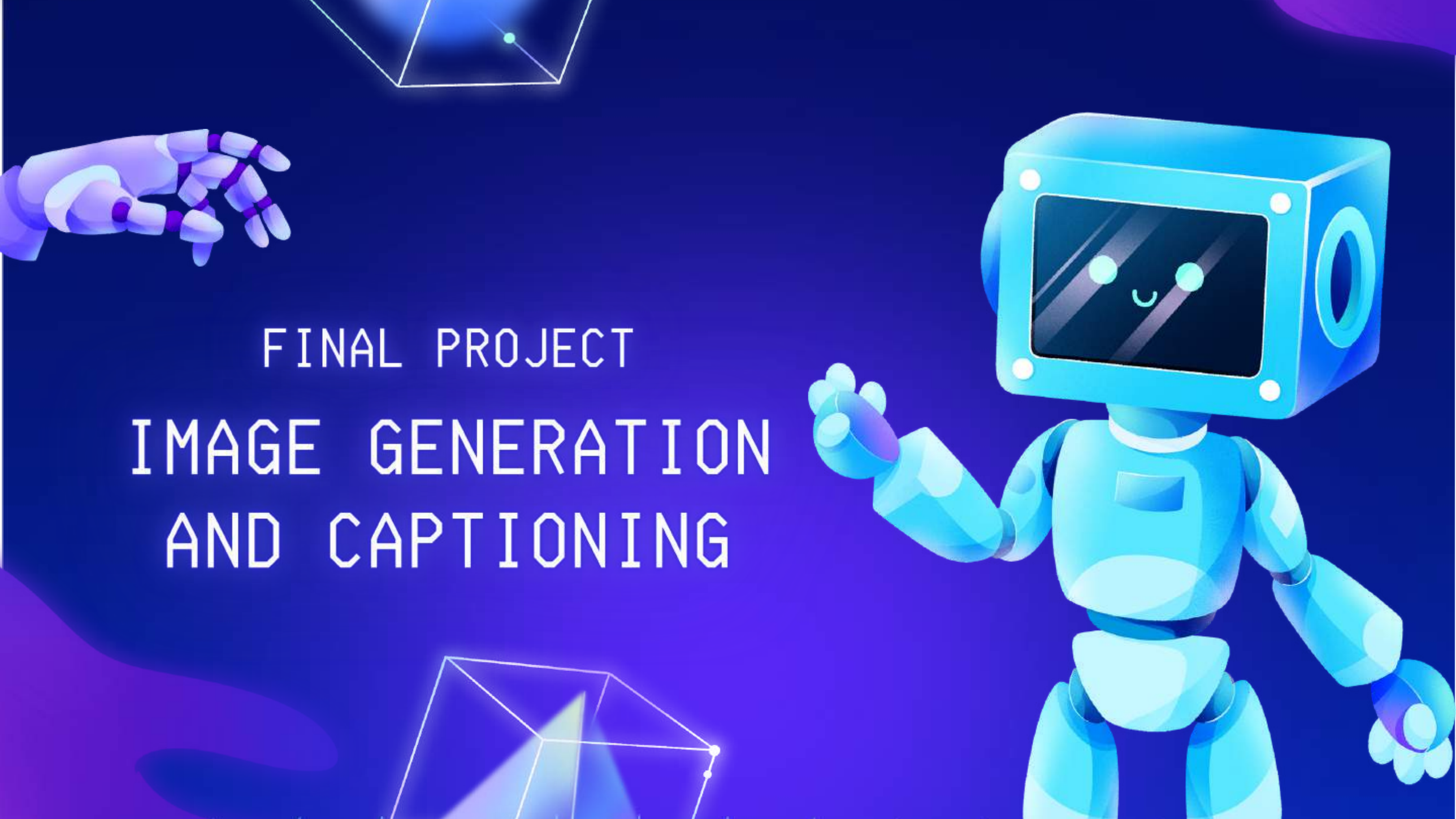
FINAL PROJECT

IMAGE GENERATION AND CAPTIONING



OUR TEAM

Shahad Alhassani

Data Analyst

Shahadbalhassani@gmail.com

@Shahad Alhassani

Noura Abdullah

Data Analyst

nourhamushi@gmail.com

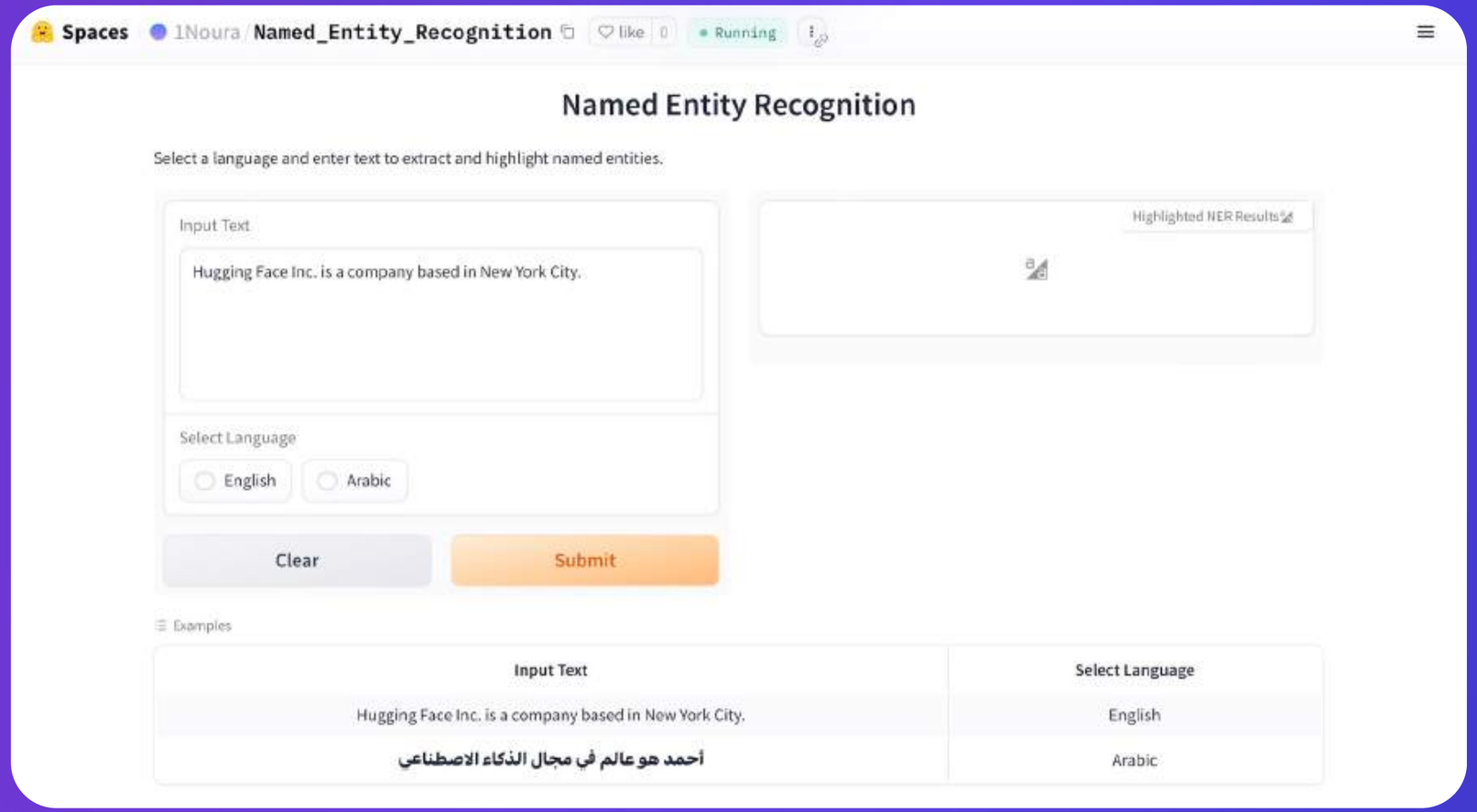
@noura abdullah

PREVIOUS WORK

This project aims to demonstrate named entity recognition (NER) for both English and Arabic languages. It utilizes Hugging Face Transformers and Gradio to extract and highlight named entities from the input text.

PROJECT LINK

DEMO


Spaces
1Noura / Named_Entity_Recognition
like 0
Running
Named Entity Recognition
Select a language and enter text to extract and highlight named entities.
Input Text
Hugging Face Inc. is a company based in New York City.
Highlighted NER Results
Select Language
English
Arabic
Clear
Submit
Examples
Input Text
Select Language
Hugging Face Inc. is a company based in New York City.
English
أحمد هو عالم في مجال الذكاء الاصطناعي
Arabic

PROJECT CONCEPTS

To generate images based on captions from uploaded images and provide translations of those captions from English to Arabic.

IMAGE CAPTIONING USING BLIP

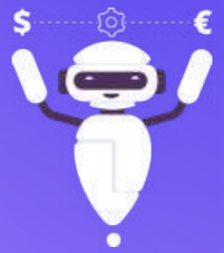
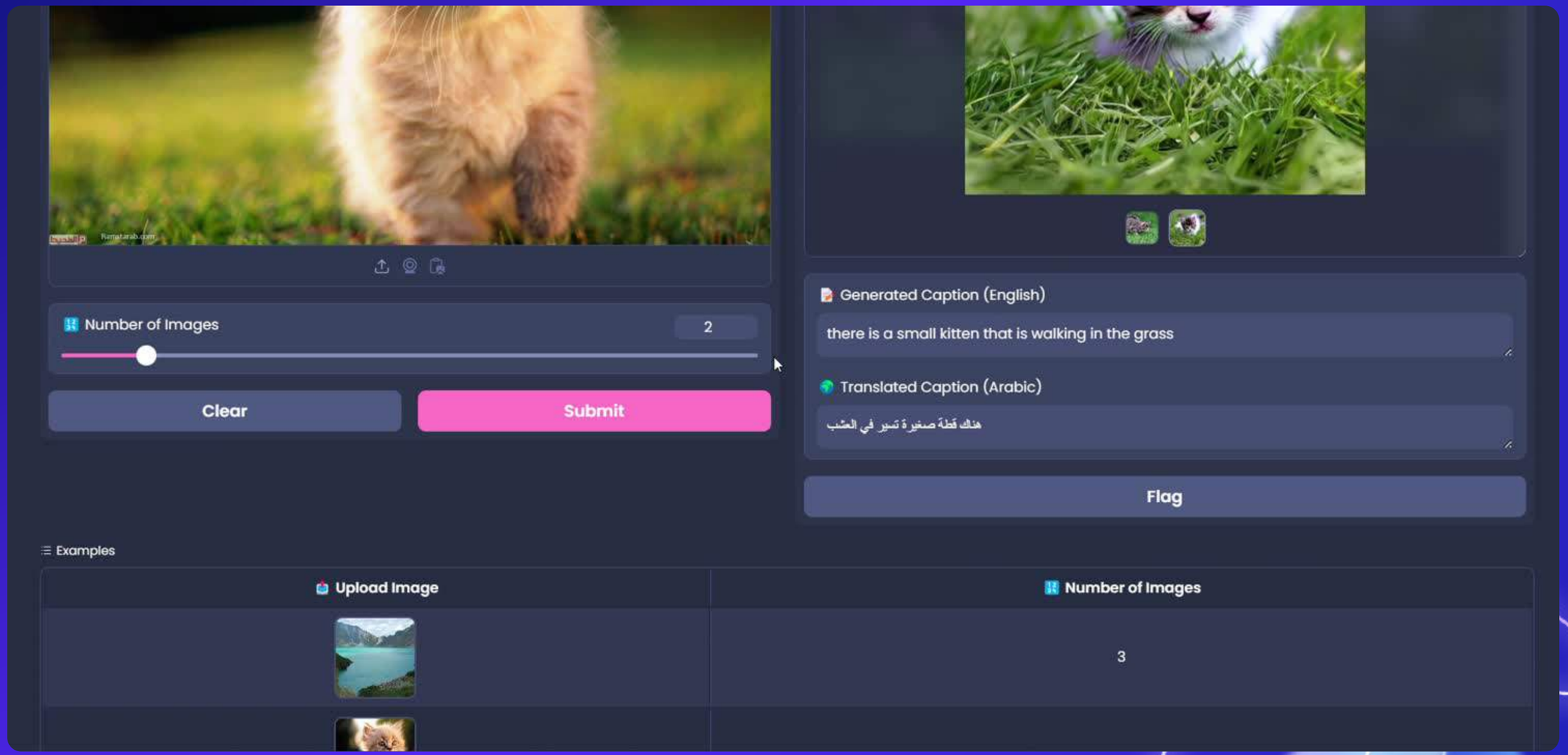


IMAGE GENERATION USING STABLE DIFFUSION

TRANSLATION USING NLLB

DEMO


Number of Images
2
Clear
Submit
Generated Caption (English)
there is a small kitten that is walking in the grass
Translated Caption (Arabic)
هناك قطة صغيرة تسير في العشب
Flag
Examples
Upload Image
Number of Images
3

PIPELINE WORKFLOW

01

Upload Image

The user uploads an image.

02

Caption Generation

Using BLIP, a caption in English is generated based on the image content.

03

Translation

The caption is translated from English to Arabic using the NLLB model.

04

Image Generation

Stable Diffusion generates new images based on the English caption.

05

Display

The original and translated captions are displayed alongside the generated images.

MODEL JUSTIFICATION

01

- BLIP (Image Captioning):
  1. Chosen for its state-of-the-art performance in generating descriptive captions based on images.

02

- Stable Diffusion (Image Generation):
  1. A widely used and powerful diffusion model for generating high-quality images based on textual prompts.

03

- NLLB-200 (Translation):
  1. A multilingual translation model, perfect for translating between English and Arabic, with efficient processing and high accuracy

CODE

```
# Load the models
caption_image = pipeline("image-to-text", model="Salesforce/blip-image-captioning-large", device=device)
sd_pipeline = StableDiffusionPipeline.from_pretrained("runwayml/stable-diffusion-v1-5").to(device)

# Load the translation model (English to Arabic)
translator = pipeline(
    task="translation",
    model="facebook/nllb-200-distilled-600M",
    torch_dtype=torch.bfloat16,
    device=device
)
```

01

PIPELINE IMPLEMENTATION

Import for libraries

Gradio	For building the user interface.
Transformers	To load and apply models (BLIP and NLLB).
Diffusers	For Stable Diffusion pipeline.
Torch	For GPU acceleration.
Wget	For downloading the images.

```
!pip install gradio
!pip install transformers
!pip install diffusers
!pip install torch
```

02

PIPELINE IMPLEMENTATION

Loading Models

```
# Load the models
caption_image = pipeline("image-to-text", model="Salesforce/blip-image-captioning-large", device=device)
sd_pipeline = StableDiffusionPipeline.from_pretrained("runwayml/stable-diffusion-v1-5").to(device)

# Load the translation model (English to Arabic)
translator = pipeline(
    task="translation",
    model="facebook/nllb-200-distilled-600M",
    torch_dtype=torch.bfloat16,
    device=device
)
```

03 PIPELINE IMPLEMENTATION

Main Function

```
# Function to generate images based on the image's caption
def generate_image_and_translate(image, num_images=1):
    # Generate caption in English from the uploaded image
    caption_en = caption_image(image)[0]['generated_text']

    # Translate the English caption to Arabic
    caption_ar = translator(caption_en, src_lang="eng_Latn", tgt_lang="arb_Arab")[0]['translation_text']

    generated_images = []

    # Generate the specified number of images based on the English caption
    for _ in range(num_images):
        generated_image = sd_pipeline(prompt=caption_en).images[0]
        generated_images.append(generated_image)

    # Return the generated images along with both captions
    return generated_images, caption_en, caption_ar
```

04 PIPELINE IMPLEMENTATION

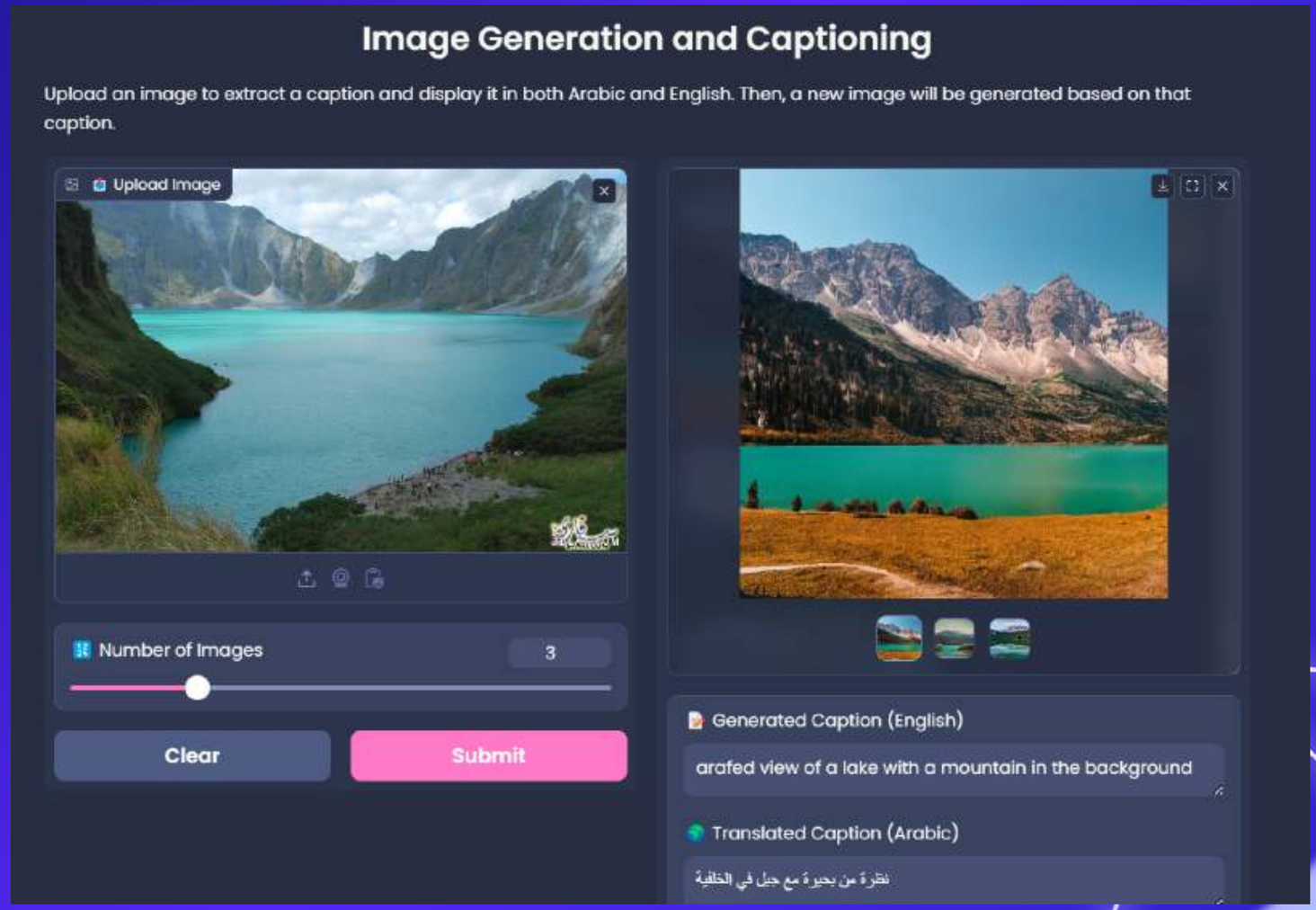
Interface Setup

```
# Set up the Gradio interface
interface = gr.Interface(
    fn=generate_image_and_translate,   # Function to call when processing input
    inputs=[
        gr.Image(type="pil", label="Upload Image"), # Input for image upload
        gr.Slider(minimum=1, maximum=10, label="Number of Images", value=1, step=1) # Slider to select number of imag
    ],
    outputs=[
        gr.Gallery(label="Generated Images"),  # Output for displaying generated images
        gr.Textbox(label="Generated Caption (English)", interactive=False),  # Output for English caption
        gr.Textbox(label="Translated Caption (Arabic)", interactive=False)# Output for Arabic caption

    ],
    title="Image Generation and Translation",  # Title of the interface
    description="Upload an image to generate new images based on its caption and translate the caption into Arabic.",
    examples=[ # Example input
        ["sea.jpg", 3],
        ["Cat.jpeg", 4],
        ["Car.jpeg", 2]
    ]
```

RESULTS & EXAMPLES

RESULTS & EXAMPLES



PROJECT ON COLAB

LINK

• LINKS

SHAHAD ALHASSANI

GITHUB 🔗 HUGGING FACE SPACE 🔗

NOURA ABDULLAH

GITHUB 🔗 HUGGING FACE SPACE 🔗

THANK YOU!