Here's a complete **Text-to-Image** generation script using **Stable Diffusion** via the Hugging Face `diffusers` library, with a **Gradio UI** for easy interaction.

□ Full Setup: Text-to-Image (Stable Diffusion) + Gradio Interface

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□ 1. Install Required Packages

You need Python 3.8–3.10 and a modern GPU (or CPU for slower generation).

```
pip install diffusers transformers accelerate safetensors gradio
```

If you're using a GPU:

```
pip install torch torchvision --index-url https://download.pytorch.org/whl/cu118
```

2. Full Python Script: `text_to_image_app.py`

```
import torch
from diffusers import StableDiffusionPipeline
import gradio as gr

# Load the Stable Diffusion pipeline (FP16 for GPU efficiency)
model_id = "runwayml/stable-diffusion-v1-5"
pipe = StableDiffusionPipeline.from_pretrained(
    model_id,
    torch_dtype=torch.float16 if torch.cuda.is_available() else torch.float32
)

# Move pipeline to GPU if available
device = "cuda" if torch.cuda.is_available() else "cpu"
pipe.to(device)

# Define image generation function
def generate_image(prompt, guidance=7.5, steps=30):
    image = pipe(prompt, guidance_scale=guidance,
num_inference_steps=steps).images[0]
    return image

# Create Gradio UI
demo = gr.Interface(
    fn=generate_image,
    inputs=[
        gr.Textbox(label="Prompt", placeholder="A fantasy castle on a hill"),
        gr.Slider(1.0, 15.0, value=7.5, label="Guidance Scale"),
        gr.Slider(10, 50, value=30, label="Inference Steps")
    ],
    outputs=gr.Image(label="Generated Image"),
    title="Stable Diffusion Text-to-Image",
    description="Enter a text prompt to generate an image using Stable Diffusion
(v1.5)."
)

# Launch the app
demo.launch()
```

▶□ 3. Run the Script

Save it as `text_to_image_app.py`, then run:

```
python text_to_image_app.py
```

Your app will open in a browser window at http://127.0.0.1:7860.

Notes

- The model `runwayml/stable-diffusion-v1-5` is hosted on Hugging Face
- If you don't have a GPU, it will still work — just slower
- You can replace the model ID with:
  - `stabilityai/stable-diffusion-2-1` for higher resolution
  - `CompVis/stable-diffusion-v1-4` for earlier version