

ML Project

November 5, 2022

1 ML PROJECT - RESEARCH PAPER IMPLEMENTATION

2 TOPIC - DIFFUSIONDB: A Large-scale Prompt Gallery Dataset for Text-to-Image Generative Models

3 IMAGE GENERATION

3.0.1 GROUP MEMBERS:

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3.1 Method 1

```
[1]: from urllib.request import urlretrieve
    from json import load
    from PIL import Image
    from os.path import join

    import numpy as np
    import shutil
```

```
[3]: # Example to get data from part-000001
    # Download part-000001.zip
    part_id = 1
    part_url = f'https://huggingface.co/datasets/poloclub/diffusiondb/resolve/main/
    ↪images/part-{part_id:06}.zip'
    urlretrieve(part_url, f'part-{part_id:06}.zip')
```

```
[3]: # Unzip part-000001.zip
shutil.unpack_archive(f'part-{part_id:06}.zip', f'part-{part_id:06}')
```

```
[16]: # Access the images and their prompts and hyperparameters
part_data = load(open(f'part-{part_id:06}/part-{part_id:06}.json', 'r',
    ↪encoding='utf8'))

# Load the image
random_img_name = np.random.choice(list(part_data.keys()), 1)[0]
img = Image.open(join(f'part-{part_id:06}', random_img_name))

# Display the image with its prompt and hyperparameters
print(part_data[random_img_name])
display(img)
```

```
{'p': 'studio ghibli anime, adorable woman walking in the forest, romantic
magical, fairytale, fantasy, pastel colors ', 'se': 1519855030, 'c': 7.0, 'st':
50, 'sa': 'k_lms'}
```



3.2 Method 2

```
[17]: pip install datasets
```

```
Collecting datasetsNote: you may need to restart the kernel to use updated packages.
```

```
Downloading datasets-2.6.1-py3-none-any.whl (441 kB)
```

```
Requirement already satisfied: tqdm>=4.62.1 in c:\users\hp\anaconda3\lib\site-packages (from datasets) (4.62.2)
```

```
Requirement already satisfied: pyyaml>=5.1 in c:\users\hp\anaconda3\lib\site-packages (from datasets) (5.4.1)
```

```
Collecting aiohttp
```

Downloading aiohttp-3.8.3-cp38-cp38-win_amd64.whl (324 kB)
 Collecting multiprocess
 Downloading multiprocess-0.70.14-py38-none-any.whl (132 kB)
 Collecting responses<0.19
 Downloading responses-0.18.0-py3-none-any.whl (38 kB)
 Requirement already satisfied: packaging in c:\users\hp\anaconda3\lib\site-packages (from datasets) (21.0)
 Collecting fsspec[http]>=2021.11.1
 Downloading fsspec-2022.10.0-py3-none-any.whl (138 kB)

 Requirement already satisfied: pandas in c:\users\hp\anaconda3\lib\site-packages (from datasets) (1.3.3)
 Collecting xxhash
 Downloading xxhash-3.1.0-cp38-cp38-win_amd64.whl (30 kB)
 Collecting pyarrow>=6.0.0
 Downloading pyarrow-10.0.0-cp38-cp38-win_amd64.whl (20.0 MB)
 Requirement already satisfied: numpy>=1.17 in c:\users\hp\anaconda3\lib\site-packages (from datasets) (1.20.3)
 Requirement already satisfied: requests>=2.19.0 in c:\users\hp\anaconda3\lib\site-packages (from datasets) (2.26.0)
 Collecting huggingface-hub<1.0.0,>=0.2.0
 Downloading huggingface-hub-0.10.1-py3-none-any.whl (163 kB)
 Collecting dill<0.3.6
 Downloading dill-0.3.5.1-py2.py3-none-any.whl (95 kB)
 Collecting aiosignal>=1.1.2
 Downloading aiosignal-1.2.0-py3-none-any.whl (8.2 kB)
 Collecting frozenlist>=1.1.1
 Downloading frozenlist-1.3.1-cp38-cp38-win_amd64.whl (34 kB)
 Requirement already satisfied: charset-normalizer<3.0,>=2.0 in c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets) (2.0.4)
 Collecting yarl<2.0,>=1.0
 Downloading yarl-1.8.1-cp38-cp38-win_amd64.whl (56 kB)
 Collecting multidict<7.0,>=4.5
 Downloading multidict-6.0.2-cp38-cp38-win_amd64.whl (28 kB)
 Collecting async-timeout<5.0,>=4.0.0a3
 Downloading async-timeout-4.0.2-py3-none-any.whl (5.8 kB)
 Requirement already satisfied: attrs>=17.3.0 in c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets) (21.2.0)
 Requirement already satisfied: filelock in c:\users\hp\anaconda3\lib\site-packages (from huggingface-hub<1.0.0,>=0.2.0->datasets) (3.0.12)
 Requirement already satisfied: typing-extensions>=3.7.4.3 in c:\users\hp\anaconda3\lib\site-packages (from huggingface-hub<1.0.0,>=0.2.0->datasets) (3.10.0.2)
 Requirement already satisfied: pyparsing>=2.0.2 in c:\users\hp\anaconda3\lib\site-packages (from packaging->datasets) (2.4.7)
 Requirement already satisfied: urllib3<1.27,>=1.21.1 in c:\users\hp\anaconda3\lib\site-packages (from requests>=2.19.0->datasets) (1.26.6)

```

Requirement already satisfied: idna<4,>=2.5 in c:\users\hp\anaconda3\lib\site-
packages (from requests>=2.19.0->datasets) (3.2)
Requirement already satisfied: certifi>=2017.4.17 in
c:\users\hp\anaconda3\lib\site-packages (from requests>=2.19.0->datasets)
(2021.5.30)
Requirement already satisfied: colorama in c:\users\hp\anaconda3\lib\site-
packages (from tqdm>=4.62.1->datasets) (0.4.4)
Collecting multiprocessing
  Downloading multiprocessing-0.70.13-py38-none-any.whl (131 kB)
Requirement already satisfied: python-dateutil>=2.7.3 in
c:\users\hp\anaconda3\lib\site-packages (from pandas->datasets) (2.8.2)
Requirement already satisfied: pytz>=2017.3 in c:\users\hp\anaconda3\lib\site-
packages (from pandas->datasets) (2021.1)
Requirement already satisfied: six>=1.5 in c:\users\hp\anaconda3\lib\site-
packages (from python-dateutil>=2.7.3->pandas->datasets) (1.16.0)
Installing collected packages: multidict, frozenlist, yarl, async-timeout,
aiosignal, fsspec, dill, aiohttp, xxhash, responses, pyarrow, multiprocessing,
huggingface-hub, datasets
  Attempting uninstall: fsspec
    Found existing installation: fsspec 2021.8.1
    Uninstalling fsspec-2021.8.1:
      Successfully uninstalled fsspec-2021.8.1
Successfully installed aiohttp-3.8.3 aiosignal-1.2.0 async-timeout-4.0.2
datasets-2.6.1 dill-0.3.5.1 frozenlist-1.3.1 fsspec-2022.10.0 huggingface-
hub-0.10.1 multidict-6.0.2 multiprocessing-0.70.13 pyarrow-10.0.0 responses-0.18.0
xxhash-3.1.0 yarl-1.8.1

```

```
[18]: pip install datasets[audio]
```

```

Requirement already satisfied: datasets[audio] in
c:\users\hp\anaconda3\lib\site-packages (2.6.1)
Requirement already satisfied: fsspec[http]>=2021.11.1 in
c:\users\hp\anaconda3\lib\site-packages (from datasets[audio]) (2022.10.0)
Requirement already satisfied: huggingface-hub<1.0.0,>=0.2.0 in
c:\users\hp\anaconda3\lib\site-packages (from datasets[audio]) (0.10.1)
Requirement already satisfied: multiprocessing in c:\users\hp\anaconda3\lib\site-
packages (from datasets[audio]) (0.70.13)
Requirement already satisfied: responses<0.19 in c:\users\hp\anaconda3\lib\site-
packages (from datasets[audio]) (0.18.0)
Requirement already satisfied: pyarrow>=6.0.0 in c:\users\hp\anaconda3\lib\site-
packages (from datasets[audio]) (10.0.0)
Requirement already satisfied: pandas in c:\users\hp\anaconda3\lib\site-packages
(from datasets[audio]) (1.3.3)
Requirement already satisfied: requests>=2.19.0 in
c:\users\hp\anaconda3\lib\site-packages (from datasets[audio]) (2.26.0)
Requirement already satisfied: tqdm>=4.62.1 in c:\users\hp\anaconda3\lib\site-
packages (from datasets[audio]) (4.62.2)
Requirement already satisfied: pyyaml>=5.1 in c:\users\hp\anaconda3\lib\site-

```

packages (from datasets[audio]) (5.4.1)
 Requirement already satisfied: packaging in c:\users\hp\anaconda3\lib\site-packages (from datasets[audio]) (21.0)
 Requirement already satisfied: xxhash in c:\users\hp\anaconda3\lib\site-packages (from datasets[audio]) (3.1.0)
 Requirement already satisfied: dill<0.3.6 in c:\users\hp\anaconda3\lib\site-packages (from datasets[audio]) (0.3.5.1)
 Requirement already satisfied: numpy>=1.17 in c:\users\hp\anaconda3\lib\site-packages (from datasets[audio]) (1.20.3)
 Requirement already satisfied: aiohttp in c:\users\hp\anaconda3\lib\site-packages (from datasets[audio]) (3.8.3)
 Collecting librosa
 Downloading librosa-0.9.2-py3-none-any.whl (214 kB)
 Requirement already satisfied: frozenlist>=1.1.1 in c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[audio]) (1.3.1)
 Requirement already satisfied: attrs>=17.3.0 in c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[audio]) (21.2.0)
 Requirement already satisfied: yarl<2.0,>=1.0 in c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[audio]) (1.8.1)
 Requirement already satisfied: aiosignal>=1.1.2 in c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[audio]) (1.2.0)
 Requirement already satisfied: async-timeout<5.0,>=4.0.0a3 in c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[audio]) (4.0.2)
 Requirement already satisfied: multidict<7.0,>=4.5 in c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[audio]) (6.0.2)
 Requirement already satisfied: charset-normalizer<3.0,>=2.0 in c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[audio]) (2.0.4)
 Requirement already satisfied: typing-extensions>=3.7.4.3 in c:\users\hp\anaconda3\lib\site-packages (from huggingface-hub<1.0.0,>=0.2.0->datasets[audio]) (3.10.0.2)
 Requirement already satisfied: filelock in c:\users\hp\anaconda3\lib\site-packages (from huggingface-hub<1.0.0,>=0.2.0->datasets[audio]) (3.0.12)
 Requirement already satisfied: pyparsing>=2.0.2 in c:\users\hp\anaconda3\lib\site-packages (from packaging->datasets[audio]) (2.4.7)
 Requirement already satisfied: certifi>=2017.4.17 in c:\users\hp\anaconda3\lib\site-packages (from requests>=2.19.0->datasets[audio]) (2021.5.30)
 Requirement already satisfied: idna<4,>=2.5 in c:\users\hp\anaconda3\lib\site-packages (from requests>=2.19.0->datasets[audio]) (3.2)
 Requirement already satisfied: urllib3<1.27,>=1.21.1 in c:\users\hp\anaconda3\lib\site-packages (from requests>=2.19.0->datasets[audio]) (1.26.6)
 Requirement already satisfied: colorama in c:\users\hp\anaconda3\lib\site-packages (from tqdm>=4.62.1->datasets[audio]) (0.4.4)
 Requirement already satisfied: scipy>=1.2.0 in c:\users\hp\anaconda3\lib\site-packages (from librosa->datasets[audio]) (1.7.1)
 Requirement already satisfied: joblib>=0.14 in c:\users\hp\anaconda3\lib\site-

```

packages (from librosa->datasets[audio]) (1.0.1)
Collecting resampy>=0.2.2
  Downloading resampy-0.4.2-py3-none-any.whl (3.1 MB)
Requirement already satisfied: scikit-learn>=0.19.1 in
c:\users\hp\anaconda3\lib\site-packages (from librosa->datasets[audio]) (0.24.2)
Collecting soundfile>=0.10.2
  Downloading soundfile-0.11.0-py2.py3-none-win_amd64.whl (1.0 MB)
Requirement already satisfied: numba>=0.45.1 in c:\users\hp\anaconda3\lib\site-
packages (from librosa->datasets[audio]) (0.53.1)
Collecting audioread>=2.1.9
  Downloading audioread-3.0.0.tar.gz (377 kB)
Collecting pooch>=1.0
  Downloading pooch-1.6.0-py3-none-any.whl (56 kB)
Requirement already satisfied: decorator>=4.0.10 in
c:\users\hp\anaconda3\lib\site-packages (from librosa->datasets[audio]) (5.1.0)
Requirement already satisfied: setuptools in c:\users\hp\anaconda3\lib\site-
packages (from numba>=0.45.1->librosa->datasets[audio]) (58.0.4)
Requirement already satisfied: llvmlite<0.37,>=0.36.0rc1 in
c:\users\hp\anaconda3\lib\site-packages (from
numba>=0.45.1->librosa->datasets[audio]) (0.36.0)
Requirement already satisfied: appdirs>=1.3.0 in c:\users\hp\anaconda3\lib\site-
packages (from pooch>=1.0->librosa->datasets[audio]) (1.4.4)
Requirement already satisfied: threadpoolctl>=2.0.0 in
c:\users\hp\anaconda3\lib\site-packages (from scikit-
learn>=0.19.1->librosa->datasets[audio]) (2.2.0)
Requirement already satisfied: cffi>=1.0 in c:\users\hp\anaconda3\lib\site-
packages (from soundfile>=0.10.2->librosa->datasets[audio]) (1.14.6)
Requirement already satisfied: pycparser in c:\users\hp\anaconda3\lib\site-
packages (from cffi>=1.0->soundfile>=0.10.2->librosa->datasets[audio]) (2.20)
Requirement already satisfied: python-dateutil>=2.7.3 in
c:\users\hp\anaconda3\lib\site-packages (from pandas->datasets[audio]) (2.8.2)
Requirement already satisfied: pytz>=2017.3 in c:\users\hp\anaconda3\lib\site-
packages (from pandas->datasets[audio]) (2021.1)
Requirement already satisfied: six>=1.5 in c:\users\hp\anaconda3\lib\site-
packages (from python-dateutil>=2.7.3->pandas->datasets[audio]) (1.16.0)
Building wheels for collected packages: audioread
  Building wheel for audioread (setup.py): started
  Building wheel for audioread (setup.py): finished with status 'done'
  Created wheel for audioread: filename=audioread-3.0.0-py3-none-any.whl
size=23706
sha256=f11b5986f286dda72fed0d9441becb3caa69f057cc02940ed65aeb8bea4b3798
  Stored in directory: c:\users\hp\appdata\local\pip\cache\wheels\0a\ed\be\49df2
538fca496690a024a437445584d65c2afd6fc3d6e9c7
Successfully built audioread
Installing collected packages: soundfile, resampy, pooch, audioread, librosa
Successfully installed audioread-3.0.0 librosa-0.9.2 pooch-1.6.0 resampy-0.4.2
soundfile-0.11.0
Note: you may need to restart the kernel to use updated packages.

```

```
[19]: pip install datasets[vision]
```

```
Requirement already satisfied: datasets[vision] in  
c:\users\hp\anaconda3\lib\site-packages (2.6.1)  
Requirement already satisfied: multiprocessing in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (0.70.13)  
Requirement already satisfied: responses<0.19 in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (0.18.0)  
Requirement already satisfied: huggingface-hub<1.0.0,>=0.2.0 in  
c:\users\hp\anaconda3\lib\site-packages (from datasets[vision]) (0.10.1)  
Requirement already satisfied: pyyaml>=5.1 in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (5.4.1)  
Requirement already satisfied: requests>=2.19.0 in  
c:\users\hp\anaconda3\lib\site-packages (from datasets[vision]) (2.26.0)  
Requirement already satisfied: tqdm>=4.62.1 in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (4.62.2)  
Requirement already satisfied: numpy>=1.17 in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (1.20.3)  
Requirement already satisfied: pyarrow>=6.0.0 in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (10.0.0)  
Requirement already satisfied: pandas in c:\users\hp\anaconda3\lib\site-packages  
(from datasets[vision]) (1.3.3)  
Requirement already satisfied: dill<0.3.6 in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (0.3.5.1)  
Requirement already satisfied: aiohttp in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (3.8.3)  
Requirement already satisfied: xxhash in c:\users\hp\anaconda3\lib\site-packages  
(from datasets[vision]) (3.1.0)  
Requirement already satisfied: fsspec[http]>=2021.11.1 in  
c:\users\hp\anaconda3\lib\site-packages (from datasets[vision]) (2022.10.0)  
Requirement already satisfied: packaging in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (21.0)  
Requirement already satisfied: Pillow>=6.2.1 in c:\users\hp\anaconda3\lib\site-  
packages (from datasets[vision]) (8.3.1)  
Requirement already satisfied: async-timeout<5.0,>=4.0.0a3 in  
c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[vision]) (4.0.2)  
Requirement already satisfied: yarl<2.0,>=1.0 in c:\users\hp\anaconda3\lib\site-  
packages (from aiohttp->datasets[vision]) (1.8.1)  
Requirement already satisfied: aiosignal>=1.1.2 in  
c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[vision]) (1.2.0)  
Requirement already satisfied: charset-normalizer<3.0,>=2.0 in  
c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[vision]) (2.0.4)  
Requirement already satisfied: multidict<7.0,>=4.5 in  
c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[vision]) (6.0.2)  
Requirement already satisfied: frozenlist>=1.1.1 in  
c:\users\hp\anaconda3\lib\site-packages (from aiohttp->datasets[vision]) (1.3.1)  
Requirement already satisfied: attrs>=17.3.0 in c:\users\hp\anaconda3\lib\site-
```


packages (from aiohttp->datasets[vision]) (21.2.0)
 Requirement already satisfied: typing-extensions>=3.7.4.3 in
 c:\users\hp\anaconda3\lib\site-packages (from huggingface-
 hub<1.0.0,>=0.2.0->datasets[vision]) (3.10.0.2)
 Requirement already satisfied: filelock in c:\users\hp\anaconda3\lib\site-
 packages (from huggingface-hub<1.0.0,>=0.2.0->datasets[vision]) (3.0.12)
 Requirement already satisfied: pyparsing>=2.0.2 in
 c:\users\hp\anaconda3\lib\site-packages (from packaging->datasets[vision])
 (2.4.7)
 Requirement already satisfied: urllib3<1.27,>=1.21.1 in
 c:\users\hp\anaconda3\lib\site-packages (from
 requests>=2.19.0->datasets[vision]) (1.26.6)
 Requirement already satisfied: certifi>=2017.4.17 in
 c:\users\hp\anaconda3\lib\site-packages (from
 requests>=2.19.0->datasets[vision]) (2021.5.30)
 Requirement already satisfied: idna<4,>=2.5 in c:\users\hp\anaconda3\lib\site-
 packages (from requests>=2.19.0->datasets[vision]) (3.2)
 Requirement already satisfied: colorama in c:\users\hp\anaconda3\lib\site-
 packages (from tqdm>=4.62.1->datasets[vision]) (0.4.4)
 Requirement already satisfied: python-dateutil>=2.7.3 in
 c:\users\hp\anaconda3\lib\site-packages (from pandas->datasets[vision]) (2.8.2)
 Requirement already satisfied: pytz>=2017.3 in c:\users\hp\anaconda3\lib\site-
 packages (from pandas->datasets[vision]) (2021.1)
 Requirement already satisfied: six>=1.5 in c:\users\hp\anaconda3\lib\site-
 packages (from python-dateutil>=2.7.3->pandas->datasets[vision]) (1.16.0)
 Note: you may need to restart the kernel to use updated packages.

```

[5]: import numpy as np
      from datasets import load_dataset

      # Load the dataset with the `random_5k` subset
      dataset = load_dataset('poloclub/diffusiondb', 'random_5k')
  
```

Downloading and preparing dataset diffusiondb/random_5k to C:/Users/HP/.cache/hu
 ggingface/datasets/poloclub__diffusiondb/random_5k/0.9.0/c98e527fa9b265717e2778
 8ced0971123572f432d66cbe5d80a3f1ce5111ac1c...

Downloading data: 0%| | 0.00/614M [00:00<?, ?B/s]

Downloading data: 0%| | 0.00/591M [00:00<?, ?B/s]

Downloading data: 0%| | 0.00/645M [00:00<?, ?B/s]

Downloading data: 0%| | 0.00/544M [00:00<?, ?B/s]

Downloading data: 0%| | 0.00/640M [00:00<?, ?B/s]

Generating train split: 0 examples [00:00, ? examples/s]

Dataset diffusiondb downloaded and prepared to C:/Users/HP/.cache/huggingface/da
 tasetts/poloclub__diffusiondb/random_5k/0.9.0/c98e527fa9b265717e27788ced09711235

72f432d66cbe5d80a3f1ce5111ac1c. Subsequent calls will reuse this data.

0%| | 0/1 [00:00<?, ?it/s]

```
[6]: # All data are stored in the `train` split
my_5k_data = dataset['train']
my_5k_data
```

```
[6]: Dataset({
      features: ['image', 'prompt', 'seed', 'step', 'cfg', 'sampler'],
      num_rows: 5000
})
```

```
[9]: random_i = np.random.choice(range(my_1k_data.num_rows))

# Print out the prompt of this image
print(my_1k_data['prompt'][random_i])

# Display this image
image = my_1k_data['image'][random_i]
display(image)
```

David Schwimmer as a child



[]: