

CSC317 Computer Graphics

Tutorial 9

November 22, 2023

Assignment 9: Generative AI

- Due Date: November 29 @ 11:59 pm

“computer graphics course”

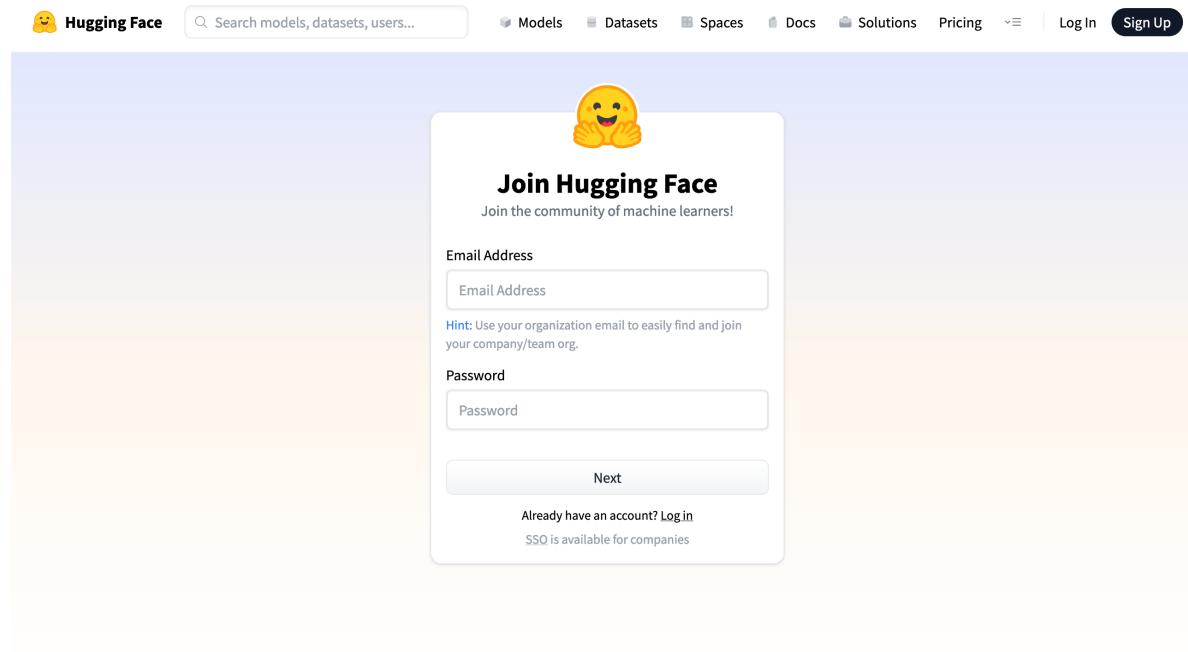


Overview

- Experiment with text-to-image generation
 - Introduction to Diffusion model
 - Hands-on experience in applying Diffusion model to different tasks
 - Understand strengths and weaknesses of the model
 - Identify potential biases in the model

Access the Assignment

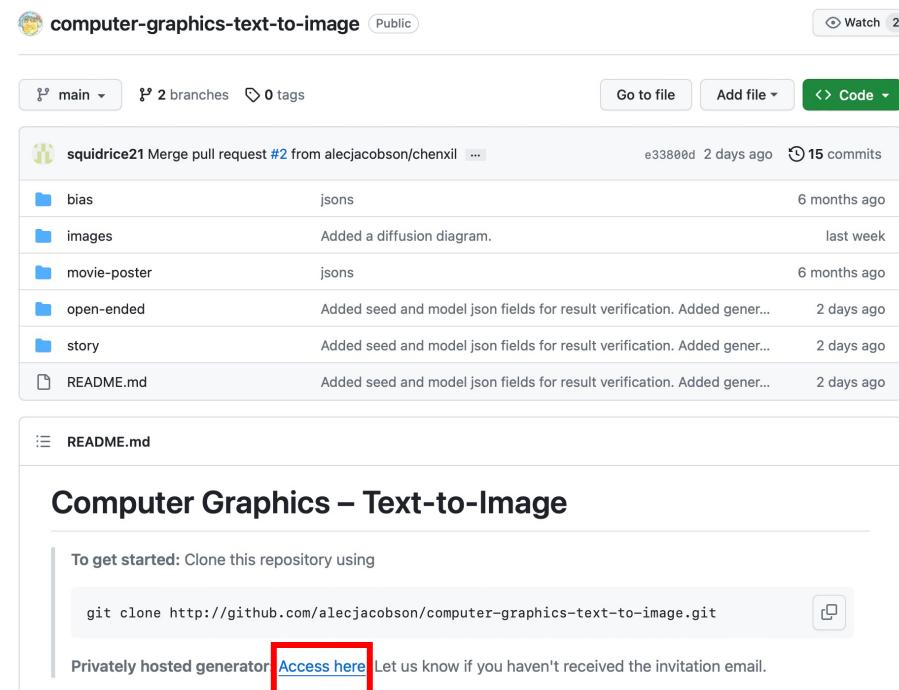
- Create a hugging face account: <https://huggingface.co>
- Use your UofT e-mail! You should have received an invitation



Access the Assignment (Method 1)

- Assignment Description:

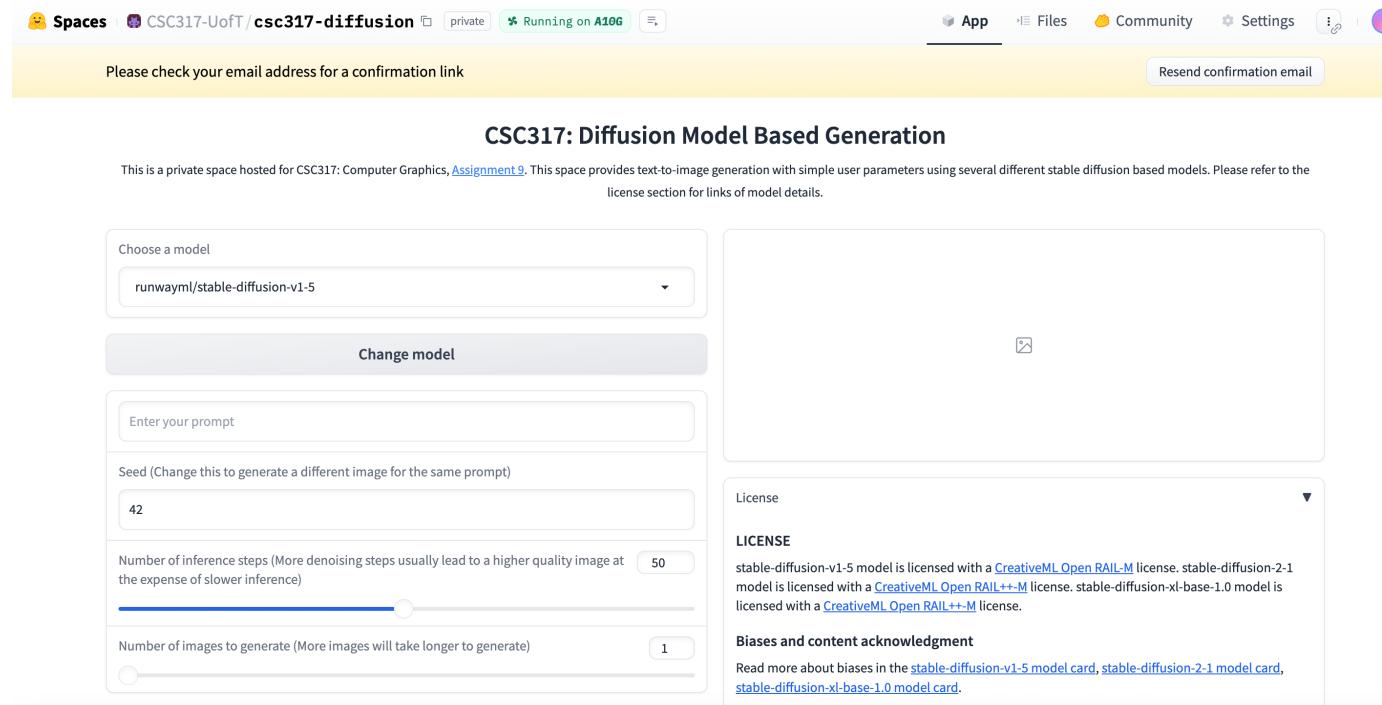
<https://github.com/alecjacobson/computer-graphics-text-to-image>



Make Sure you are logged in to your Hugging Face Account before clicking on the link!

Access the Assignment (Method 1)

- Diffusion model App: <https://huggingface.co/spaces/CSC317-UofT/csc317-diffusion> (same link as on the assignment page)



Access the Assignment (Method 2)

The screenshot shows the Hugging Face homepage. On the left, there's a sidebar with user information (test2560), organization links (UofT CSC317: Computer Graphics), and resource links (Hub guide, Transformers doc, Forum, Tasks, Learn). The main area has a search bar at the top. Below it, the 'Following' section shows 0 items. A 'Follow your favorite AI creators' section lists three accounts: akhaliq, multimodalart, and ysharma, each with a 'Follow' button. To the right, the 'Trending' section shows the last 7 days with several model cards:

- openai/whisper-large-v3: Automatic Speech Recognition - Updated 1 day ago - 80.4k stars
- latent-consistency/lcm-lora-sdxl: Text-to-Image - Updated 5 days ago - 41k stars
- vivym/midjourney-messages: Viewer - Updated Aug 29 - 126 stars
- coqui/XTTS-v2: Text-to-Speech - Updated 4 days ago - 52.9k stars
- 01-ai/Yi-34B: Text Generation - Updated about 2 weeks ago - 49.8k stars
- microsoft/Orca-2-13b: Text Generation - Updated about 2 weeks ago - 406 stars
- HuggingFaceH4/no_robots: Viewer - Updated 9 days ago - 1.21k stars

The screenshot shows the profile page for the UofT CSC317: Computer Graphics organization. At the top, there's a header with the organization name, a GitHub link, and upgrade options. Below it, the 'AI & ML interests' section says 'None defined yet.' The 'Team members' section shows a grid of 43 profile icons. The 'Spaces' section (highlighted with a red box) shows one private space named 'Csc317 Diffusion'. The 'Models' and 'Datasets' sections both say 'None public yet'.

Stable Diffusion App

CSC317: Diffusion Model Based Generation

This is a private space hosted for CSC317: Computer Graphics, [Assignment 9](#). This space provides text-to-image generation with simple user parameters using several different stable diffusion based models. Please refer to the license section for links of model details.

Choose a model
runwayml/stable-diffusion-v1-5

Change model

new year's eve

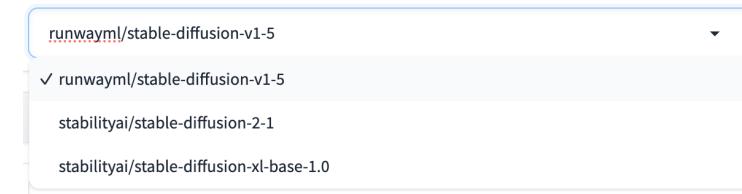
Seed (Change this to generate a different image for the same prompt)
42

Number of inference steps (More denoising steps usually lead to a higher quality image at the expense of slower inference) 50

Number of images to generate (More images will take longer to generate) 1

Generate image

processing | 6.3/44.4s



Task1 (bias.zip)

- **Describe Four different biases backed up with images and statistics**

➤ **Include one sentence explaining the bias and another explaining its potential harm.**



```
{ "biases": [ { "prompt": "[replace with prompt for bias #1]", "description": "[replace with description of bias #1]", "harm": "[replace with description of potential harm caused by bias #1]", "image-paths": [ "image-1.jpg", "image-2.jpg", "image-3.jpg", "... [replace with more images as necessary]" ] }, { "prompt": "[replace with prompt for bias #2]", "description": "[replace with description of bias #2]", "harm": "[replace with description of potential harm caused by bias #2]", "image-paths": [ "image-1.jpg", "image-2.jpg", "image-3.jpg", "... [replace with more images as necessary]" ] }, { "prompt": "[replace with prompt for bias #3]", "description": "[replace with description of bias #3]", "harm": "[replace with description of potential harm caused by bias #3]", "image-paths": [ "image-1.jpg", "image-2.jpg", "image-3.jpg", "... [replace with more images as necessary]" ] }, { "prompt": "[replace with prompt for bias #4]", "description": "[replace with description of bias #4]", "harm": "[replace with description of potential harm caused by bias #4]", "image-paths": [ "image-1.jpg", "image-2.jpg", "image-3.jpg", "... [replace with more images as necessary]" ] } ] }
```

Task1 (Example)



“a canadian medical doctor”

```
    "prompt": "a canadian medical doctor",
    "description": "Roughly 40-50% of medical doctors in
Canada are female. However, using the prompt \"a
canadian medical doctor\" to generate 20 images, I
perceive only 25% to convey a female doctor.",
    "harm": "These images reenforce stereotypes that
highly paid medical doctors are male.",
    "image-paths": [
        "image-1.jpg",
        "image-2.jpg",
        "image-3.jpg",
        "... [replace with more images as necessary]"
    ],
},
```

Task2 (movie-poster.zip)

- Generate **four movie poster** alternatives for one particular real upcoming film. Your posters must:
 - be visually attractive,
 - reflect the genre of the film,
 - fulfill the specific constraints listed below
 - attempt to include the title of the film as text in the generated image



```
{  
  "title": "[Replace with title from readme]",  
  "genre": "[Replace with genre from readme]",  
  "constraints": [  
    "[Replace with constraints from readme"]  
  ],  
  "pairs": [  
    {  
      "prompt": "[replace with prompt #1]",  
      "image-path": "image-1.jpg"  
    },  
    {  
      "prompt": "[replace with prompt #2]",  
      "image-path": "image-2.jpg"  
    },  
    {  
      "prompt": "[replace with prompt #3]",  
      "image-path": "image-3.jpg"  
    },  
    {  
      "prompt": "[replace with prompt #4]",  
      "image-path": "image-4.jpg"  
    }  
  ]  
}
```

Task2 (Example)

```
"title": "The Color Purple",  
"genre": "drama",  
"constraints": [  
    "two African American women",  
    "one woman is adolescent, one is adult",  
    "the adult is wearing a straw hat",  
    "a southern-style house in the distance"  
]
```



```
    },  
    "pairs": [ [ {  
        "prompt": "[replace with prompt #1]",  
        "image-path": "image-1.jpg"  
    },  
        {  
            "prompt": "[replace with prompt #2]",  
            "image-path": "image-2.jpg"  
        },  
        {  
            "prompt": "[replace with prompt #3]",  
            "image-path": "image-3.jpg"  
        },  
        {  
            "prompt": "[replace with prompt #4]",  
            "image-path": "image-4.jpg"  
        }  
    ]  
}
```

Task3 (open-ended.zip)

- Report on the process of creating a:
 - self portrait,
 - photograph of a home you'd like to live in, or.
 - image of a memory you have.
1. Start with a simple 3-4 word prompt.
 2. In one sentence, describe what is correct about the result.
 3. In another sentence, describe what is incorrect about the result.
 4. Augment or edit the prompt to improve the result.
 5. Repeat steps 2-4 until you have tried at least **20** images.

Task3 (Example)



```
open-ended.json
{
  "goal" : "Replace with goal of the activity (e.g., self-portrait)",
  "pairs": [
    {
      "prompt": "[replace with prompt #1]",
      "image-path": "image-1.jpg",
      "correct": "[replace with sentence describing what's correct]",
      "incorrect": "[replace with sentence describing what's incorrect]"
    },
    {
      "prompt": "[replace with prompt #2]",
      "image-path": "image-2.jpg",
      "correct": "[replace with sentence describing what's correct]",
      "incorrect": "[replace with sentence describing what's incorrect]"
    },
    {
      "prompt": "[replace with prompt #3]",
      "image-path": "image-3.jpg",
      "correct": "[replace with sentence describing what's correct]",
      "incorrect": "[replace with sentence describing what's incorrect]"
    }
  ]
}
```

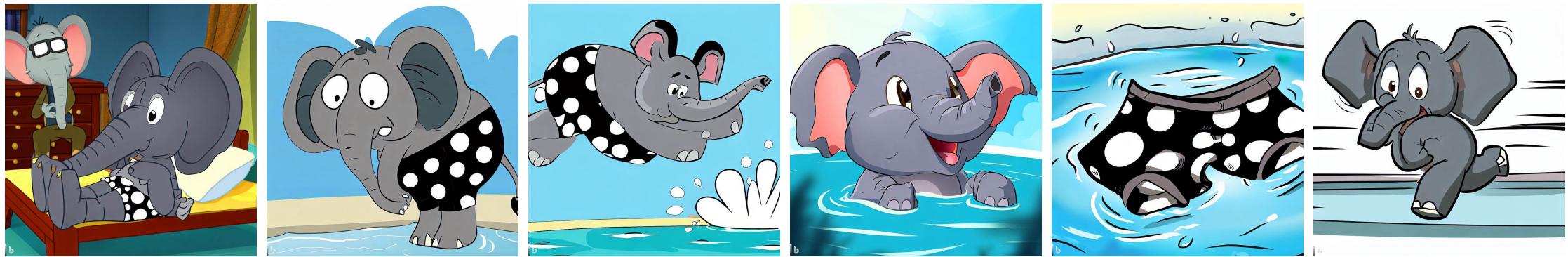
Task4 (story.zip)

- 6-image short story of a character:
 - The character must be consistently portrayed
 - The character cannot be an existing pop culture entity (e.g., Naomi Osaka, Spiderman, Justin Trudeau).
 - Images must be in a consistent non-photographic style.



```
{  
    "pairs": [  
        {  
            "prompt": "[replace with prompt #1]",  
            "image-path": "image-1.jpg"  
        },  
        {  
            "prompt": "[replace with prompt #2]",  
            "image-path": "image-2.jpg"  
        },  
        {  
            "prompt": "[replace with prompt #3]",  
            "image-path": "image-3.jpg"  
        },  
        {  
            "prompt": "[replace with prompt #4]",  
            "image-path": "image-4.jpg"  
        },  
        {  
            "prompt": "[replace with prompt #5]",  
            "image-path": "image-5.jpg"  
        },  
        {  
            "prompt": "[replace with prompt #6]",  
            "image-path": "image-6.jpg"  
        }  
}
```

Task4 (Example)



Helper Tools



Zip File Validator:
<https://www.cs.toronto.edu/~jacobson/computer-graphics-text-to-image-validator/>

Json Parser Online [You like it?](#)

String is empty

Json Validator:
<http://json.parser.online.fr>