Lab Report-02

Course title: Digital Image Processing Laboratory

Course code: CSE-406

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Lab Report Title

Convert to Negative Image

Introduction

This lab demonstrates the conversion of an image to its negative in Python. A negative image inverts each pixel's color, making the dark areas appear light and vice versa. This type of image processing is useful in fields like medical imaging and photography to enhance contrast or highlight features.

Python code

```
# image_negative.py

from PIL import Image
import matplotlib.pyplot as plt

def convert_to_negative(input_path, output_path):
    # Open the image file
    img = Image.open(input_path)

    # Convert image to negative
    negative_img = Image.eval(img, lambda x: 255 - x)

    # Save the negative image
    negative_img.save(output_path)

    # Display the original and negative images
    plt.figure(figsize=(10, 5))

    # Display original image
    plt.subplot(1, 2, 1)
    plt.imshow(img)
    plt.title("Original Image")
    plt.axis("off")

    # Display negative image
    plt.subplot(1, 2, 2)
    plt.imshow(negative_img)
    plt.title("Negative Image")
    plt.axis("off")

    plt.show()

# Example usage
```

```
if __name__ == "__main__":
    input_path = "input.jpg"    # Replace with your input image path
    output_path = "negative.jpg" # Desired output image path
    convert_to_negative(input_path, output_path)
    print(f"Negative image saved as {output_path}")
```

Input

Figure 1:

Output

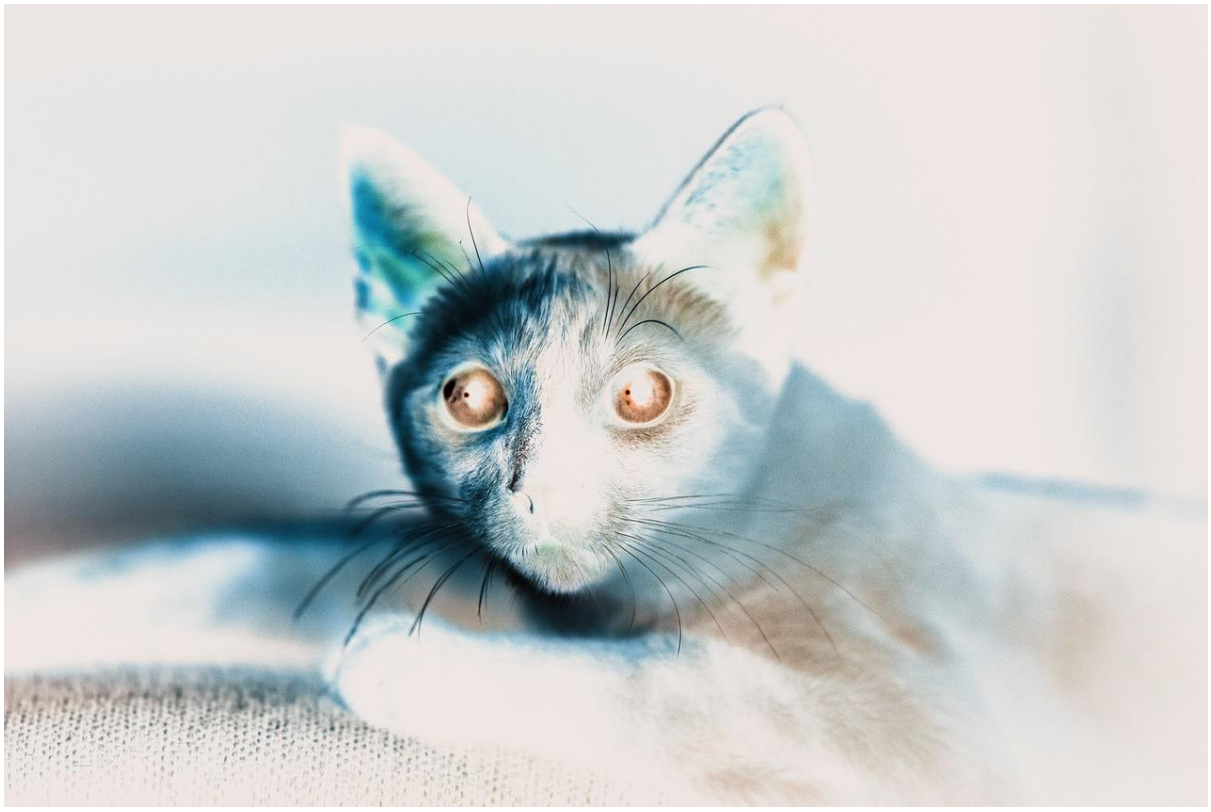

Figure 2:

Lab Report Title

Image Enhancement using Contrast Stretching

Introduction

Contrast stretching is an image enhancement technique used to improve the visibility of details in an image. It enhances the contrast by expanding the range of intensity values in an image, making the light areas lighter and the dark areas darker. This technique is widely used in medical imaging, satellite image processing, and photography to reveal hidden features in low-contrast images.

Python code

```
# contrast_stretching.py

from PIL import Image
import numpy as np
import matplotlib.pyplot as plt

def contrast_stretching(input_path, output_path):
    # Open the image and convert to grayscale
    img = Image.open(input_path).convert("L")
    img_array = np.array(img)

    # Get minimum and maximum pixel values
    min_val = np.min(img_array)
    max_val = np.max(img_array)

    # Apply contrast stretching formula: (pixel - min) * (255 / (max -
    stretched_array = (img_array - min_val) * (255 / (max_val - min_val
    stretched_img = Image.fromarray(stretched_array.astype(np.uint8))

    # Save and display the original and enhanced images
    stretched_img.save(output_path)

    # Plot the original and stretched images side-by-side
    plt.figure(figsize=(10, 5))

    # Display original image
    plt.subplot(1, 2, 1)
    plt.imshow(img, cmap="gray")
    plt.title("Original Image")
    plt.axis("off")

    # Display contrast-stretched image
```

```
    plt.subplot(1, 2, 2)
    plt.imshow(stretched_img, cmap="gray")
    plt.title("Contrast-Stretched Image")
    plt.axis("off")

    plt.show()

# Example usage
if __name__ == "__main__":
    input_path = "input.jpg"          # Replace with your input image pa
    output_path = "contrast_stretch.jpg"  # Desired output image path
    contrast_stretching(input_path, output_path)
    print(f"Contrast-stretched image saved as {output_path}")
```

Input

Figure 3:

Output

Figure 4: