```
pip install diffusers
```

⮕ Requirement already satisfied: diffusers in /usr/local/lib/python3.11/dist-packages (0.34.0)
  Requirement already satisfied: importlib_metadata in /usr/local/lib/python3.11/dist-packages (from diffusers) (8.7.0)
  Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-packages (from diffusers) (3.18.0)
  Requirement already satisfied: huggingface-hub>=0.27.0 in /usr/local/lib/python3.11/dist-packages (from diffusers) (0.33.4)
  Requirement already satisfied: numpy in /usr/local/lib/python3.11/dist-packages (from diffusers) (2.0.2)
  Requirement already satisfied: regex!=2019.12.17 in /usr/local/lib/python3.11/dist-packages (from diffusers) (2024.11.6)
  Requirement already satisfied: requests in /usr/local/lib/python3.11/dist-packages (from diffusers) (2.32.3)
  Requirement already satisfied: safetensors>=0.3.1 in /usr/local/lib/python3.11/dist-packages (from diffusers) (0.5.3)
  Requirement already satisfied: Pillow in /usr/local/lib/python3.11/dist-packages (from diffusers) (11.3.0)
  Requirement already satisfied: fsspec>=2023.5.0 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.27.0->diffusers) (20
  Requirement already satisfied: packaging>=20.9 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.27.0->diffusers) (25.
  Requirement already satisfied: pyyaml>=5.1 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.27.0->diffusers) (6.0.2)
  Requirement already satisfied: tqdm>=4.42.1 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.27.0->diffusers) (4.67.1
  Requirement already satisfied: typing-extensions>=3.7.4.3 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.27.0->diff
  Requirement already satisfied: hf-xet<2.0.0,>=1.1.2 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub>=0.27.0->diffusers)
  Requirement already satisfied: zipp>=3.20 in /usr/local/lib/python3.11/dist-packages (from importlib_metadata->diffusers) (3.23.0)
  Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.11/dist-packages (from requests->diffusers) (3.4.2)
  Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.11/dist-packages (from requests->diffusers) (3.10)
  Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.11/dist-packages (from requests->diffusers) (2.5.0)
  Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-packages (from requests->diffusers) (2025.7.14)

```
pip install transformers
```

⮕ Requirement already satisfied: transformers in /usr/local/lib/python3.11/dist-packages (4.53.2)
  Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-packages (from transformers) (3.18.0)
  Requirement already satisfied: huggingface-hub<1.0,>=0.30.0 in /usr/local/lib/python3.11/dist-packages (from transformers) (0.33.4)
  Requirement already satisfied: numpy>=1.17 in /usr/local/lib/python3.11/dist-packages (from transformers) (2.0.2)
  Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.11/dist-packages (from transformers) (25.0)
  Requirement already satisfied: pyyaml>=5.1 in /usr/local/lib/python3.11/dist-packages (from transformers) (6.0.2)
  Requirement already satisfied: regex!=2019.12.17 in /usr/local/lib/python3.11/dist-packages (from transformers) (2024.11.6)
  Requirement already satisfied: requests in /usr/local/lib/python3.11/dist-packages (from transformers) (2.32.3)
  Requirement already satisfied: tokenizers<0.22,>=0.21 in /usr/local/lib/python3.11/dist-packages (from transformers) (0.21.2)
  Requirement already satisfied: safetensors>=0.4.3 in /usr/local/lib/python3.11/dist-packages (from transformers) (0.5.3)
  Requirement already satisfied: tqdm>=4.27 in /usr/local/lib/python3.11/dist-packages (from transformers) (4.67.1)
  Requirement already satisfied: fsspec>=2023.5.0 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub<1.0,>=0.30.0->transform
  Requirement already satisfied: typing-extensions>=3.7.4.3 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub<1.0,>=0.30.0-
  Requirement already satisfied: hf-xet<2.0.0,>=1.1.2 in /usr/local/lib/python3.11/dist-packages (from huggingface-hub<1.0,>=0.30.0->trans
  Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.11/dist-packages (from requests->transformers) (3.4.2)
  Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.11/dist-packages (from requests->transformers) (3.10)
  Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.11/dist-packages (from requests->transformers) (2.5.0)
  Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-packages (from requests->transformers) (2025.7.14)

```
pip install torch
```

⮕

```
      Found existing installation: nvidia-cuda-nvrtc-cu12 12.5.82
      Uninstalling nvidia-cuda-nvrtc-cu12-12.5.82:
        Successfully uninstalled nvidia-cuda-nvrtc-cu12-12.5.82
    Attempting uninstall: nvidia-cuda-cupti-cu12
      Found existing installation: nvidia-cuda-cupti-cu12 12.5.82
      Uninstalling nvidia-cuda-cupti-cu12-12.5.82:
        Successfully uninstalled nvidia-cuda-cupti-cu12-12.5.82
    Attempting uninstall: nvidia-cublas-cu12
      Found existing installation: nvidia-cublas-cu12 12.5.3.2
      Uninstalling nvidia-cublas-cu12-12.5.3.2:
        Successfully uninstalled nvidia-cublas-cu12-12.5.3.2
    Attempting uninstall: nvidia-cusparse-cu12
      Found existing installation: nvidia-cusparse-cu12 12.5.1.3
      Uninstalling nvidia-cusparse-cu12-12.5.1.3:
        Successfully uninstalled nvidia-cusparse-cu12-12.5.1.3
    Attempting uninstall: nvidia-cudnn-cu12
      Found existing installation: nvidia-cudnn-cu12 9.3.0.75
      Uninstalling nvidia-cudnn-cu12-9.3.0.75:
        Successfully uninstalled nvidia-cudnn-cu12-9.3.0.75
    Attempting uninstall: nvidia-cusolver-cu12
      Found existing installation: nvidia-cusolver-cu12 11.6.3.83
      Uninstalling nvidia-cusolver-cu12-11.6.3.83:
        Successfully uninstalled nvidia-cusolver-cu12-11.6.3.83
Successfully installed nvidia-cublas-cu12-12.4.5.8 nvidia-cuda-cupti-cu12-12.4.127 nvidia-cuda-nvrtc-cu12-12.4.127 nvidia-cuda-runtime
```

pip install accelerate

```
Requirement already satisfied: accelerate in /usr/local/lib/python3.11/dist-packages (1.9.0)
Requirement already satisfied: numpy<3.0.0,>=1.17 in /usr/local/lib/python3.11/dist-packages (from accelerate) (2.0.2)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.11/dist-packages (from accelerate) (25.0)
Requirement already satisfied: psutil in /usr/local/lib/python3.11/dist-packages (from accelerate) (5.9.5)
Requirement already satisfied: pyyaml in /usr/local/lib/python3.11/dist-packages (from accelerate) (6.0.2)
Requirement already satisfied: torch>=2.0.0 in /usr/local/lib/python3.11/dist-packages (from accelerate) (2.6.0+cu124)
Requirement already satisfied: huggingface_hub>=0.21.0 in /usr/local/lib/python3.11/dist-packages (from accelerate) (0.33.4)
Requirement already satisfied: safetensors>=0.4.3 in /usr/local/lib/python3.11/dist-packages (from accelerate) (0.5.3)
Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-packages (from huggingface_hub>=0.21.0->accelerate) (3.18.0)
Requirement already satisfied: fsspec>=2023.5.0 in /usr/local/lib/python3.11/dist-packages (from huggingface_hub>=0.21.0->accelerate) (2
Requirement already satisfied: requests in /usr/local/lib/python3.11/dist-packages (from huggingface_hub>=0.21.0->accelerate) (2.32.3)
Requirement already satisfied: tqdm>=4.42.1 in /usr/local/lib/python3.11/dist-packages (from huggingface_hub>=0.21.0->accelerate) (4.67.
Requirement already satisfied: typing-extensions>=3.7.4.3 in /usr/local/lib/python3.11/dist-packages (from huggingface_hub>=0.21.0->acce
Requirement already satisfied: hf-xet<2.0.0,>=1.1.2 in /usr/local/lib/python3.11/dist-packages (from huggingface_hub>=0.21.0->accelerate
Requirement already satisfied: networkx in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate) (3.5)
Requirement already satisfied: jinja2 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate) (3.1.6)
Requirement already satisfied: nvidia-cuda-nvrtc-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerat
Requirement already satisfied: nvidia-cuda-runtime-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->acceler
Requirement already satisfied: nvidia-cuda-cupti-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerat
Requirement already satisfied: nvidia-cudnn-cu12==9.1.0.70 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate) (9
Requirement already satisfied: nvidia-cublas-cu12==12.4.5.8 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate) (
Requirement already satisfied: nvidia-cufft-cu12==11.2.1.3 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate) (1
Requirement already satisfied: nvidia-curand-cu12==10.3.5.147 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate)
Requirement already satisfied: nvidia-cusolver-cu12==11.6.1.9 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate)
Requirement already satisfied: nvidia-cusparse-cu12==12.3.1.170 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerat
Requirement already satisfied: nvidia-cusparselt-cu12==0.6.2 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate)
Requirement already satisfied: nvidia-nccl-cu12==2.21.5 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate) (2.21
Requirement already satisfied: nvidia-nvtx-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate) (12
Requirement already satisfied: nvidia-nvjitlink-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate
Requirement already satisfied: triton==3.2.0 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate) (3.2.0)
Requirement already satisfied: sympy==1.13.1 in /usr/local/lib/python3.11/dist-packages (from torch>=2.0.0->accelerate) (1.13.1)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.11/dist-packages (from sympy==1.13.1->torch>=2.0.0->accelera
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.11/dist-packages (from jinja2->torch>=2.0.0->accelerate) (3.0.2
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface_hub>=0.21
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface_hub>=0.21.0->accelera
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface_hub>=0.21.0->ac
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface_hub>=0.21.0->ac
```

pip install safetensors

```
Requirement already satisfied: safetensors in /usr/local/lib/python3.11/dist-packages (0.5.3)
```

```python
from diffusers import StableDiffusionPipeline
import torch

# Load the pre-trained model (You need Hugging Face token for private models)
model_id = "CompVis/stable-diffusion-v1-4"

pipe = StableDiffusionPipeline.from_pretrained(model_id, torch_dtype=torch.float16)
pipe = pipe.to("cuda")
```

```
/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://huggingface.co/settings/tokens), set it as secre
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 or datasets.
  warnings.warn(
```

model_index.json: 100%   541/541 [00:00<00:00, 56.1kB/s]

Fetching 16 files: 100%   16/16 [02:25<00:00, 8.26s/it]

config.json: 4.56k/? [00:00<00:00, 262kB/s]

scheduler_config-checkpoint.json: 100%   209/209 [00:00<00:00, 2.60kB/s]

merges.txt: 525k/? [00:00<00:00, 4.84MB/s]

config.json: 100%   592/592 [00:00<00:00, 7.17kB/s]

preprocessor_config.json: 100%   342/342 [00:00<00:00, 5.29kB/s]

scheduler_config.json: 100%   313/313 [00:00<00:00, 6.35kB/s]

special_tokens_map.json: 100%   472/472 [00:00<00:00, 54.9kB/s]

text_encoder/model.safetensors: 100%   492M/492M [02:06<00:00, 2.02MB/s]

tokenizer_config.json: 100%   806/806 [00:00<00:00, 56.1kB/s]

vocab.json: 1.06M/? [00:00<00:00, 17.1MB/s]

config.json: 100%   551/551 [00:00<00:00, 17.7kB/s]

config.json: 100%   743/743 [00:00<00:00, 23.3kB/s]

unet/diffusion_pytorch_model.safetensors: 100%   3.44G/3.44G [02:24<00:00, 47.3MB/s]

vae/diffusion_pytorch_model.safetensors: 100%   335M/335M [02:18<00:00, 3.35MB/s]

safety_checker/model.safetensors: 100%   1.22G/1.22G [01:32<00:00, 26.0MB/s]

Loading pipeline components...: 100%   7/7 [00:22<00:00, 4.49s/it]

```python
from diffusers import StableDiffusionPipeline
import torch

model_id = "CompVis/stable-diffusion-v1-4"

device = "cuda" if torch.cuda.is_available() else "cpu"

pipe = StableDiffusionPipeline.from_pretrained(model_id, torch_dtype=torch.float32)
pipe = pipe.to(device)

pipe.enable_attention_slicing()

prompt = "A magical forest with glowing mushrooms"
image = pipe(prompt).images[0]
image.save("output.png")
image.show()
```

Loading pipeline components...: 100%   7/7 [00:02<00:00, 3.13it/s]

100%   50/50 [00:27<00:00, 1.87it/s]

```python
prompt = "a futuristic cityscape at sunset, digital art"
image = pipe(prompt).images[0]

# Save the image
image.save("generated_image.png")
image.show()
```

100%   50/50 [00:29<00:00, 1.72it/s]

```python
from diffusers import StableDiffusionPipeline
import torch
from PIL import Image
```

```
from IPython.display import display
```

```
model_id = "runwayml/stable-diffusion-v1-5"

pipe = StableDiffusionPipeline.from_pretrained(model_id, torch_dtype=torch.float16)
pipe = pipe.to("cuda")  # Use GPU
pipe.enable_attention_slicing()
```

model_index.json: 100%	541/541 [00:00<00:00, 40.6kB/s]	
Fetching 15 files: 100%	15/15 [01:10<00:00, 5.09s/it]	
preprocessor_config.json: 100%	342/342 [00:00<00:00, 10.2kB/s]	
config.json: 4.72k/? [00:00<00:00, 83.3kB/s]		
scheduler_config.json: 100%	308/308 [00:00<00:00, 5.75kB/s]	
special_tokens_map.json: 100%	472/472 [00:00<00:00, 7.26kB/s]	
config.json: 100%	617/617 [00:00<00:00, 11.0kB/s]	
merges.txt: 525k/? [00:00<00:00, 6.41MB/s]		
model.safetensors: 100%	1.22G/1.22G [00:38<00:00, 26.4MB/s]	
model.safetensors: 100%	492M/492M [00:16<00:00, 81.6MB/s]	
vocab.json: 1.06M/? [00:00<00:00, 5.92MB/s]		
tokenizer_config.json: 100%	806/806 [00:00<00:00, 24.0kB/s]	
config.json: 100%	743/743 [00:00<00:00, 6.61kB/s]	
config.json: 100%	547/547 [00:00<00:00, 4.51kB/s]	
diffusion_pytorch_model.safetensors: 100%	3.44G/3.44G [01:09<00:00, 48.6MB/s]	
diffusion_pytorch_model.safetensors: 100%	335M/335M [00:15<00:00, 26.6MB/s]	
Loading pipeline components...: 100%	7/7 [00:23<00:00, 4.26s/it]	

```
prompt = "Forest with road"

print("Generating image...")
image = pipe(prompt).images[0]
image.save("generated_image.png")

# Display in Colab
display(image)
```

Generating image...
100%   50/50 [00:10<00:00, 4.62it/s]

Generating image...