Home Decor Collage Generation Using Stable Diffusion

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Abstract

This project aims to generate home decor collages using the Stable Diffusion model from Hugging Face's repository. The collages combine various home decor elements such as sofas, lighting, and rugs to create aesthetic visual setups for different living spaces.

1 Introduction

The objective of this project is to generate home decor collages based on text descriptions. Using the Stable Diffusion model, we can create realistic images of home decor setups that include items such as sofas, lighting, and rugs. The generated images are then combined into collages, providing a comprehensive visual representation of different decor styles.

2 Workflow Overview

The workflow for generating the collages consists of the following key steps:

1. **Model Selection**: The Stable Diffusion model (`stabilityai/stable-diffusion-2-1`) was used for high-quality image generation.
2. **Prompt Generation**: Text prompts describing various home decor setups were created.
3. **Collage Creation**: Generated images were arranged in a structured collage layout.
4. **Saving and Displaying**: The final collages were stored in Google Drive for easy access.

3 Implementation Details

3.1 Model Setup

The Stable Diffusion model was sourced from Hugging Face and configured using the `diffusers` library. The setup process is as follows:

```
import torch
from diffusers import StableDiffusionPipeline
```

```
from PIL import Image
from google.colab import drive

# Mount Google Drive
drive.mount('/content/drive')

# Define model
model_id = "stabilityai/stable-diffusion-2-1"
pipe = StableDiffusionPipeline.from_pretrained(model_id, torch_dtype=torch.float16)
pipe.to("cuda")
```

3.2 Image Generation and Prompting

A list of home decor items and aesthetic prompts was used to generate images.

```
home_decor_items = [
    "sofa", "lights", "vases", "curtains", "paintings", "coffee table",
    "bed", "bookshelves", "rugs", "armchairs", "side tables"
]

aesthetic_prompts = [
    "a cozy living room with a leather sofa, soft lighting, plants, and a coffee table",
    "a modern bedroom with a large bed, bedside lamps, a rug, and indoor plants",
    "a minimalist living room with a sectional sofa, pendant lights, and abstract wall art",
    "a chic dining room with a wooden dining table, dining chairs, and a large pendant chandelier",
    "a rustic kitchen with open shelving, plants, and wooden accents",
    "a luxury bathroom with marble countertops, candles, towels, and a decorative mirror",
    "a stylish home office with a desk, ergonomic chair, bookshelves, and floor lamps",
    "a cozy reading nook with a comfortable armchair, side table, and soft lighting",
    "a modern entryway with a console table, plants, and decorative mirrors",
    "a vibrant outdoor patio with outdoor furniture, string lights, and plants"

]
```

3.3 Collage Creation

The generated images were arranged into a grid format:

```
def create_collage(images, grid_size=(2, 3), image_size=(512, 512)):
    collage_width = grid_size[1] * image_size[0]
    collage_height = grid_size[0] * image_size[1]

    collage = Image.new("RGB", (collage_width, collage_height))

    x_offset, y_offset = 0, 0
    for i, img in enumerate(images):
        img = img.resize(image_size)
        collage.paste(img, (x_offset, y_offset))

        x_offset += image_size[0]
        if x_offset >= collage_width:
            x_offset = 0
            y_offset += image_size[1]

    return collage
```

3.4 Generating and Saving Collages

The following script was used to generate and save multiple collages:

```
# Generate and save 10 collages
for i in range(10):
    collage = generate_collage(num_images=6)
    collage.show()
    collage.save(f"/content/drive/MyDrive/collage_{i+1}.jpg")
```

4 Results

A total of 10 collages were successfully generated, showcasing different combinations of home decor items. These collages were stored in Google Drive for further analysis and visualization.

5 Conclusion

This project successfully leveraged the Stable Diffusion model to generate realistic home decor collages based on text descriptions. The workflow can be expanded for applications in interior design and visualization.