-eng
Using a pipeline without specifying a model name and revision in production is not recomme
/usr/local/lib/python3.11/dist-packages/huggingface_hub/utils/_auth.py:94: UserWarning:
The secret `HF_TOKEN` does not exist in your Colab secrets.
To authenticate with the Hugging Face Hub, create a token in your settings tab (https://hu
You will be able to reuse this secret in all of your notebooks.
Please note that authentication is recommended but still optional to access public models
  warnings.warn(
config.json: 100%                                  629/629 [00:00<00:00, 42.2kB/s]
Xet Storage is enabled for this repo, but the 'hf_xet' package is not installed. Falling b
WARNING:huggingface_hub.file_download:Xet Storage is enabled for this repo, but the 'hf_xe
model.safetensors: 100%                            268M/268M [00:02<00:00, 115MB/s]
tokenizer_config.json: 100%                        48.0/48.0 [00:00<00:00, 3.83kB/s]
vocab.txt: 100%                                    232k/232k [00:00<00:00, 7.49MB/s]
Device set to use cpu
```

Load Google Gemini And Stable Diffusion

```
import os
os.environ["GOOGLE_API_KEY"] = userdata.get('GOOGLE_API_KEY_1')
```

```
llm = ChatGoogleGenerativeAI(
    model="gemini-2.0-flash",
    temperature=0.3
)


image_client = InferenceClient(model="stabilityai/stable-diffusion-3.5-large")
```

Function Definitions

```
from PIL import Image
import io

def analyze_sentiment(prompt):
    result = sentiment_analyzer(prompt)[0]
    return result['label']

def extract_named_entities(prompt):
    doc = nlp(prompt)
    return [ent.text for ent in doc.ents]

def classify_request_type(prompt):
    classification_prompt = f"""Classify this prompt into one of the categories:
    - text
    - image
    - translation

    Prompt: "{prompt}"
    Only return one word: text, image, or translation."""

    response = llm([HumanMessage(content=classification_prompt)])
    return response.content.strip().lower()

def handle_text_request(prompt):
    response = llm([HumanMessage(content=prompt)])
    return response.content.strip()


def generate_image_and_captions(prompt):

    pil_image = image_client.text_to_image(prompt, guidance_scale=7.5)

    img_path = "generated_image.png"
    pil_image.save(img_path)

    caption_prompt = f"Generate 3 creative captions for an image based on: {prompt}"
    captions = llm([HumanMessage(content=caption_prompt)]).content.strip().split('\n')
    captions = [cap.strip("-• ") for cap in captions if cap.strip()]

```

```
    return img_path, captions


def translate_prompt(prompt, target_lang="fr"):
    translate_prompt = f"Translate the text :\n\n{prompt}"
    return llm([HumanMessage(content=translate_prompt)]).content.strip()

```

Chatbot

```
print("Welcome to SmartBot in Colab! Type 'exit' to quit.\n")

while True:
    user_input = input("You: ")

    if user_input.lower() == "exit":
        print("Goodbye!")
        break

    sentiment = analyze_sentiment(user_input)
    entities = extract_named_entities(user_input)
    task_type = classify_request_type(user_input)

    print(f"\n[Sentiment]: {sentiment}")
    print(f"[Named Entities]: {entities}")
    print(f"[Request Type]: {task_type}")

    if task_type == "text":
        response = handle_text_request(user_input)
        print(f"[Response]: {response}\n")

    elif task_type == "image":
        img_path, captions = generate_image_and_captions(user_input)
        print("[Captions]:")
        for i, cap in enumerate(captions, 1):
            print(f"  {i}. {cap}")
        display(IPyImage(filename=img_path))

    elif task_type == "translation":
        translation = translate_prompt(user_input)
        print(f"[Translated]: {translation}\n")

    else:
        print("[Error]: Unrecognized request type.\n")

```

```
Welcome to SmartBot in Colab! Type 'exit' to quit.

You: Tell me interesting facts about monarch butterflies.

[Sentiment]: POSITIVE
[Named Entities]: []
[Request Type]: text
[Response]: Okay, here are some interesting facts about Monarch butterflies, covering thei

**Migration & Navigation:**

*   **Epic Migration:** Monarch butterflies undertake one of the most spectacular migratio
*   **Multi-Generational Journey:** The butterflies that complete the migration to Mexico
*   **Solar Compass:** Monarchs use a combination of the sun's position in the sky and the
*   **Magnetic Sense:** Recent research suggests that Monarchs also use the Earth's magnet
*   **Following Ancestral Routes:** Somehow, each generation knows where to go, even thoug
*   **Overwintering Clustering:** At their overwintering sites, Monarchs cluster together

**Life Cycle & Biology:**

*   **Milkweed Specialists:** Monarch caterpillars *exclusively* eat milkweed plants. Milk
*   **Toxicity as Defense:** These toxins make both the caterpillars and the adult butterf
*   **Complete Metamorphosis:** Monarchs undergo complete metamorphosis, meaning they have
*   **Chrysalis Transformation:** The chrysalis stage is a marvel of nature. Inside the ja
*   **Sex Determination:** You can tell the difference between male and female Monarchs. M
*   **Short Adult Lifespan (Except the Migrants):**  Most Monarch butterflies live only a
*   **Taste Receptors on Feet:** Butterflies taste with their feet! They have taste recept

**Conservation & Threats:**

*   **Declining Populations:** Monarch populations have declined dramatically in recent de
*   **Habitat Loss:** The loss of milkweed, due to herbicide use in agriculture and develo
*   **Climate Change Impacts:** Extreme weather events, such as droughts and severe storms
*   **Logging in Overwintering Sites:** Illegal logging in the oyamel fir forests of Mexic
*   **Citizen Science:**  Citizen science projects, such as tagging Monarchs and monitorin
*   **Plant Milkweed!** One of the best things you can do to help Monarchs is to plant mil

I hope you found these facts interesting! They are truly remarkable creatures.

You: Translate the sentence "The butterfly dances through the garden" to Hindi

[Sentiment]: NEGATIVE
[Named Entities]: ['Hindi']
[Request Type]: translation
[Translated]: The most common and natural translation of "The butterfly dances through the

**तितली बगीचे में नाचती है।** (Titli bagiche mein nachti hai.)

Here's a breakdown:

*   **तितली** (Titli) - Butterfly
*   **बगीचे में** (Bagiche mein) - In the garden / Through the garden
*   **नाचती है** (Nachti hai) - Dances

Other possible translations, though less common, could be:

*   **तितली बगीचे में नृत्य करती है।** (Titli bagiche mein nritya karti hai.) - This uses "nritya" w
*   **तितली बगीचे से होकर नाचती हुई जाती है।** (Titli bagiche se hokar nachti hui jaati hai.) - This

Therefore, **तितली बगीचे में नाचती है।** is the best and most natural translation.

You: Create a beautiful image of a butterfly resting on a flower in the morning sunlight.

[Sentiment]: POSITIVE
[Named Entities]: ['morning']
[Request Type]: image
[Captions]:
```

1. Here are 3 creative captions for an image of a butterfly resting on a flower in the m
2. 1. **"Kissed by dawn, a fleeting masterpiece unfolds. The butterfly, a brushstroke o
3. 2. **"Golden hour whispers secrets to the butterfly, as it sips the nectar of a new
4. 3. **"From chrysalis to sunbeam, a journey celebrated in petals. This butterfly, a s