7 - 8.3. Linear Translation

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1 Introduction

In image processing, `linear translation` is a simple operation that involves shifting an image by a certain distance along the x and y axes. This operation is also known as `image translation` or `image shifting`.

2 Setup

[ ]:
```
%pip install opencv-python opencv-contrib-python numpy matplotlib scipy
```

3 Initial Setup

[12]:
```
# Import Libraries
import os
import cv2
import matplotlib.pyplot as plt
import scipy.ndimage as nd

# Asset Root
asset_root = os.path.join(os.getcwd(), '../../assets')

# Image Path
image_path = os.path.join(asset_root, 'images', 'parrot.jpg')

# Read Image and convert to RGB
input_image = cv2.cvtColor(cv2.imread(image_path), cv2.COLOR_BGR2RGB)

# Display Both Image
plt.figure("Parrot", figsize=(10, 10))

plt.imshow(input_image, cmap='gray')
plt.title("Original Image")
```

```
plt.axis('off')

plt.show()
```

4 Shifting an Image

To shift an image, we can use the `scipy.ndimage.shift` function. This function takes the following parameters:

- `input`: The input image
- `shift`: The shift values vertically and horizontally

[11]:
```
# Set Shift Values
vertical_shift = 250
horizontal_shift = 100

# Shift Image
shifted_image = nd.shift(input_image, (vertical_shift, horizontal_shift, 0))

# Display Both Image
plt.figure("Shifting an Image", figsize=(12, 6))

plt.subplot(1, 2, 1)
plt.imshow(input_image)
plt.title(f"Original Image: {input_image.shape[0]}x{input_image.shape[1]}")
plt.axis('off')

plt.subplot(1, 2, 2)
plt.imshow(shifted_image)
plt.title(f"Shifted Image by {vertical_shift} , {horizontal_shift} ")
plt.axis('off')

plt.show()
```

In the above example, we shifted the image by 250 pixels vertically and 100 pixels horizontally. The `shift` function of `scipy.ndimage` shifts the image by the specified number of pixels. The shift values can be positive or negative. Positive values shift the image down and right, while negative values shift the image up and left.

5 Summary

- In image processing, `linear translation` is a simple operation that involves shifting an image by a certain distance along the x and y axes.
- This operation is also known as `image translation` or `image shifting`.
- We can use the `scipy.ndimage.shift` function to shift an image.
- The function takes the input image and the shift values as parameters.
- The shift values are specified in pixels along the x and y axes.

Read More:

- scipy.ndimage.shift - SciPy v1.7.3 Reference Guide

6 References

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