Hamdan Syaifuddin Zuhri_1103220220.ipynb

Filter Moving Average

```
[9] import numpy as np
    import cv2 as cv
    from matplotlib import pyplot as plt
    from ipywidgets import FileUpload

    # Fungsi untuk menampilkan gambar setelah diupload
    def process_image(change):
        # Mengambil file yang diupload
        uploaded_image = list(uploaded_files.value.values())[0]

        # Mengkonversi gambar ke format numpy array
        img_array = np.frombuffer(uploaded_image['content'], np.uint8)
        img = cv.imdecode(img_array, cv.IMREAD_COLOR)

        # Memastikan gambar berhasil dibaca, jika tidak akan menampilkan File tidak dapat dibaca
        assert img is not None, "File tidak dapat dibaca."

        # Membuat kernel filter rata-rata dengan ukuran yang lebih besar (misalnya 9x9)
        kernel = np.ones((81, 81), np.float32) / 6561  # 81x81, dan jumlahnya adalah 1/6561
        dst = cv.filter2D(img, -1, kernel)

        # Menampilkan gambar asli dan hasil filter
        plt.subplot(121), plt.imshow(cv.cvtColor(img, cv.COLOR_BGR2RGB)), plt.title('Gambar Semula')
        plt.xticks([]), plt.yticks([])
        plt.subplot(122), plt.imshow(cv.cvtColor(dst, cv.COLOR_BGR2RGB)), plt.title('Gambar Setelah Averaging')
        plt.xticks([]), plt.yticks([])
        plt.show()

    # Membuat widget upload file
    uploaded_files = FileUpload(accept='image/*', multiple=False)
    uploaded_files.observe(process_image, names='value')
    display(uploaded_files)
```

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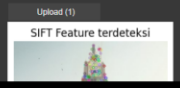
Deteksi Fitur SIFT

```
import cv2
import numpy as np
from matplotlib import pyplot as plt
from ipywidgets import FileUpload
from io import BytesIO

# Fungsi untuk menampilkan gambar setelah diupload
def process_image(change):
    # Mengambil file yang diupload
    uploaded_image = list(uploaded_files.value.values())[0]

    # Membaca gambar sebagai array numpy
    img_array = np.frombuffer(uploaded_image['content'], np.uint8)
    img = cv2.imdecode(img_array, cv2.IMREAD_COLOR)

    # Mengonversi gambar ke grayscale
    gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

    # Membuat SIFT feature extractor
    sift = cv2.SIFT_create()

    # Mendeteksi fitur pada gambar
    keypoints, descriptors = sift.detectAndCompute(gray, None)

    # Menggambar keypoints yang terdeteksi pada gambar
    sift_image = cv2.drawKeypoints(img, keypoints, None)

    # Menampilkan gambar hasil deteksi
    plt.imshow(cv2.cvtColor(sift_image, cv2.COLOR_BGR2RGB))
    plt.title('SIFT Feature terdeteksi')
    plt.axis('Off')
    plt.show()

# Membuat widget upload file
uploaded_files = FileUpload(accept='image/*', multiple=False)
uploaded_files.observe(process_image, names='value')
display(uploaded_files)
```



Upload (1)

SIFT Feature terdeteksi

Representasi Histogram

Hamdan Syaifuddin Zuhri_110

colab.research.google.com/drive/160w21aWmlR7JZbsq0BmaCF4MpzhTkC-s#scrollTo=38gMfecYKLnK

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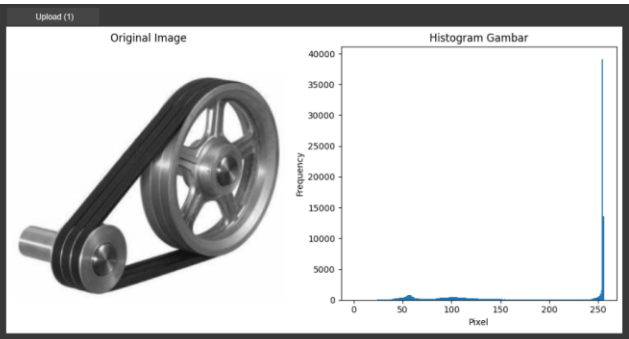
Representasi Histogram

```
import cv2
from matplotlib import pyplot as plt
import ipywidgets as widgets
from IPython.display import display

# Membuat file picker
uploader = widgets.FileUpload(accept='image/*', multiple=False)
display(uploader)

def process_file(change):
    if uploader.value:
        file_data = list(uploader.value.values())[0]
        content = file_data['content']

        # Membaca gambar dari file yang diunggah
        with open("gambar.jpg", "wb") as f:
            f.write(content)

        img = cv2.imread("gambar.jpg", 0)
        if img is not None:
            # Membuat subplot untuk menampilkan gambar dan histogram
            plt.figure(figsize=(10, 5))

            # Menampilkan gambar original
            plt.subplot(1, 2, 1)
            plt.imshow(img, cmap='gray')
            plt.title('Original Image')
            plt.axis('off')

            # Menampilkan histogram
            plt.subplot(1, 2, 2)
            plt.hist(img.ravel(), 256, [0, 256])
            plt.title('Histogram Gambar')
            plt.xlabel('Pixel')
            plt.ylabel('Frequency')

            # Menampilkan kedua plot
            plt.tight_layout()
            plt.show()
        else:
            print("Gagal membaca file gambar.")

# Memproses file setelah diunggah
uploader.observe(process_file, names='value')
```


Upload (1)



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Gemini

Gaussian Smoothing

```python
from PIL import Image, ImageFilter
import matplotlib.pyplot as plt
import ipywidgets as widgets
from IPython.display import display

# Membuat file picker
uploader = widgets.FileUpload(accept='image/*', multiple=False)
display(uploader)

def process_file(change):
    if uploader.value:
        file_data = list(uploader.value.values())[0]
        content = file_data['content']

        # Membaca gambar dari file yang diunggah
        with open("gambar.jpg", "wb") as f:
            f.write(content)

        # Membuka gambar asli
        original_image = Image.open("gambar.jpg")

        # Mengaplikasikan filter Gaussian Blur dengan radius tetap
        radius = 6
        blurred_image = original_image.filter(ImageFilter.GaussianBlur(radius=radius))

        # Menampilkan gambar asli dan hasil filter secara berdampingan
        plt.figure(figsize=(12, 6))

        # Menampilkan gambar asli
        plt.subplot(1, 2, 1)
        plt.imshow(original_image)
        plt.title("Gambar Semula")
        plt.axis('off')

        # Menampilkan gambar hasil filter
        plt.subplot(1, 2, 2)
        plt.imshow(blurred_image)
        plt.title(f"Gambar Gaussian Blurred (Radius: {radius})")
        plt.axis('off')

        # Menampilkan kedua gambar
        plt.tight_layout()
        plt.show()
    else:
        print("Tidak ada gambar yang diunggah.")
```

Search

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Upload (1)

Gambar Semula

Gambar Gaussian Blurred (Radius: 6)

Search

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+ Code + Text

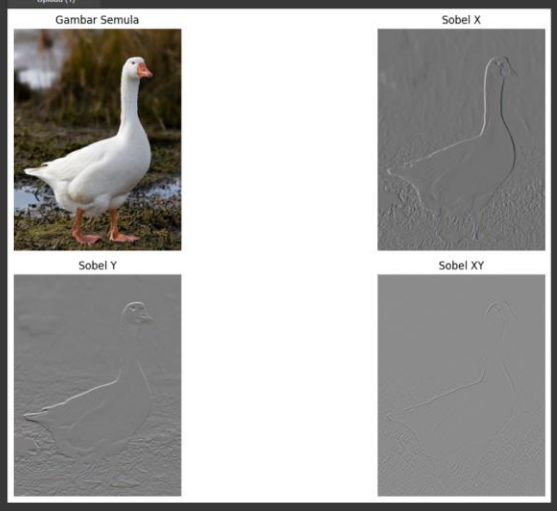
Edge detection with Sobel

```
import cv2
import matplotlib.pyplot as plt
import ipywidgets as widgets
from IPython.display import display

# Membuat file picker
uploader = widgets.FileUpload(accept='image/*', multiple=False)
display(uploader)

def process_file(change):
    if uploader.value:
        file_data = list(uploader.value.values())[0]
        content = file_data['content']

        # Membaca gambar dari file yang diunggah
        with open("gambar.jpg", "wb") as f:
            f.write(content)

        # Membaca gambar menggunakan OpenCV
        img = cv2.imread("gambar.jpg")
        img_rgb = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)  # Konversi ke RGB untuk matplotlib

        # Blur untuk deteksi tepi yang lebih baik
        img_blur = cv2.GaussianBlur(img, (3, 3), 0)

        # Sobel Edge Detection
        sobelx = cv2.Sobel(src=img_blur, ddepth=cv2.CV_64F, dx=1, dy=0, ksize=5)  # Sobel X
        sobely = cv2.Sobel(src=img_blur, ddepth=cv2.CV_64F, dx=0, dy=1, ksize=5)  # Sobel Y
        sobelxy = cv2.Sobel(src=img_blur, ddepth=cv2.CV_64F, dx=1, dy=1, ksize=5)  # Sobel XY

        # Normalisasi hasil Sobel ke rentang [0, 255]
        sobelx_norm = cv2.normalize(sobelx, None, 0, 255, cv2.NORM_MINMAX).astype('uint8')
        sobely_norm = cv2.normalize(sobely, None, 0, 255, cv2.NORM_MINMAX).astype('uint8')
        sobelxy_norm = cv2.normalize(sobelxy, None, 0, 255, cv2.NORM_MINMAX).astype('uint8')

        # Menampilkan hasil
        plt.figure(figsize=(15, 8))

        # Gambar asli
        plt.subplot(2, 2, 1)
        plt.imshow(img_rgb)
        plt.title("Gambar Semula")
        plt.axis('off')

        # Sobel X
        plt.subplot(2, 2, 2)
```

09.22 05/12/2024

```
        print("Tidak ada gambar yang diunggah.")

# Memproses file setelah diunggah
uploader.observe(process_file, names='value')
```

Upload (1)



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Histogram of Oriented Gradients (HOG)

```
import matplotlib.pyplot as plt
from skimage.feature import hog
from skimage import exposure, io
import ipywidgets as widgets
from IPython.display import display

# Membuat widget untuk upload file
uploader = widgets.FileUpload(accept='image/*', multiple=False)
display(uploader)

def process_file(change):
    if uploader.value:
        # Membaca file dari uploader
        file_data = list(uploader.value.values())[0]
        content = file_data['content']

        # Membaca gambar menggunakan skimage
        with open("gambar.jpg", "wb") as f:
            f.write(content)
        image = io.imread("gambar.jpg")

        # Menghitung Histogram orientasi gradien
        fd, hog_image = hog(
            image,
            orientations=8,
            pixels_per_cell=(16, 16),
            cells_per_block=(1, 1),
            visualize=True,
            channel_axis=-1,
        )

        # Rescale histogram agar tampilannya bagus
        hog_image_rescaled = exposure.rescale_intensity(hog_image, in_range=(0, 10))

        # Menampilkan gambar asli dan Histogram orientasi gradien
        fig, (ax1, ax2) = plt.subplots(1, 2, figsize=(12, 6), sharex=True, sharey=True)

        ax1.axis('off')
        ax1.imshow(image, cmap=plt.cm.gray)
        ax1.set_title('Gambar Input')

        ax2.axis('off')
        ax2.imshow(hog_image_rescaled, cmap=plt.cm.gray)
        ax2.set_title('Histogram Orientasi Gradien')

        plt.show()
```

Upload (1)

Gambar Input

Histogram Orientasi Gradien