Stable Diffusion Text-to-Image Program Explanation

1. Importing Libraries

- from diffusers import StableDiffusionPipeline: Loads the pipeline for stable diffusion.

- import torch: PyTorch library used for tensor operations and GPU acceleration.

2. Checking GPU Availability

- torch.cuda.is_available(): Checks if CUDA GPU is available.

- torch.cuda.get_device_name(0): Prints the GPU name if available.

3. Loading the Stable Diffusion Model

- from_pretrained("CompVis/stable-diffusion-v1-4"): Loads the pretrained model.

- torch_dtype=torch.float16: Uses half-precision (efficient for GPU).

- use_auth_token=True: Uses your Hugging Face token for access.

- revision="main": Loads the specified model version.

4. Moving Model to GPU

- pipe.to("cuda"): Moves model to GPU for faster inference.

5. Generating the Image

- pipe(prompt).images[0]: Feeds a text prompt to generate an image.

6. Saving and Showing the Image

- image.save("filename.png"): Saves the generated image.

- image.show(): Displays the image.

Summary Table:

| Step | Purpose |

|------|---------|

| Check GPU | torch.cuda.is_available() |

| Load Model | from_pretrained() |

| Move to GPU | .to("cuda") |

| Generate Image | pipe(prompt) |

| Save/Display | .save(), .show() |

Note: Enable GPU in Google Colab and ensure you have a Hugging Face token.