

```
In [103...]:  
import cv2  
import matplotlib.pyplot as plt  
import numpy as np
```

```
In [2]:  
def mostrar_imagen(image, title='Imagen'):  
    image_rgb = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)  
    plt.imshow(image_rgb)  
    plt.title(title)  
    plt.axis('off')  
    plt.show()
```

```
In [3]: imagenes_rutas = ['./imagenes/{i}.png' for i in range(11)]
```

```
In [4]: # Mostrar Imagenes Originales  
  
for i, ruta in enumerate(imagenes_rutas):  
    imagen = cv2.imread(ruta)  
  
    if imagen is None:  
        print(f"No se pudo cargar la imagen en {ruta}")  
    else:  
        mostrar_imagen(imagen, title=f'Imagen {i}')
```

Imagen 0

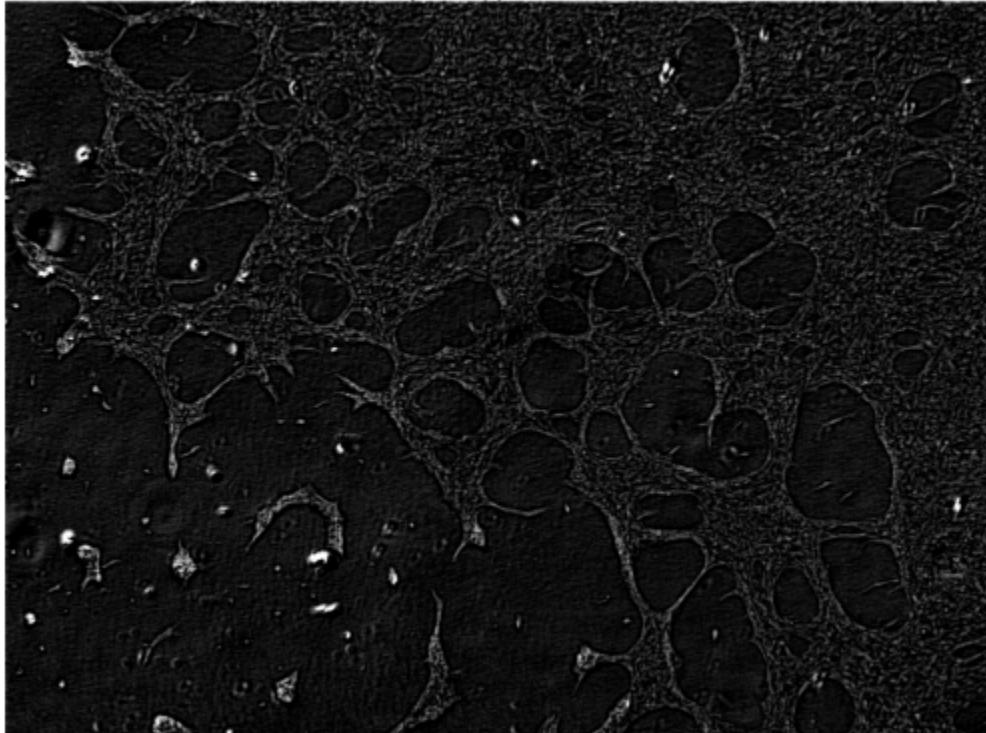


Imagen 1

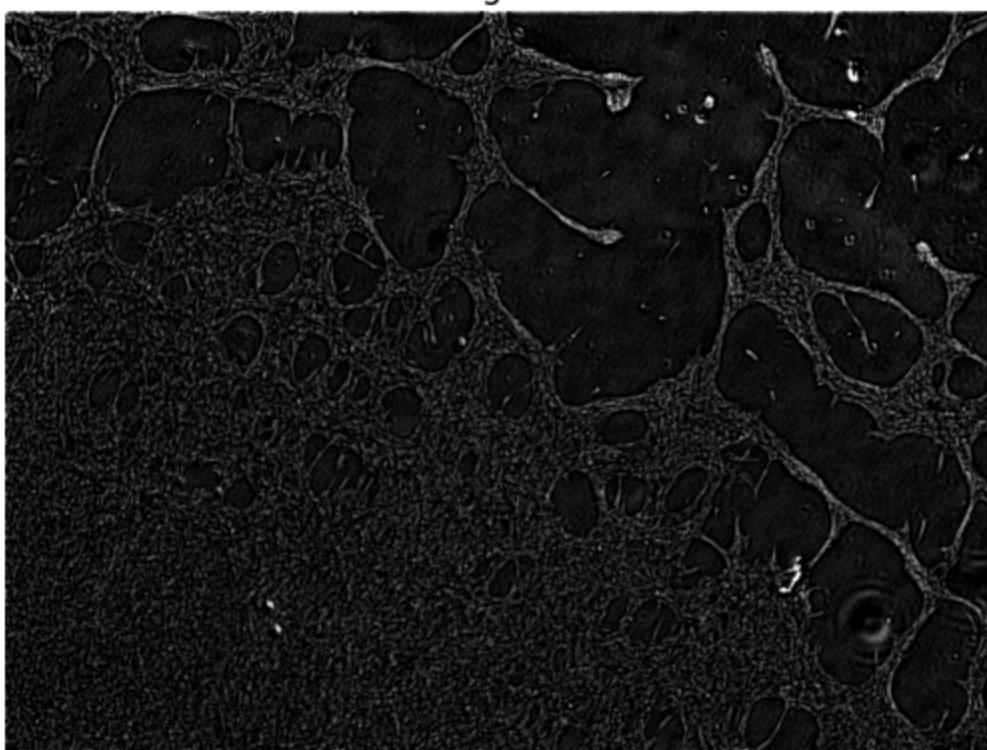


Imagen 2

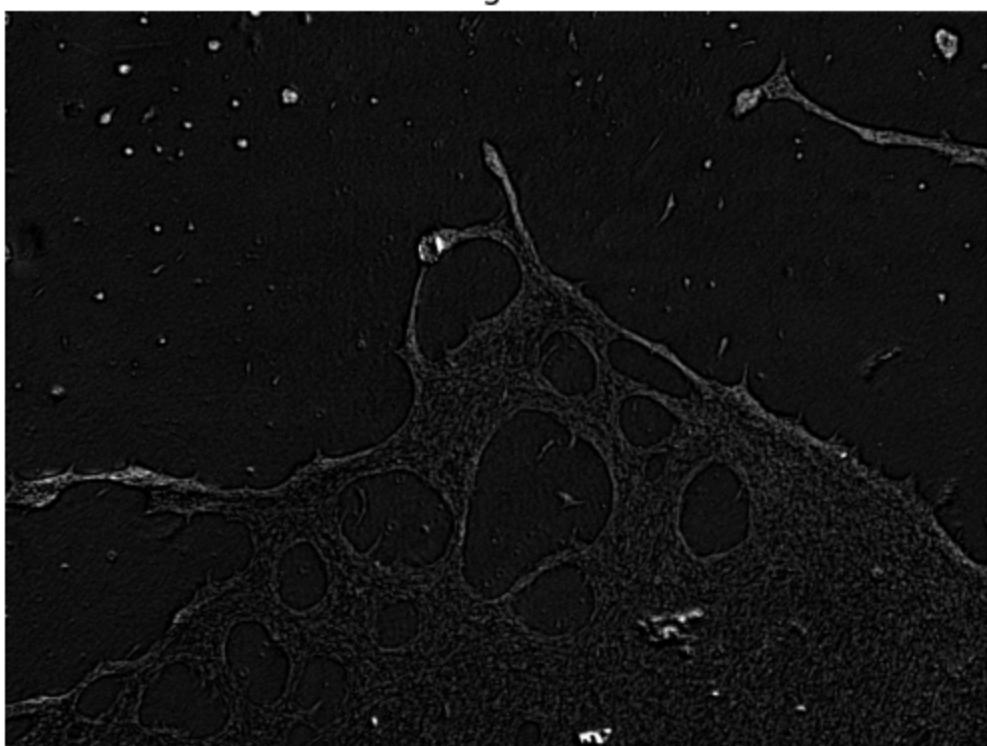


Imagen 3

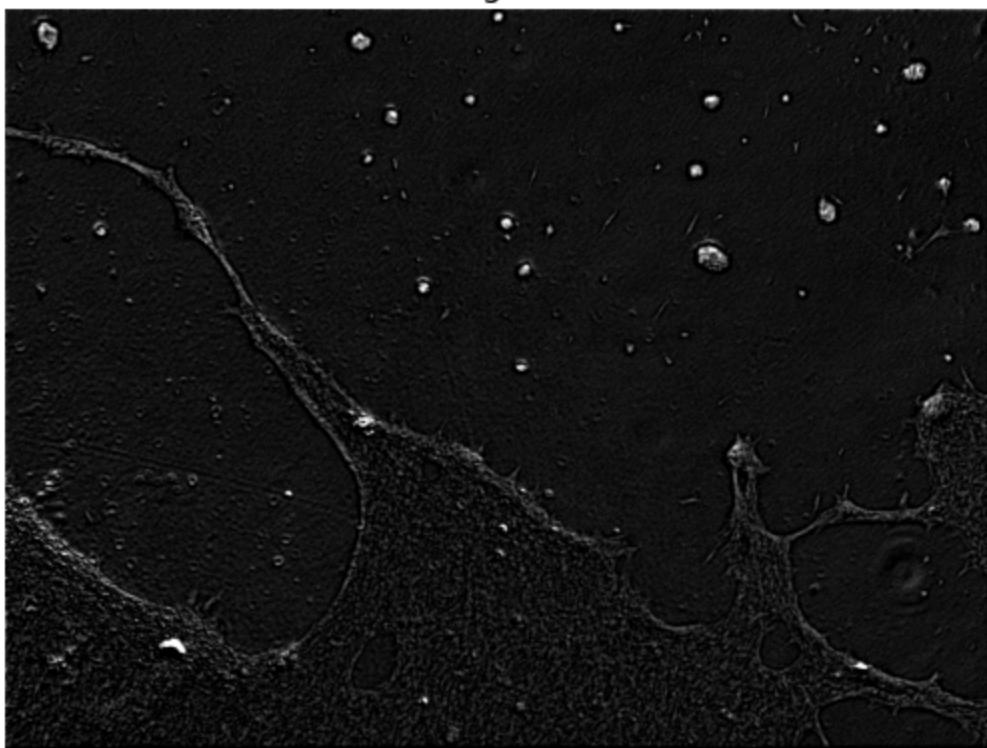


Imagen 4

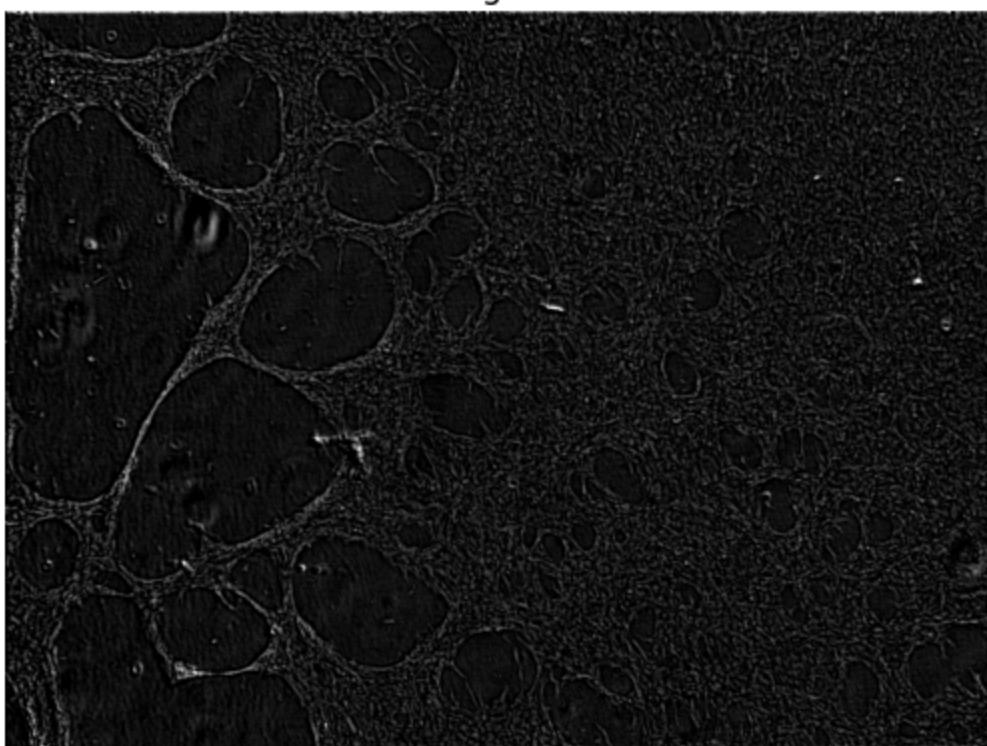


Imagen 5

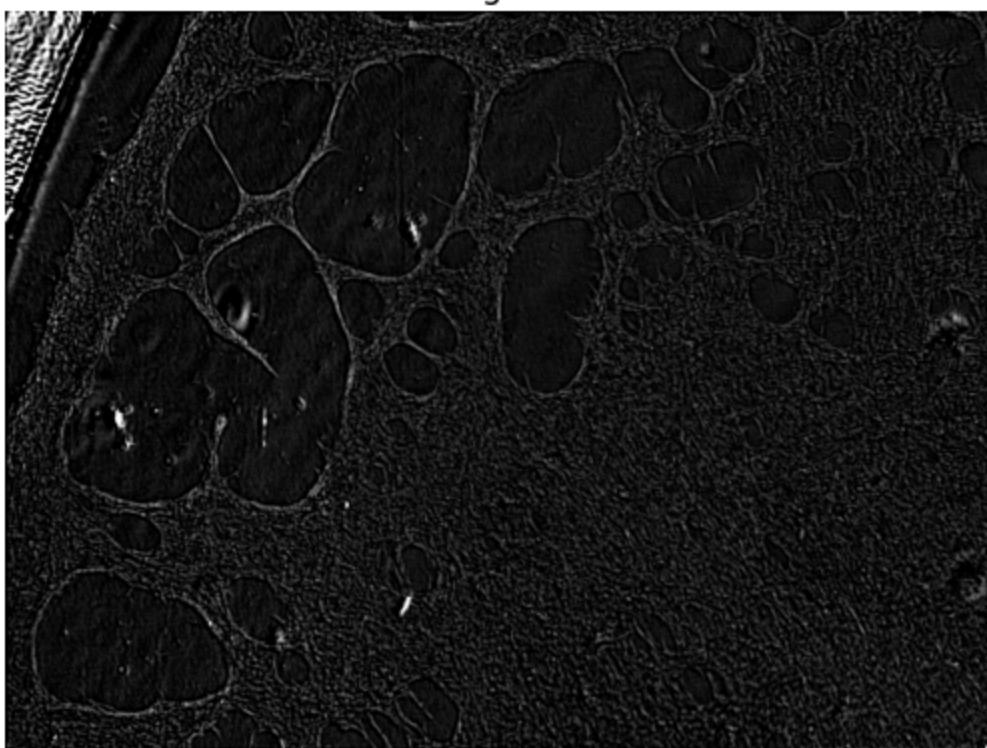


Imagen 6

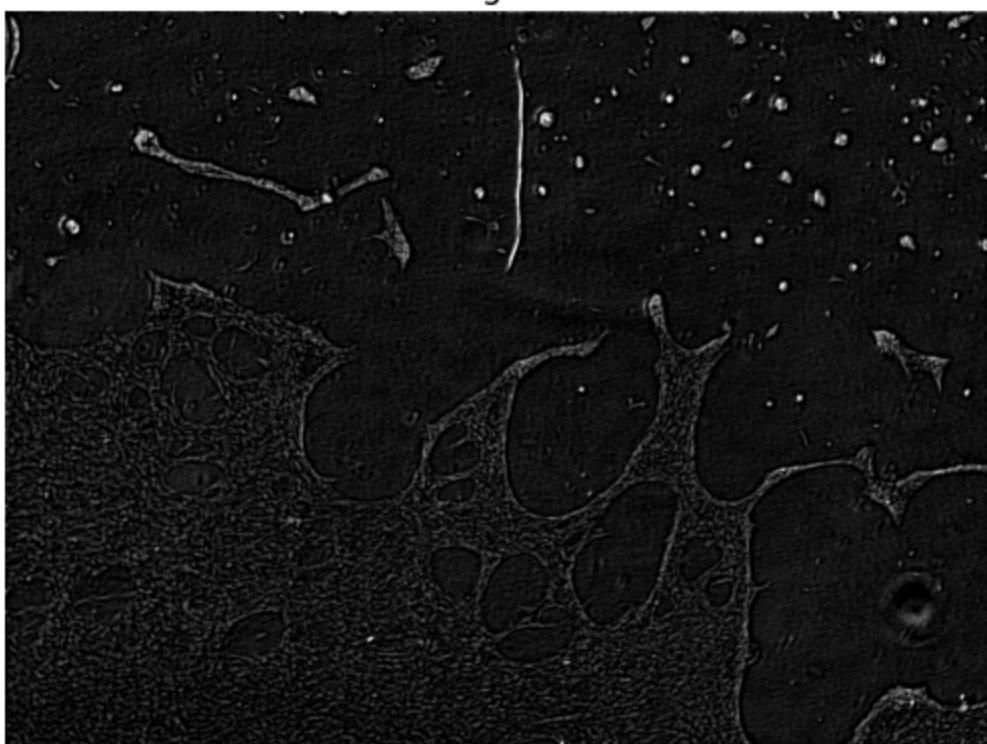


Imagen 7

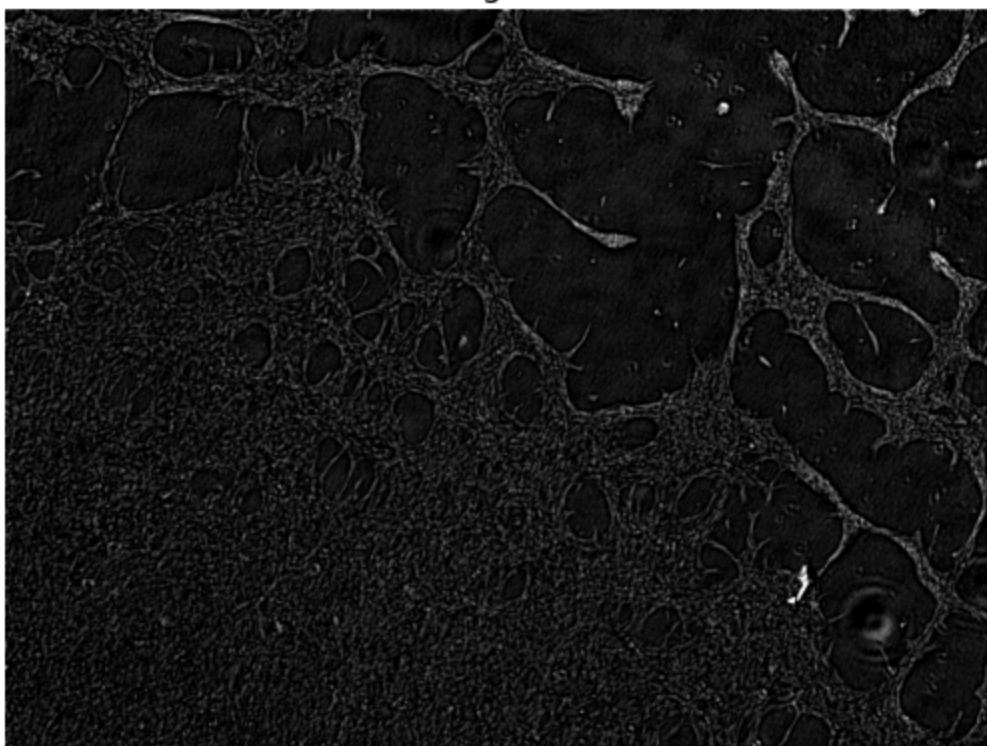


Imagen 8

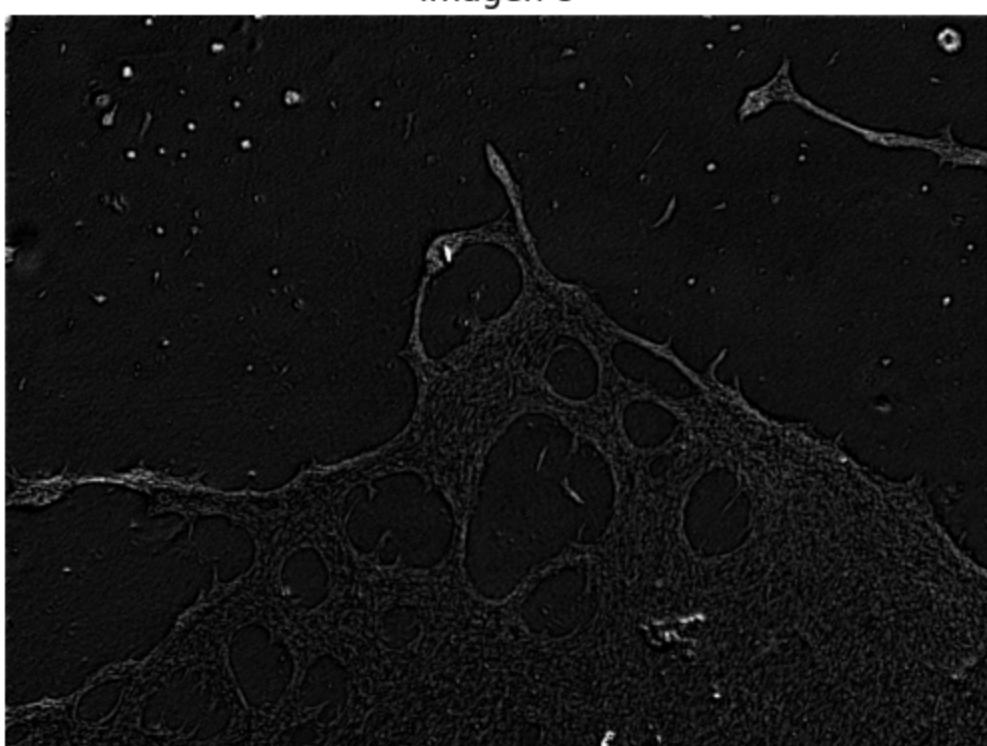


Imagen 9

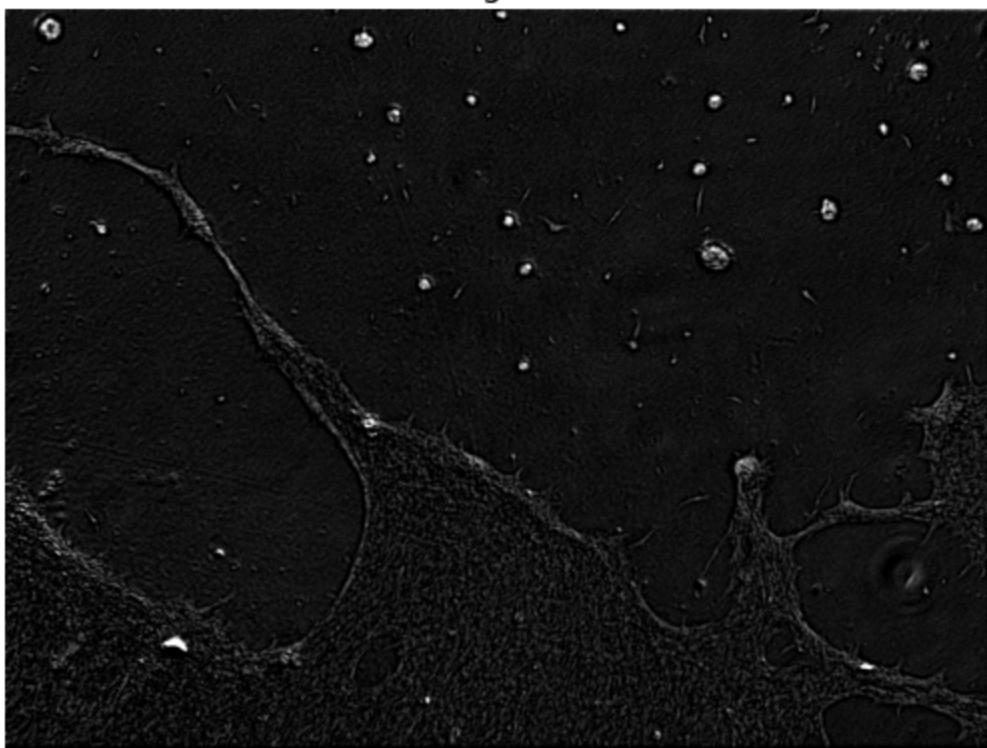
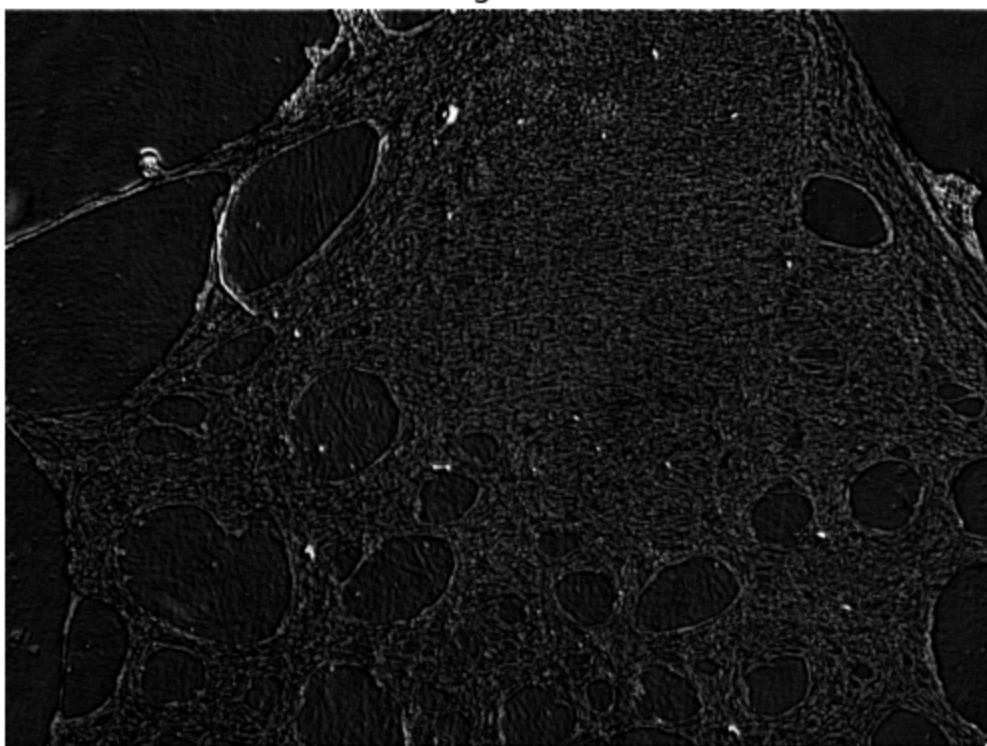


Imagen 10



```
In [68]: # Imagenes binarizadas
umbral = 100
imagenes_binarizadas = []

for i, ruta in enumerate(imagenes_rutas):
    imagen = cv2.imread(ruta, cv2.IMREAD_GRAYSCALE)
```

```
if imagen is None:  
    print(f"No se pudo cargar la imagen en {ruta}")  
else:  
    _, imagen_binarizada = cv2.threshold(imagen, umbral, 255, cv2.THRESH_BINARY  
    imagenes_binarizadas.append(imagen_binarizada)  
    mostrar_imagen(imagen_binarizada, title=f'Imagen binarizada {i+1}')
```

Imagen binarizada 1



Imagen binarizada 2

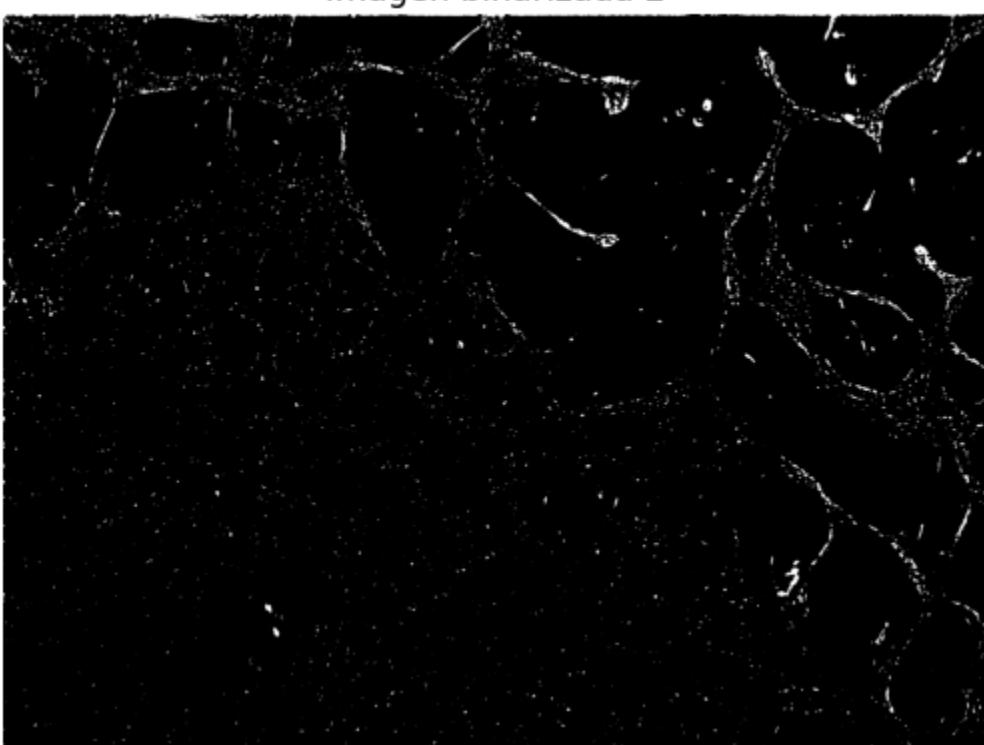


Imagen binarizada 3



Imagen binarizada 4



Imagen binarizada 5

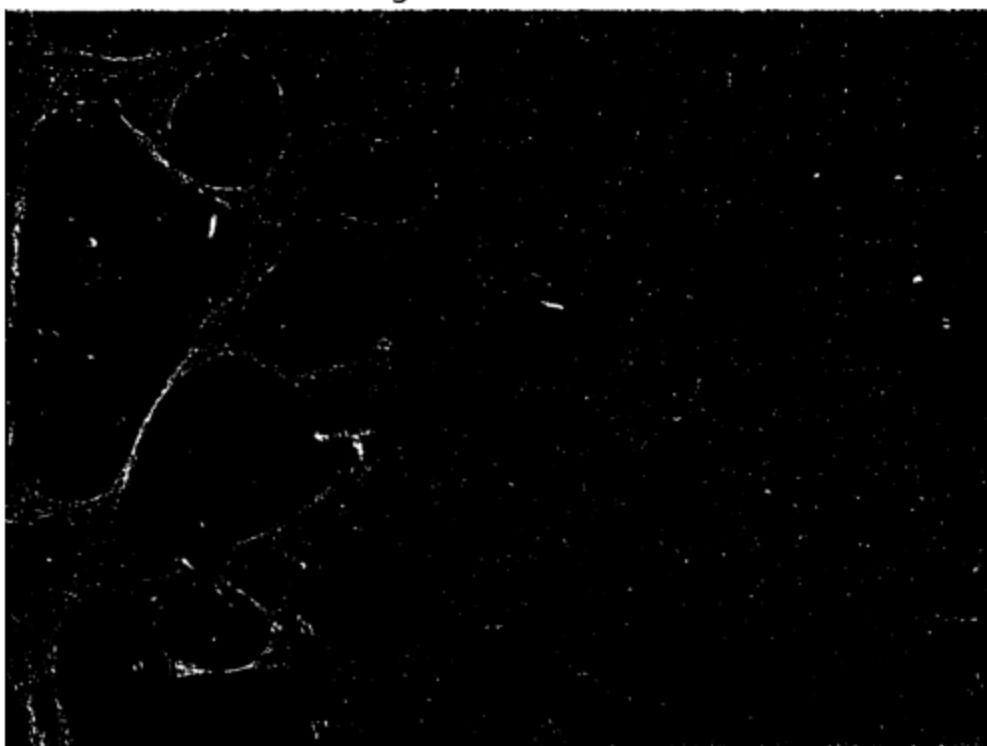


Imagen binarizada 6

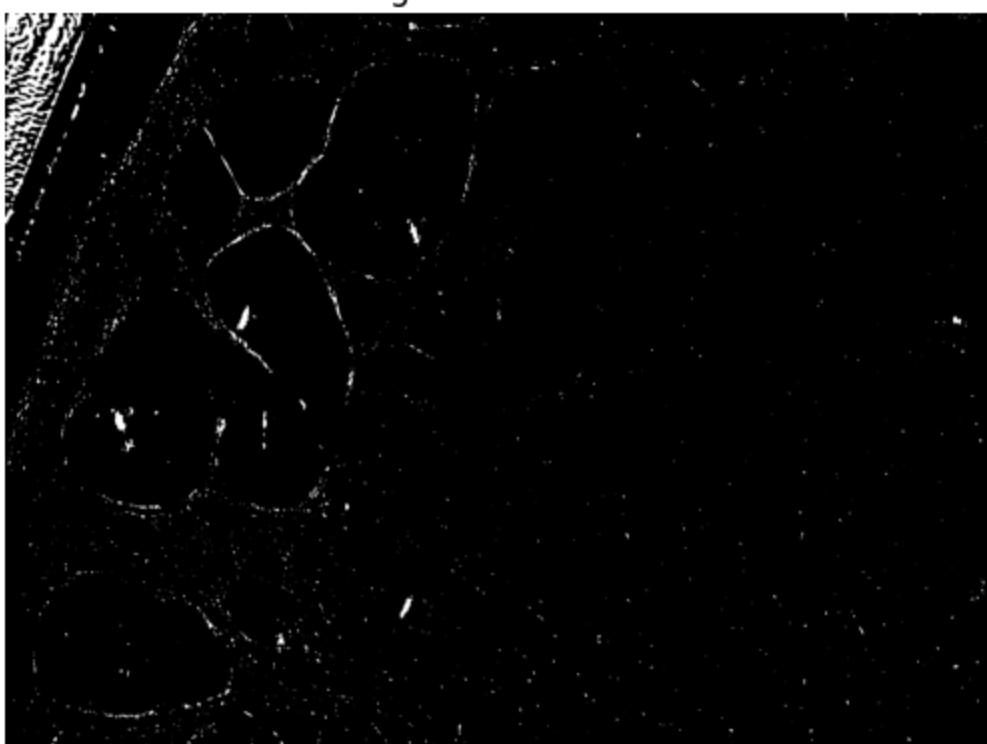


Imagen binarizada 7



Imagen binarizada 8

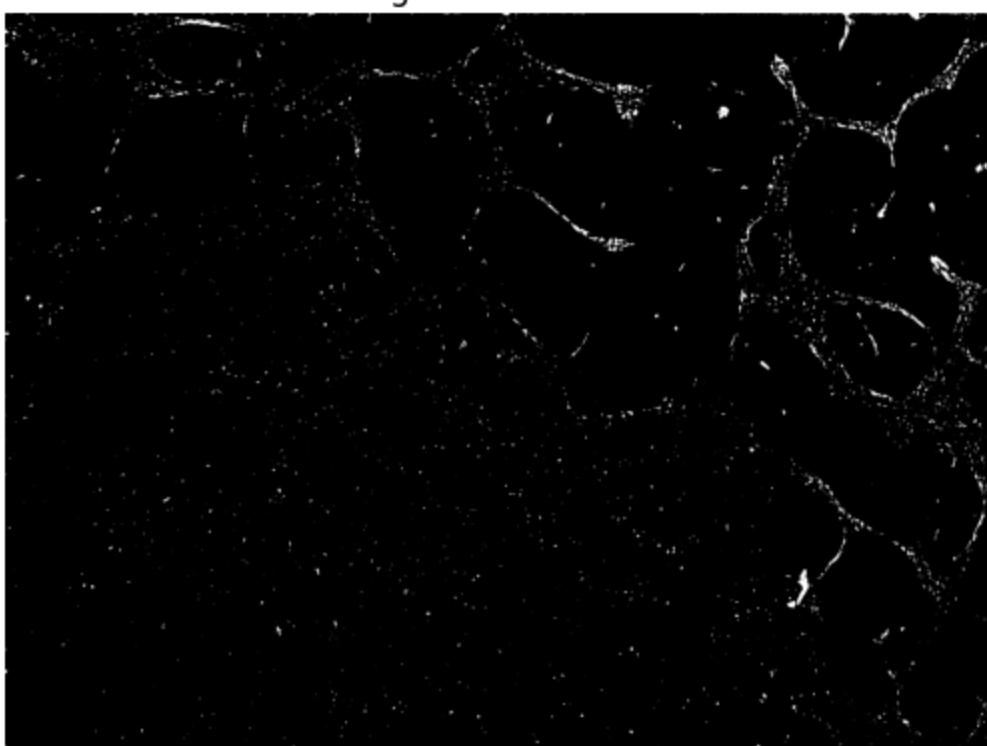


Imagen binarizada 9

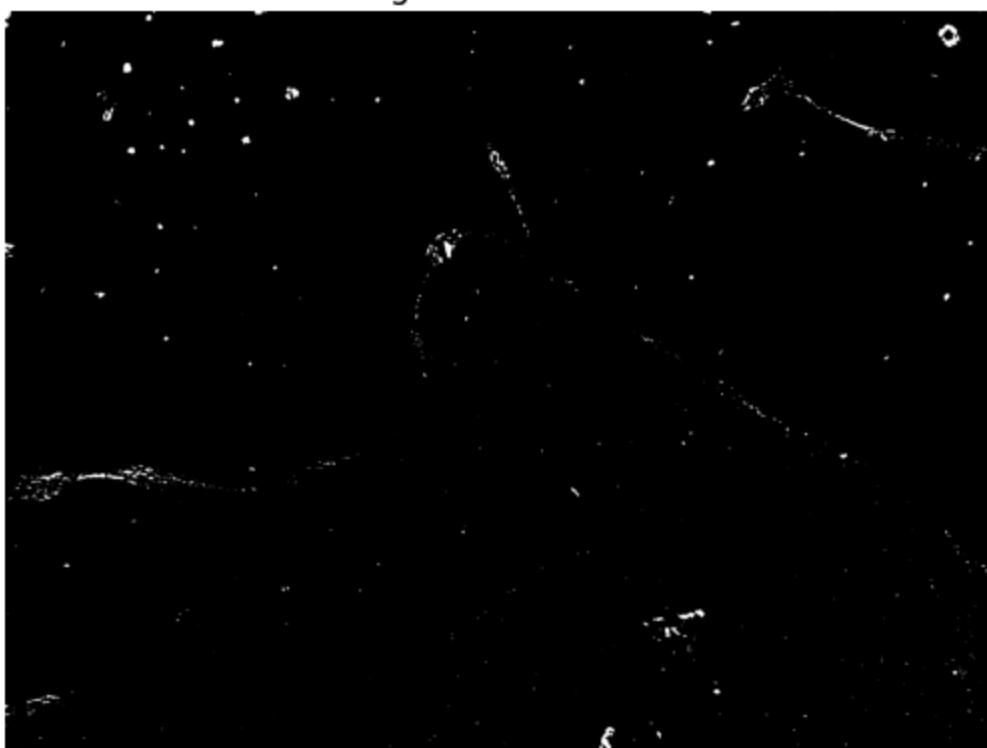


Imagen binarizada 10

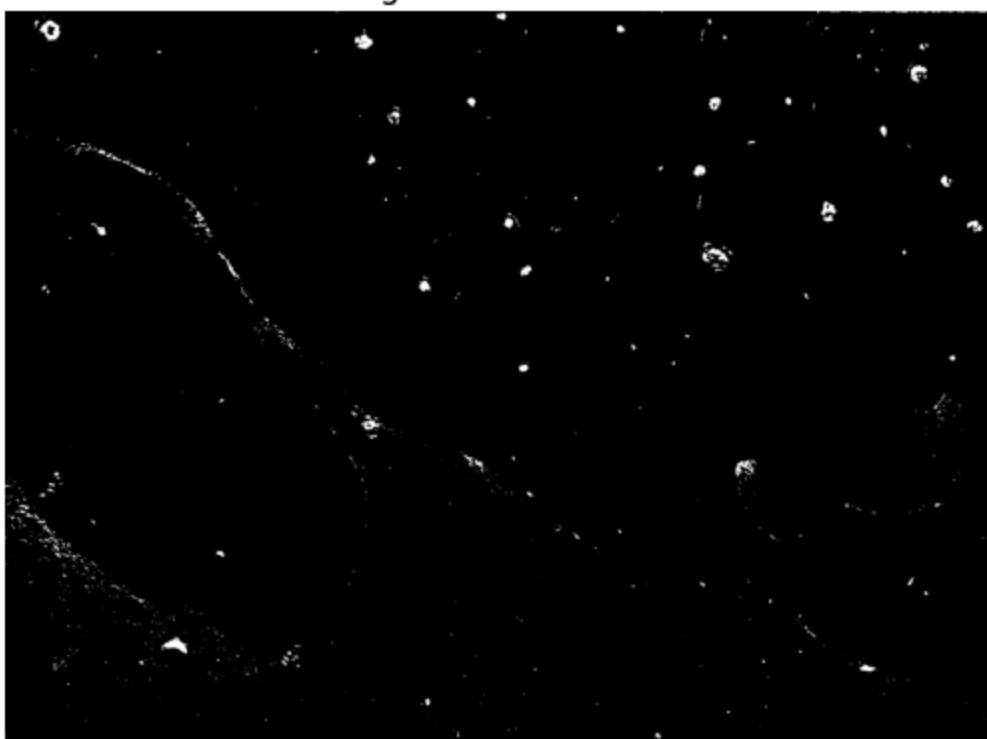


Imagen binarizada 11



In [102]:

```
kernel = np.ones((3, 3), np.uint8)
imagenes_dilatadas = []

for i, imagen_binarizada in enumerate(imagenes_binarizadas):
    # Erosión
    imagen_erodida = cv2.erode(imagen_binarizada, kernel, iterations=1)
    mostrar_imagen(imagen_erodida, title=f'Erosión de la imagen binarizada {i+1}')

    # Dilatación
    imagen_dilatada = cv2.dilate(imagen_binarizada, kernel, iterations=1)
    imagenes_dilatadas.append(imagen_dilatada)
    mostrar_imagen(imagen_dilatada, title=f'Dilatación de la imagen binarizada {i+1}'
```

Erosión de la imagen binarizada 1



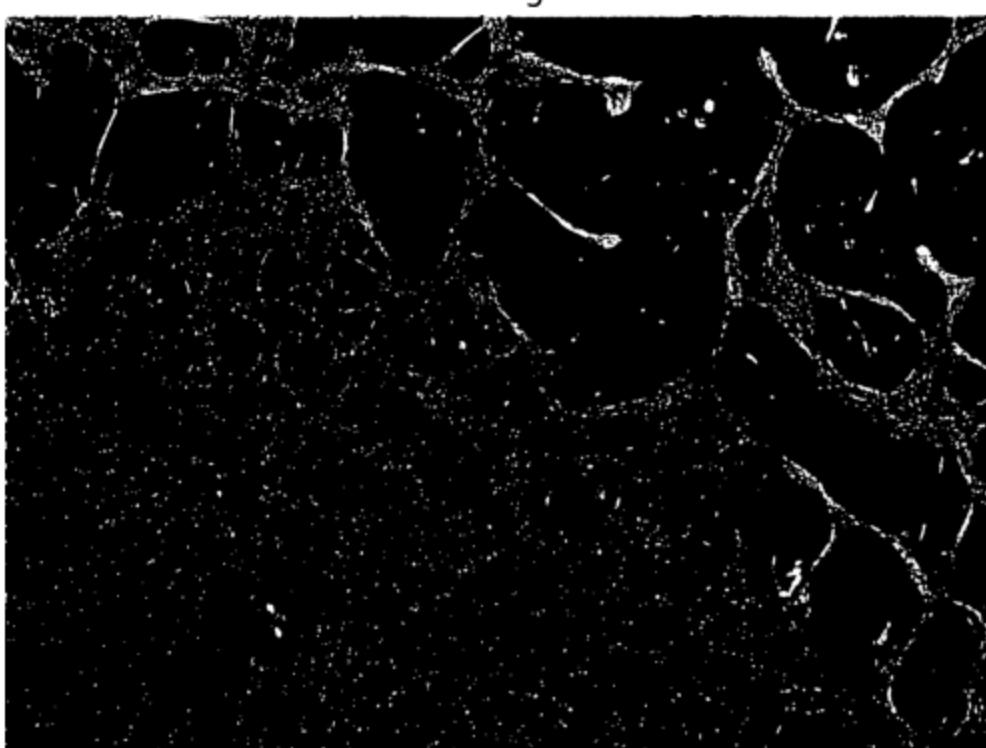
Dilatación de la imagen binarizada 1



Erosión de la imagen binarizada 2



Dilatación de la imagen binarizada 2



Erosión de la imagen binarizada 3



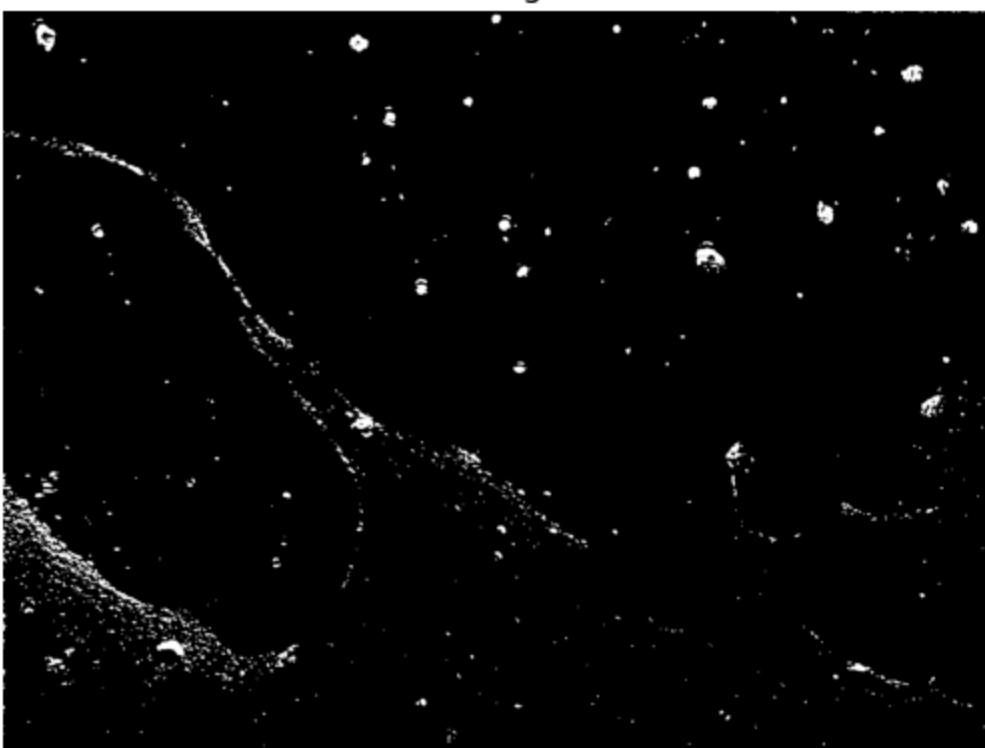
Dilatación de la imagen binarizada 3



Erosión de la imagen binarizada 4



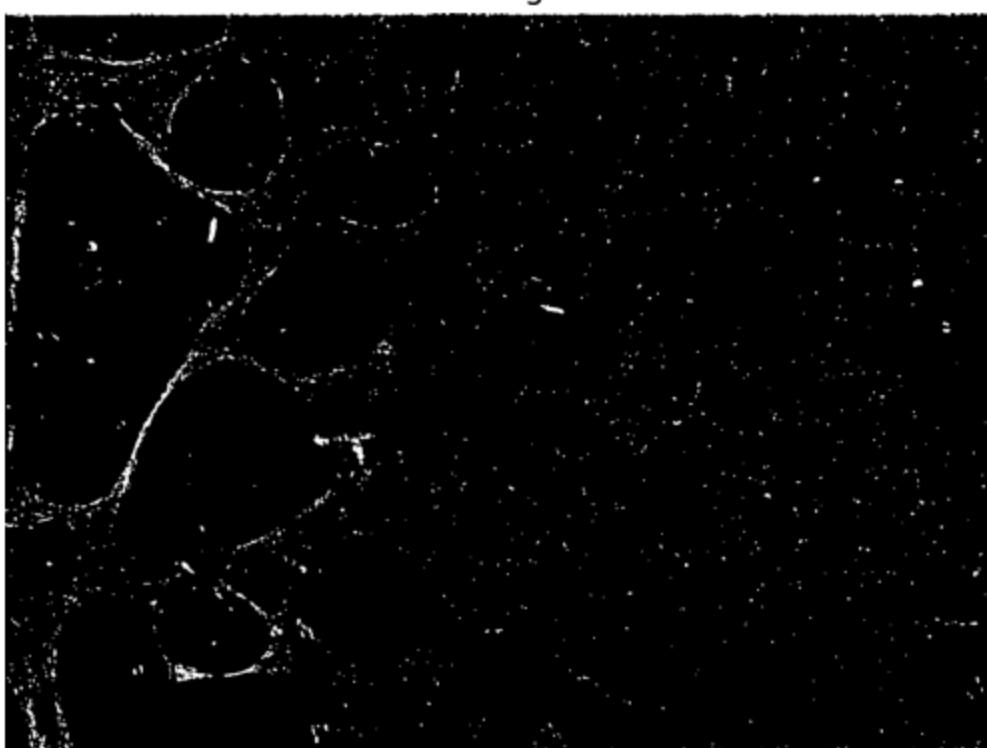
Dilatación de la imagen binarizada 4



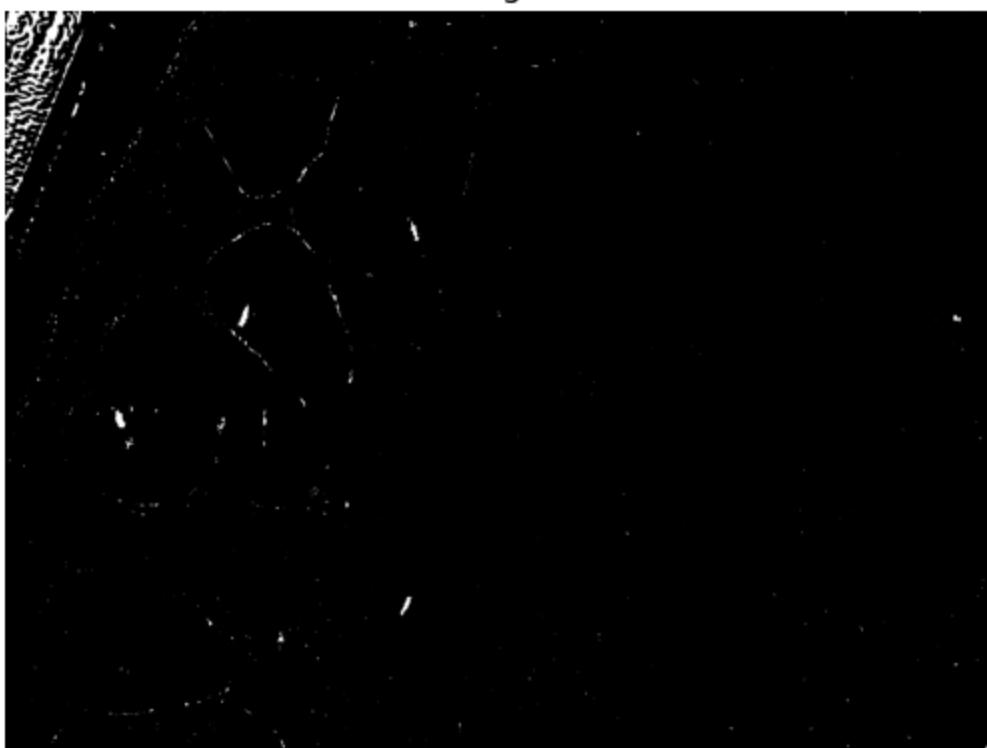
Erosión de la imagen binarizada 5



Dilatación de la imagen binarizada 5



Erosión de la imagen binarizada 6



Dilatación de la imagen binarizada 6



Erosión de la imagen binarizada 7



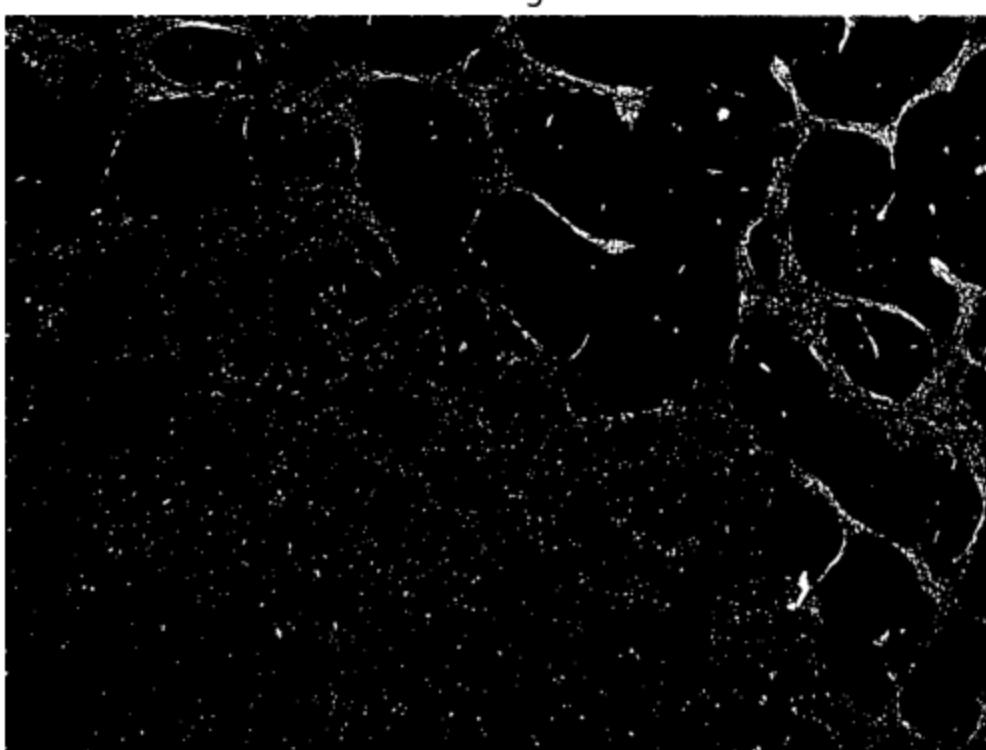
Dilatación de la imagen binarizada 7



Erosión de la imagen binarizada 8



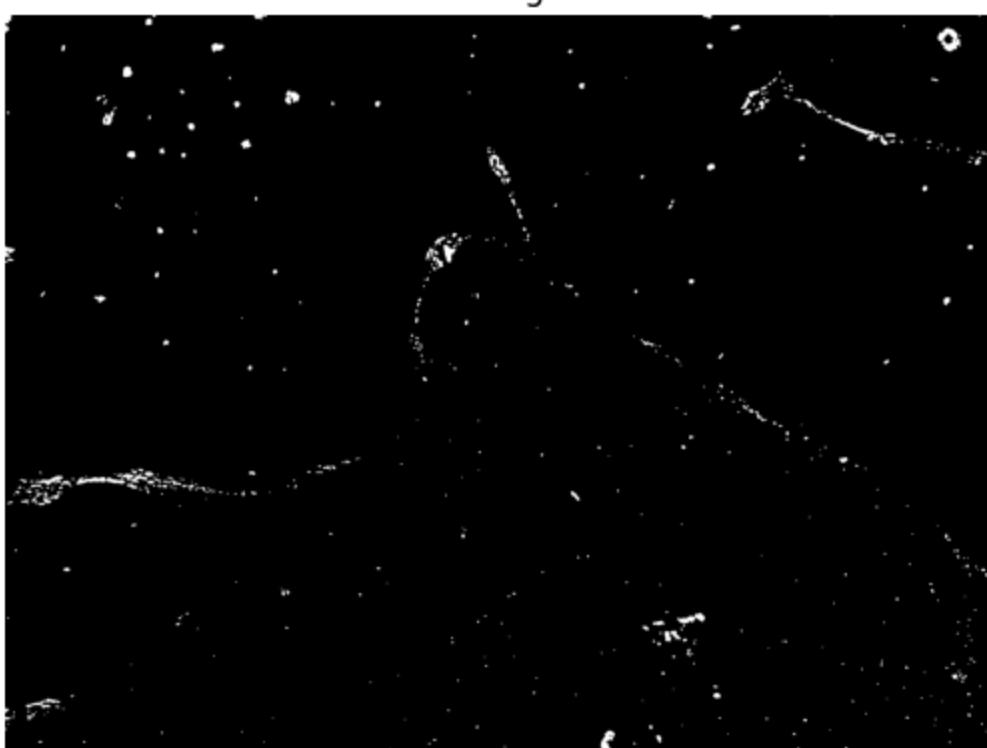
Dilatación de la imagen binarizada 8



Erosión de la imagen binarizada 9



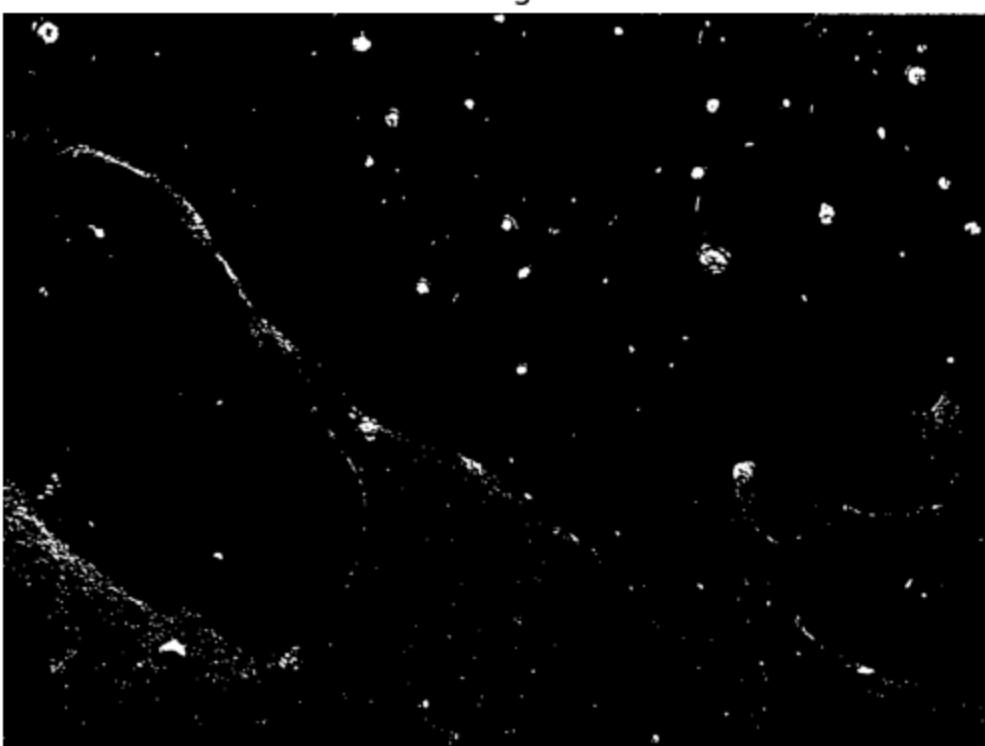
Dilatación de la imagen binarizada 9



Erosión de la imagen binarizada 10



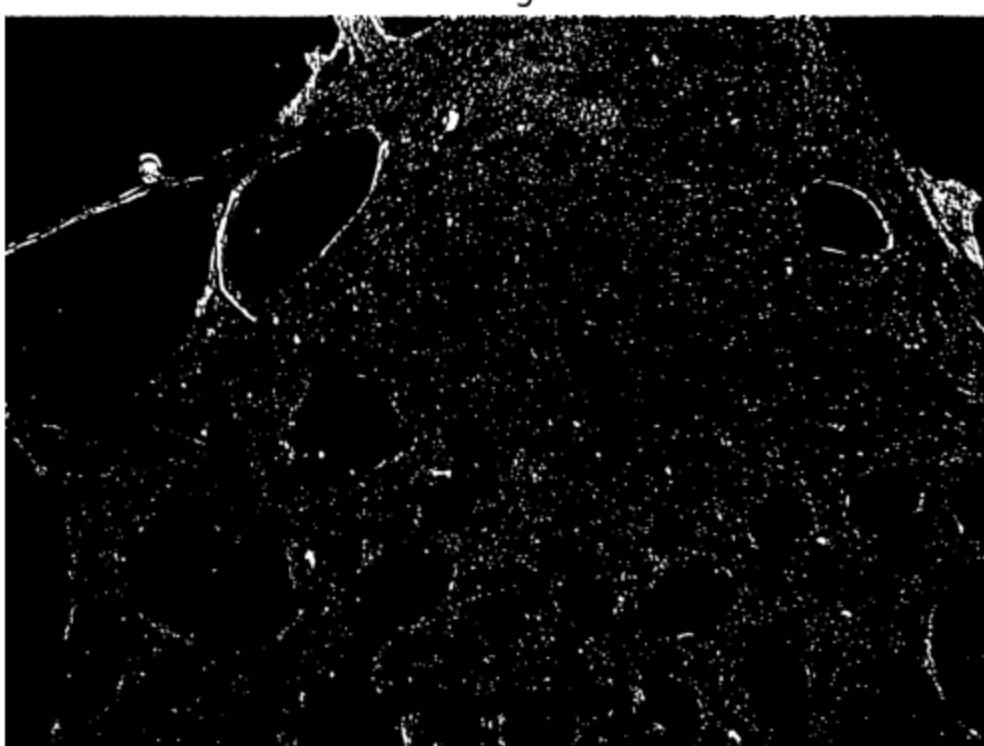
Dilatación de la imagen binarizada 10



Erosión de la imagen binarizada 11



Dilatación de la imagen binarizada 11



```
In [95]: kernel_cierre = np.ones((5, 5), np.uint8)
imagenes_denoised = []

for i, imagen_dilatada in enumerate(imagenes_dilatadas):
    imagen_denoised = cv2.fastNlMeansDenoising(imagen_dilatada, None, 7, 21)
    imagen_suavizada = cv2.medianBlur(imagen_denoised, 5)
```

```
imagen_suavizada.blur = cv2.GaussianBlur(imagen_suavizada, (5, 5), 0)
mostrar_imagen(imagen_suavizada.blur, title=f'Imagen con denoising {i+1}')

imagen_cierre = cv2.morphologyEx(imagen_suavizada.blur, cv2.MORPH_CLOSE, kernel)

num_labels, labels_im, stats, centroids = cv2.connectedComponentsWithStats(imagen_filtrada = np.zeros_like(imagen_cierre))

for label in range(1, num_labels):
    area = stats[label, cv2.CC_STAT_AREA]
    if area > 300:
        imagen_filtrada[labels_im == label] = 255

imagenes_denoised.append(imagen_filtrada)
mostrar_imagen(imagen_filtrada, title=f'Imagen con objetos pequeños removidos y
```

Imagen con denoising 1



Imagen con objetos pequeños removidos y cracks cerrados 1



Imagen con denoising 2

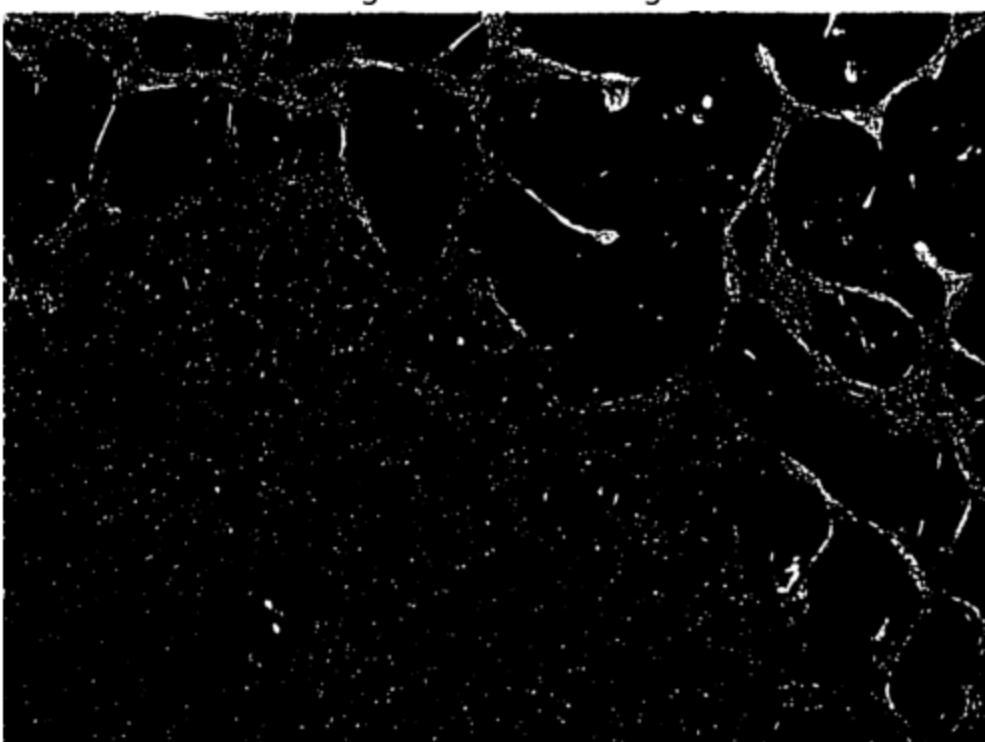


Imagen con objetos pequeños removidos y cracks cerrados 2

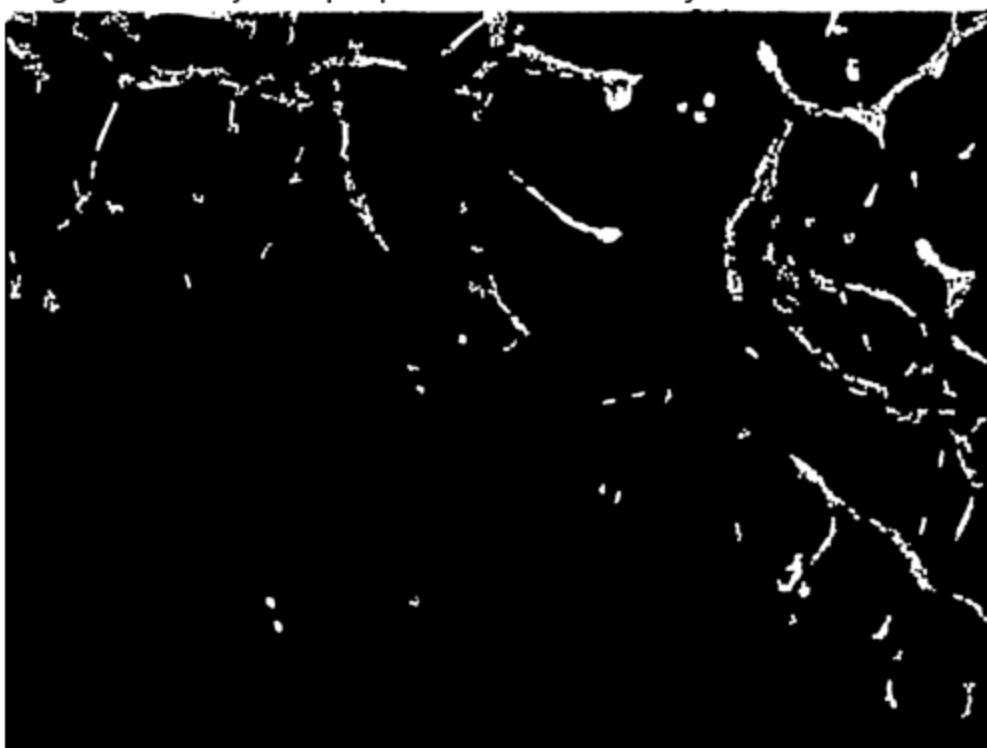


Imagen con denoising 3

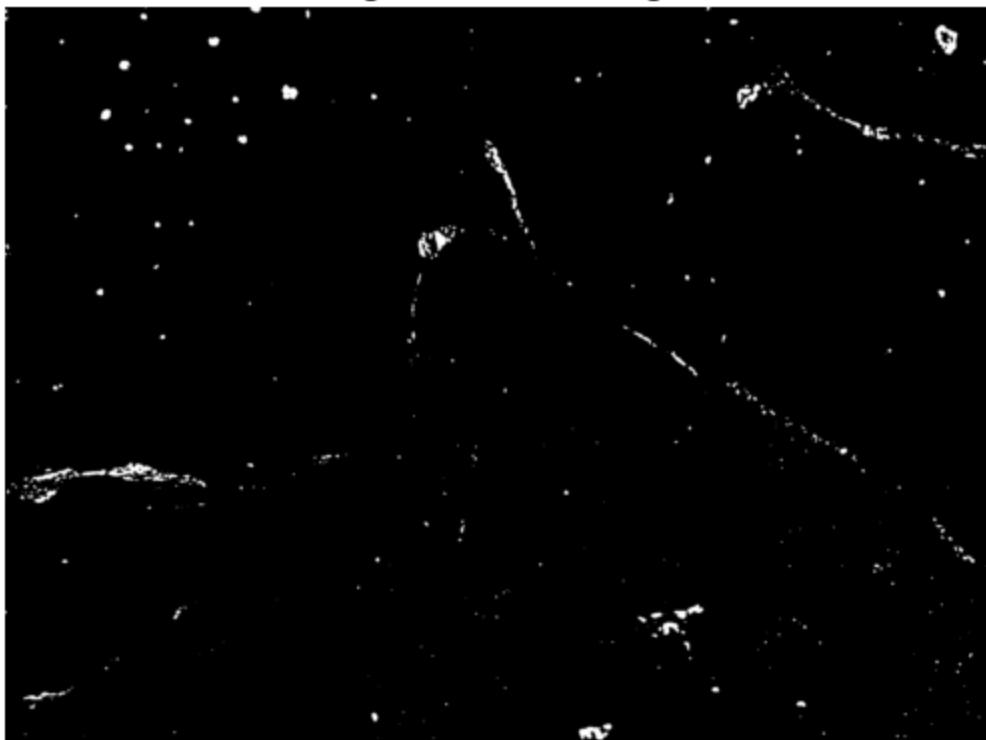


Imagen con objetos pequeños removidos y cracks cerrados 3

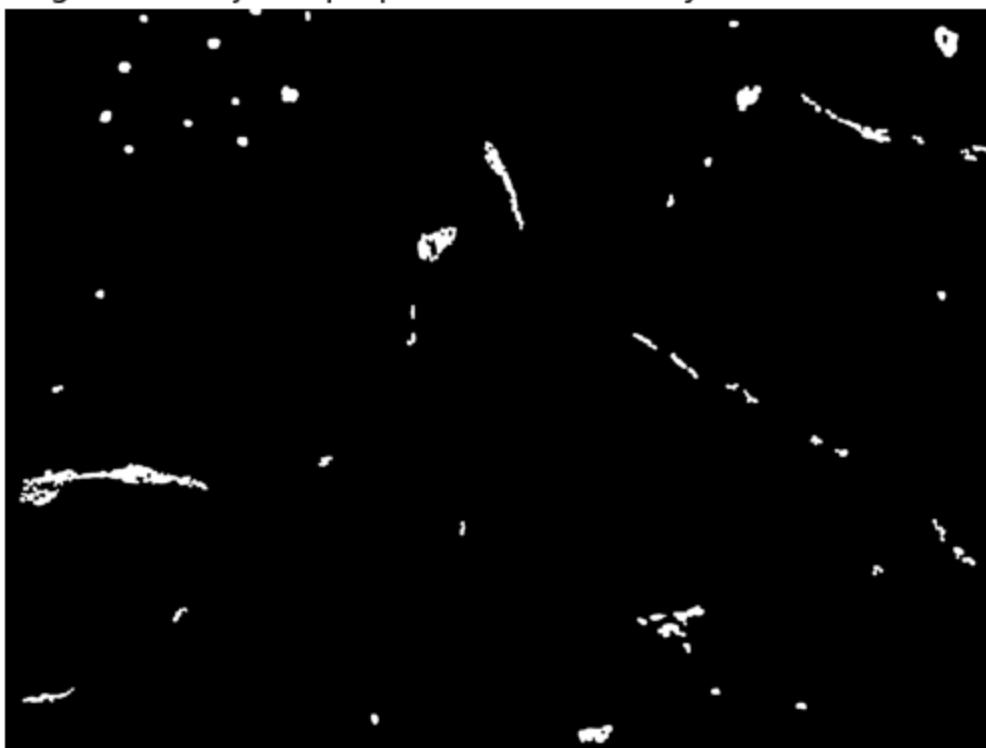


Imagen con denoising 4

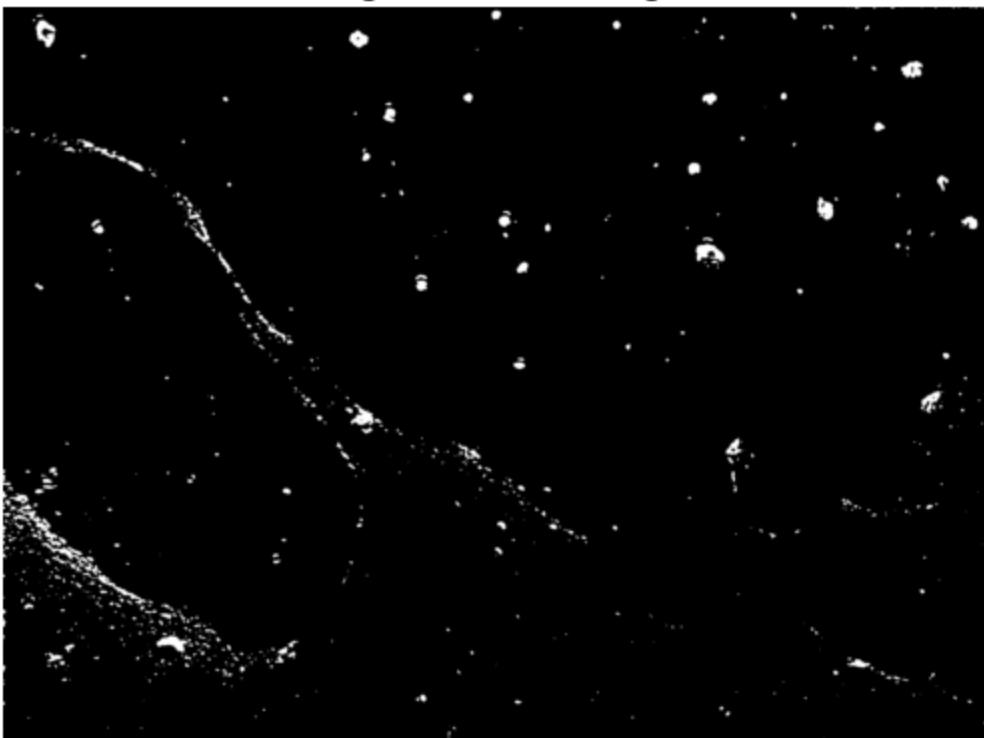


Imagen con objetos pequeños removidos y cracks cerrados 4

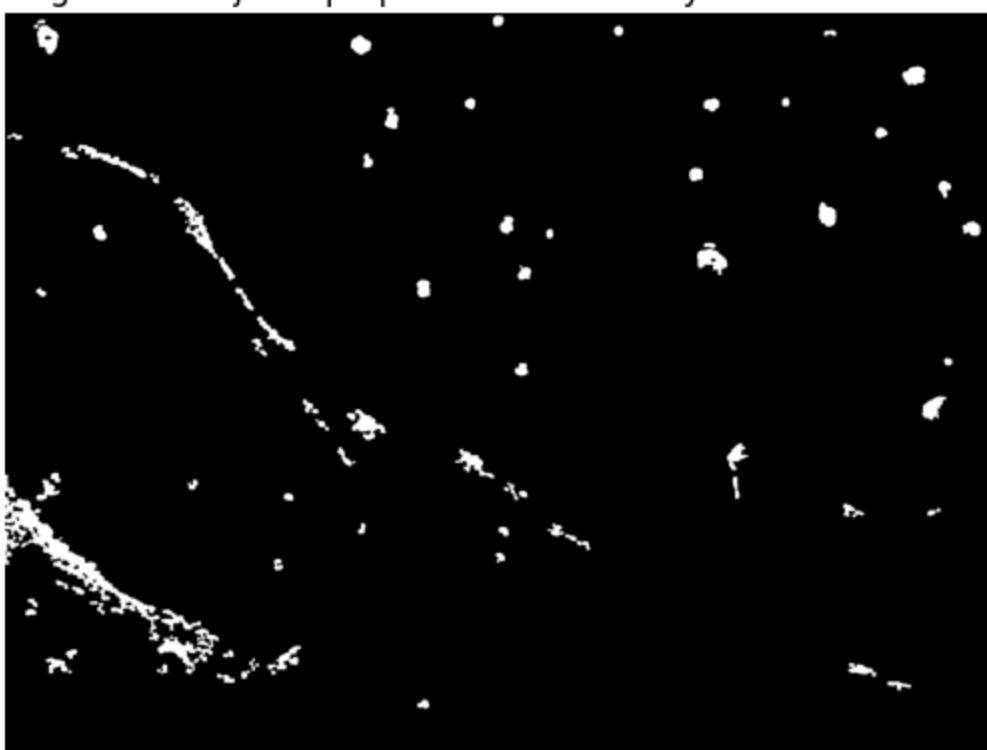


Imagen con denoising 5

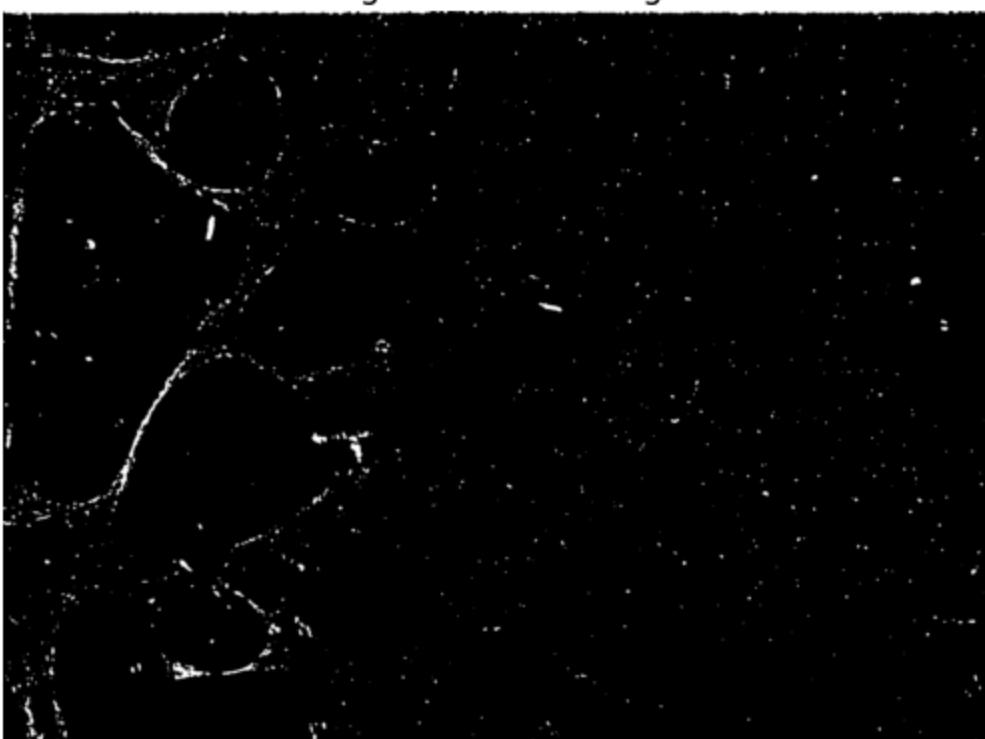


Imagen con objetos pequeños removidos y cracks cerrados 5



Imagen con denoising 6

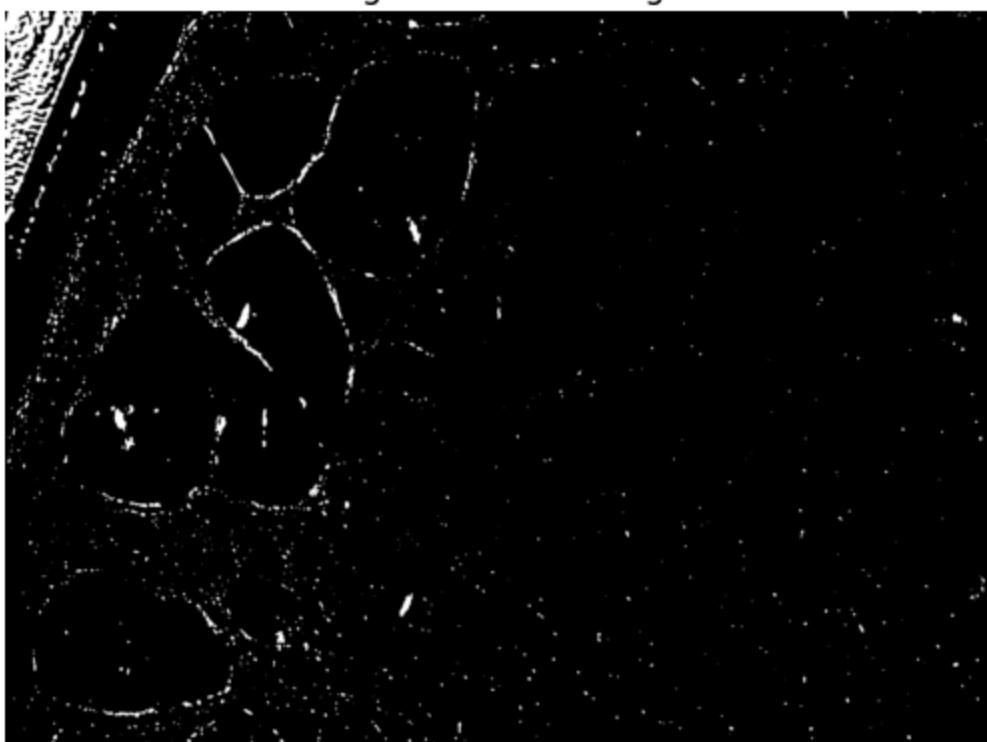


Imagen con objetos pequeños removidos y cracks cerrados 6



Imagen con denoising 7



Imagen con objetos pequeños removidos y cracks cerrados 7



Imagen con denoising 8

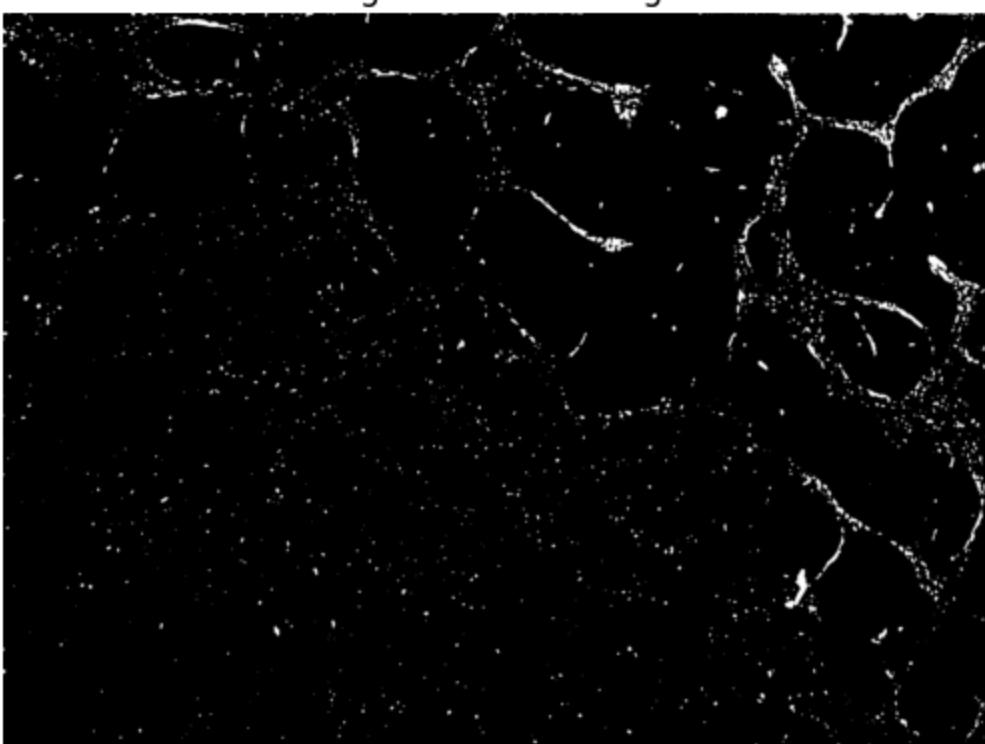


Imagen con objetos pequeños removidos y cracks cerrados 8



Imagen con denoising 9

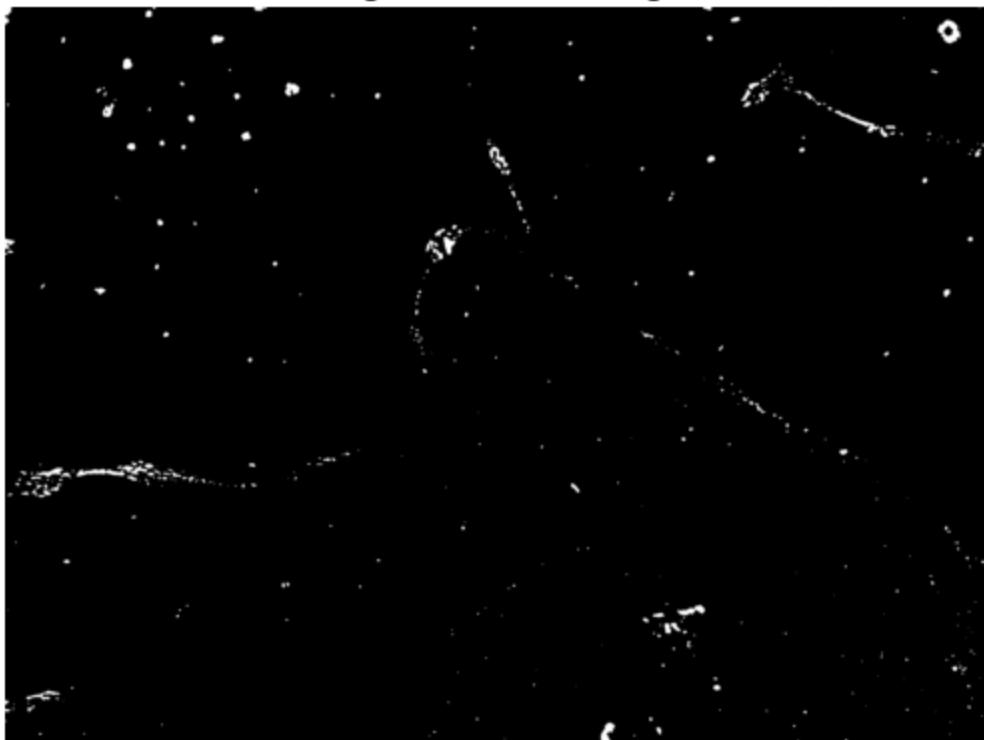


Imagen con objetos pequeños removidos y cracks cerrados 9



Imagen con denoising 10

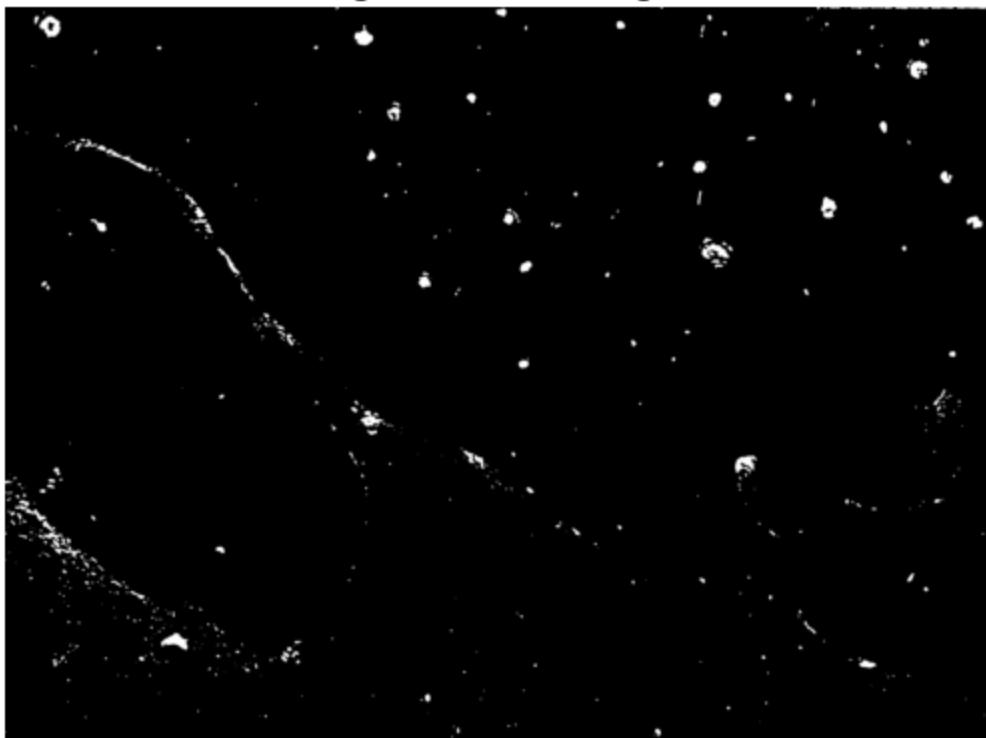


Imagen con objetos pequeños removidos y cracks cerrados 10



Imagen con denoising 11

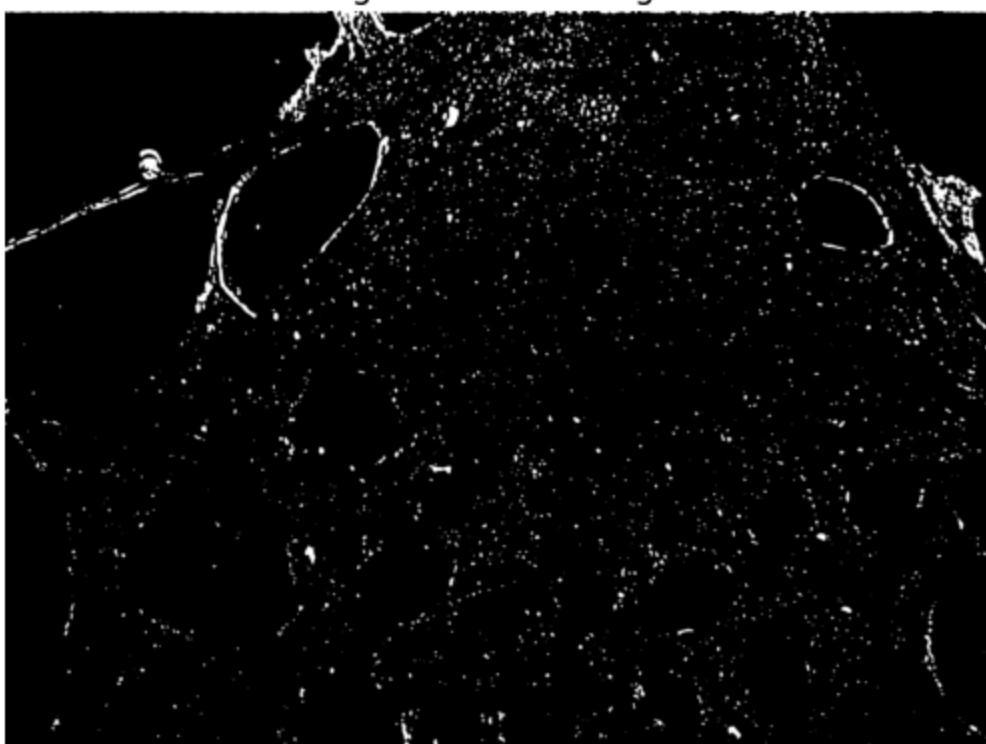


Imagen con objetos pequeños removidos y cracks cerrados 11



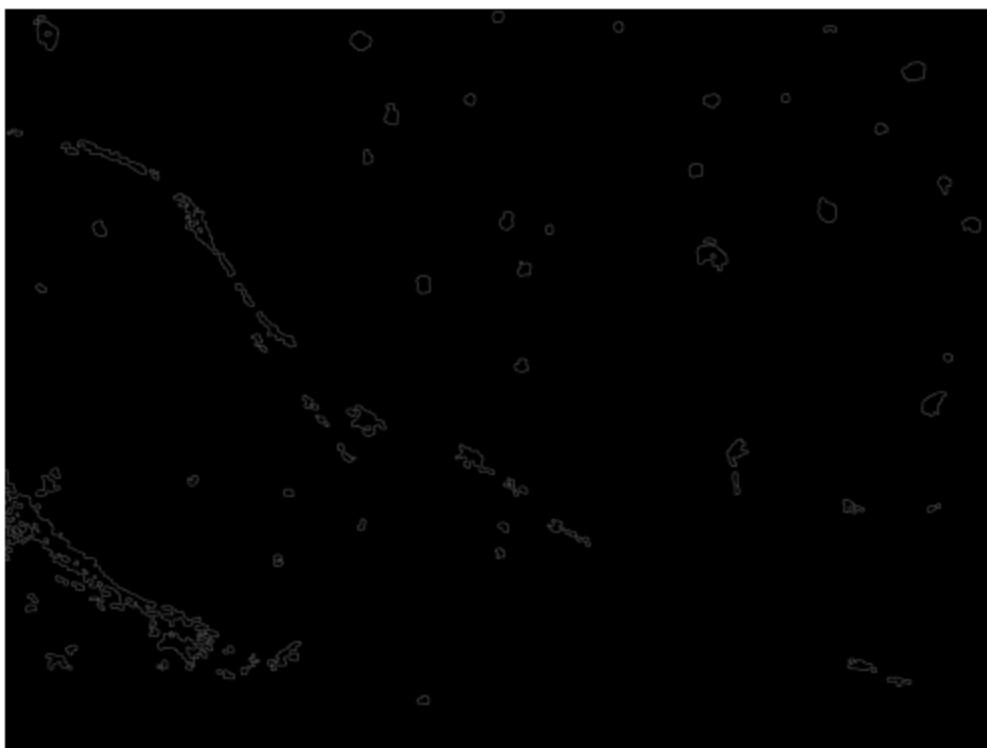
```
In [97]: imagenes_bordes = []

for i, imagen_suavizada in enumerate(imagenes_denoised):
    imagen_bordes = cv2.Canny(imagen_suavizada, 100, 200)
    imagenes_bordes.append(imagen_bordes)
    mostrar_imagen(imagen_bordes, title=f'Bordes detectados {i+1}')
```

Bordes detectados 1



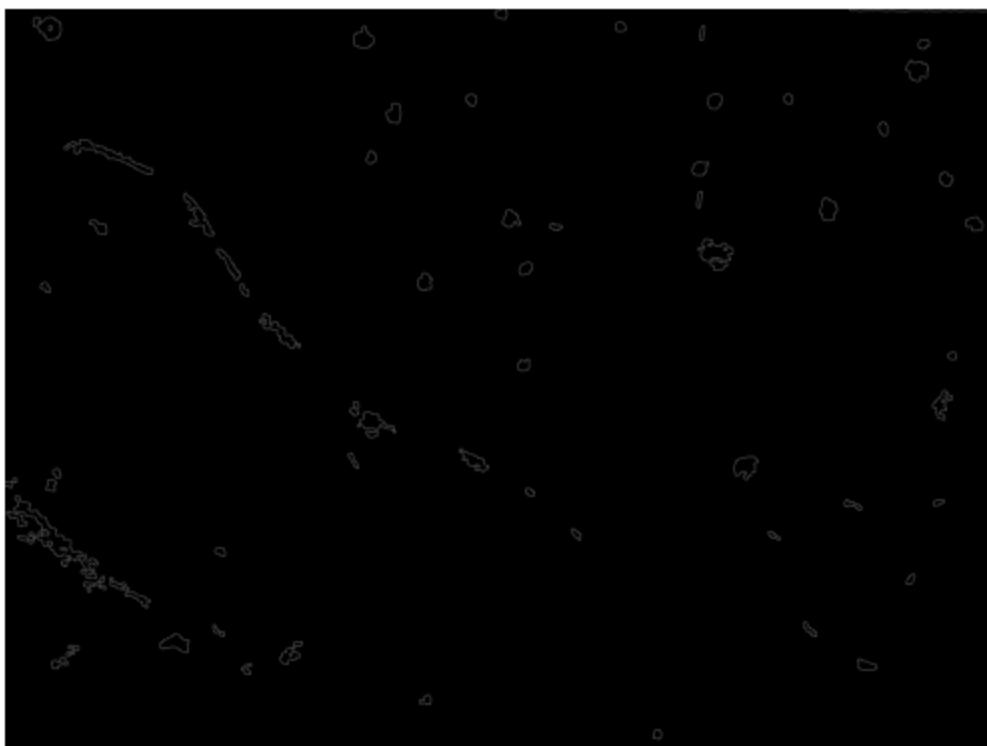
Bordes detectados 2**Bordes detectados 3**

Bordes detectados 4**Bordes detectados 5**

Bordes detectados 6**Bordes detectados 7**

Bordes detectados 8**Bordes detectados 9**

Bordes detectados 10



Bordes detectados 11



```
In [101]:  
def apply_mask(original_image, mask):  
    mask_3d = cv2.cvtColor(mask, cv2.COLOR_GRAY2BGR)  
    masked_image = cv2.bitwise_and(original_image, mask_3d)  
    return masked_image  
  
for i, ruta in enumerate(imagenes_rutas):
```

```
original_image = cv2.imread(ruta)

mask = imagenes_denoised[i]
masked_image = apply_mask(original_image, mask)

mostrar_imagen(masked_image, title=f'Imagen segmentada mask {i+1}')
```

Imagen segmentada mask 1



Imagen segmentada mask 2



Imagen segmentada mask 3



Imagen segmentada mask 4



Imagen segmentada mask 5



Imagen segmentada mask 6

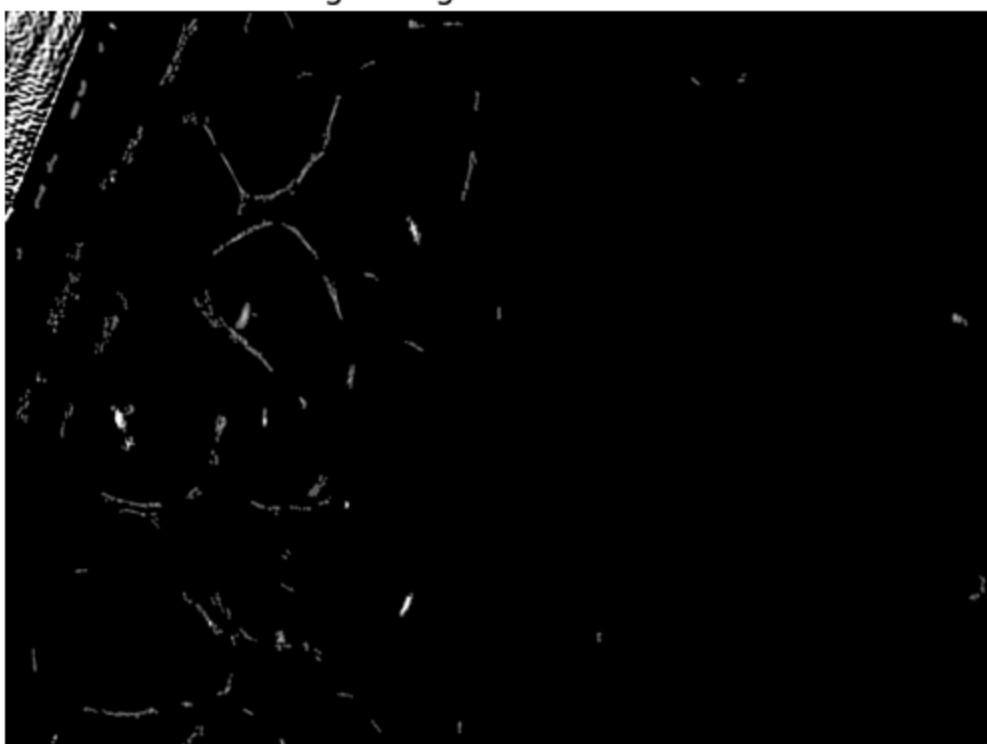


Imagen segmentada mask 7



Imagen segmentada mask 8



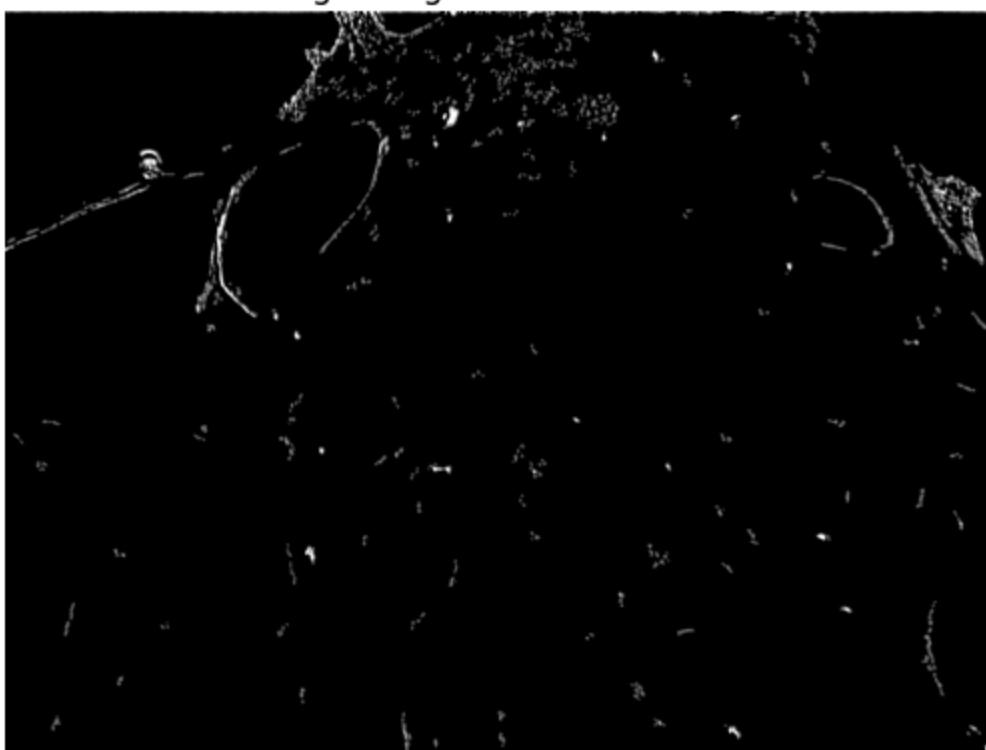
Imagen segmentada mask 9



Imagen segmentada mask 10



Imagen segmentada mask 11



In [106...]

```
dimensiones_crops = []

for i, ruta in enumerate(imagenes_rutas):
    original_image = cv2.imread(ruta)

    mask = imagenes_denoised[i]
    contours, _ = cv2.findContours(mask, cv2.RETR_EXTERNAL, cv2.CHAIN_APPROX_SIMPLE

    for contour in contours:
        if cv2.contourArea(contour) > 0:
            x, y, w, h = cv2.boundingRect(contour)
            crop = original_image[y:y+h, x:x+w]

            dimensiones_crops.append((w, h))
            if(i<2):
                mostrar_imagen(crop, title=f'Image {i+1} - Width: {w}, Height: {h}'
```

Image 1 - Width: 26, Height: 16

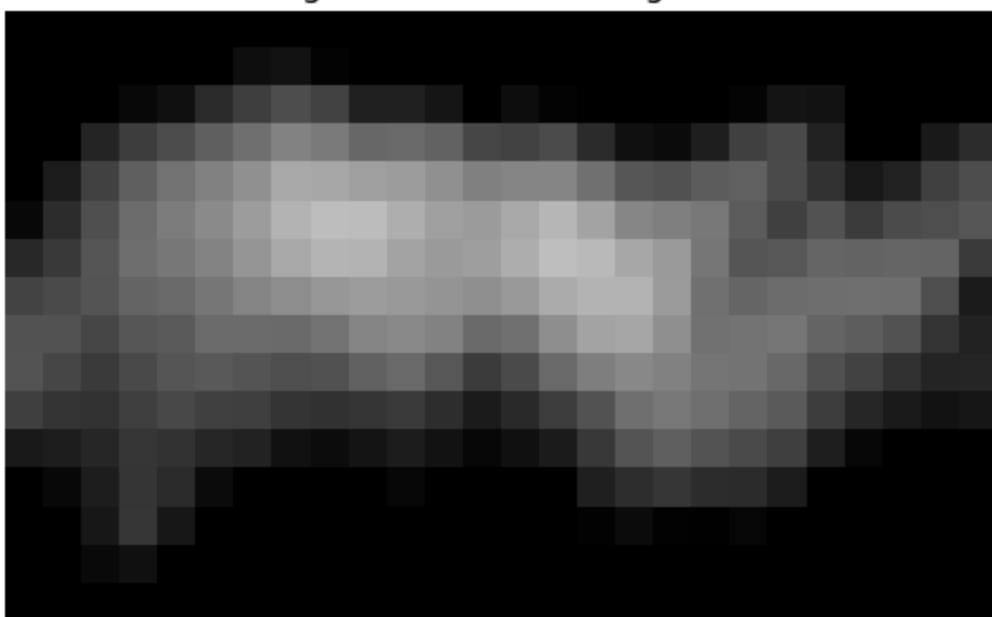


Image 1 - Width: 21, Height: 32

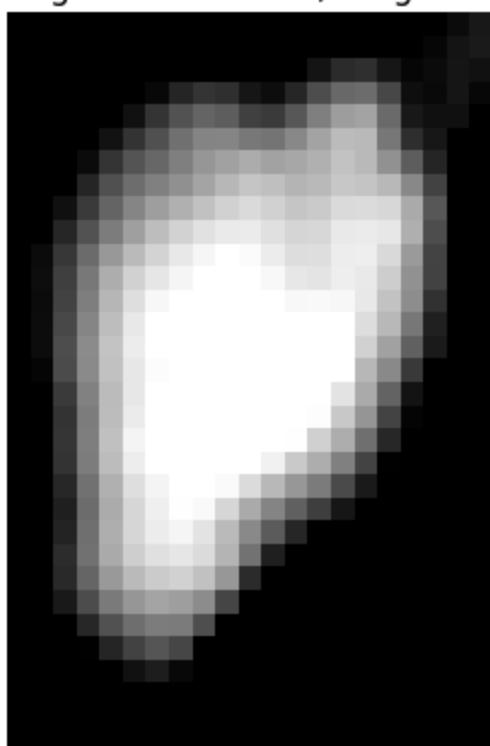


Image 1 - Width: 15, Height: 27

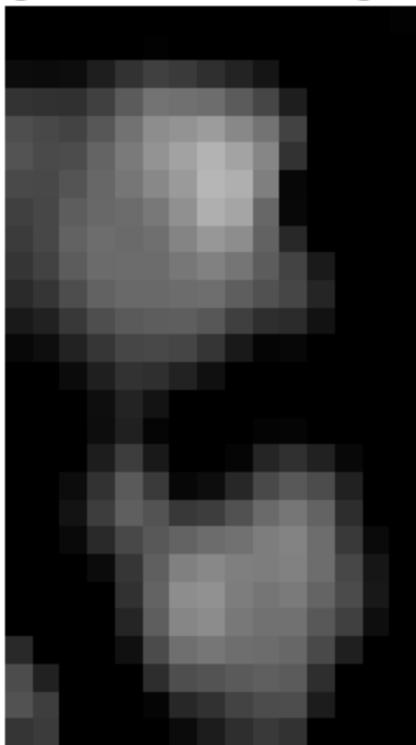


Image 1 - Width: 15, Height: 32

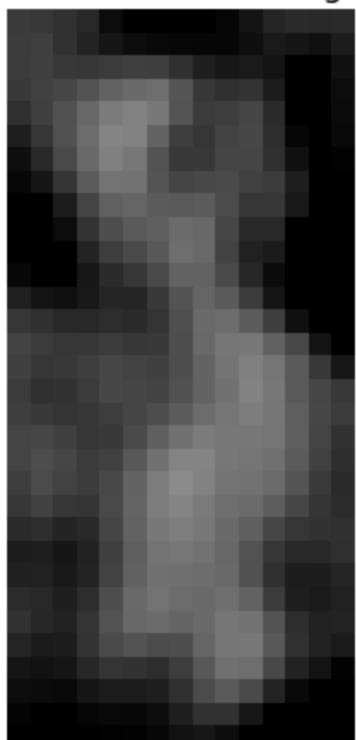


Image 1 - Width: 41, Height: 51



Image 1 - Width: 103, Height: 68



Image 1 - Width: 62, Height: 45

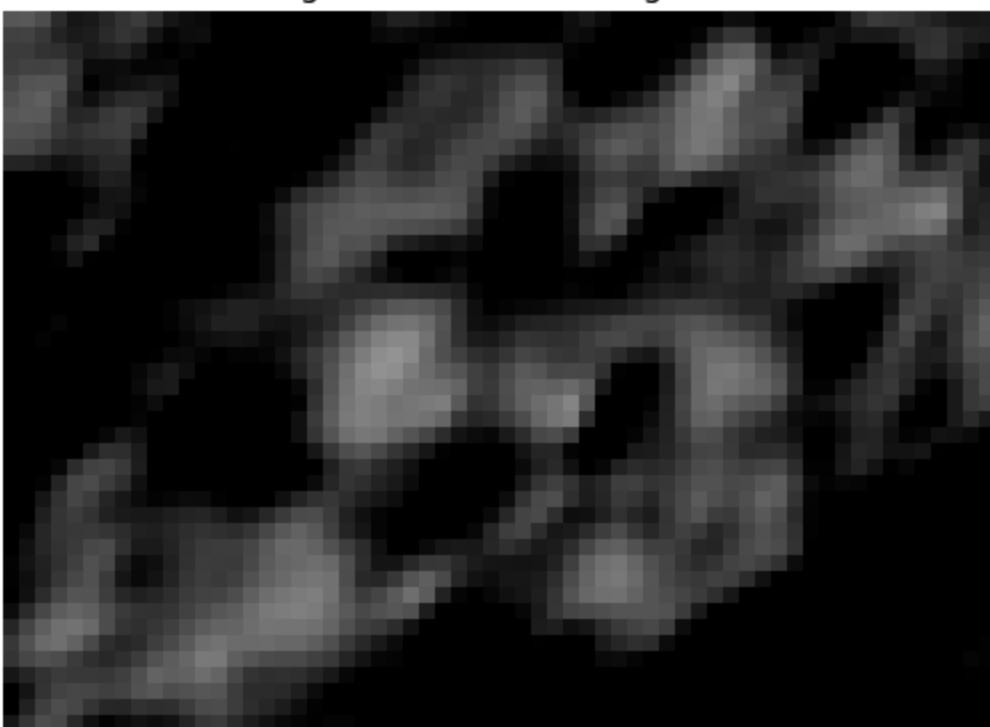


Image 1 - Width: 106, Height: 116

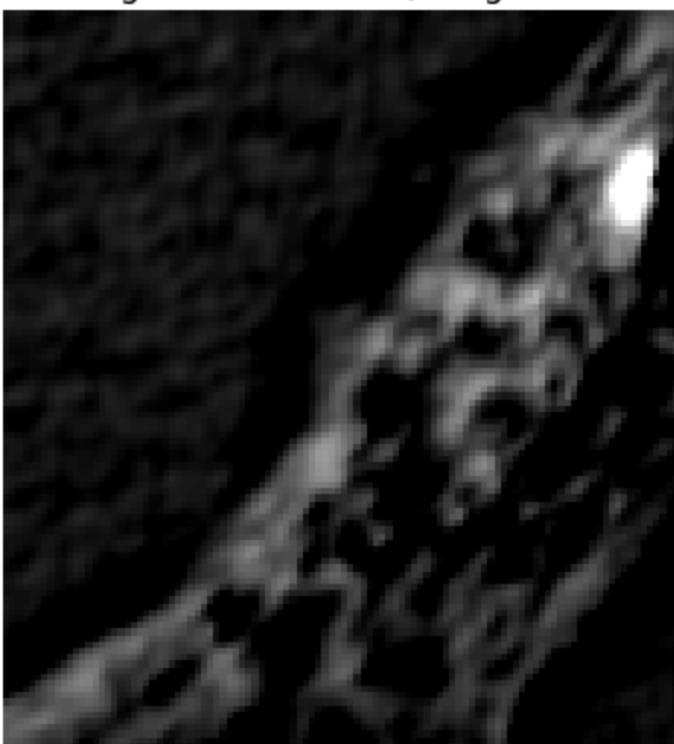


Image 1 - Width: 23, Height: 36

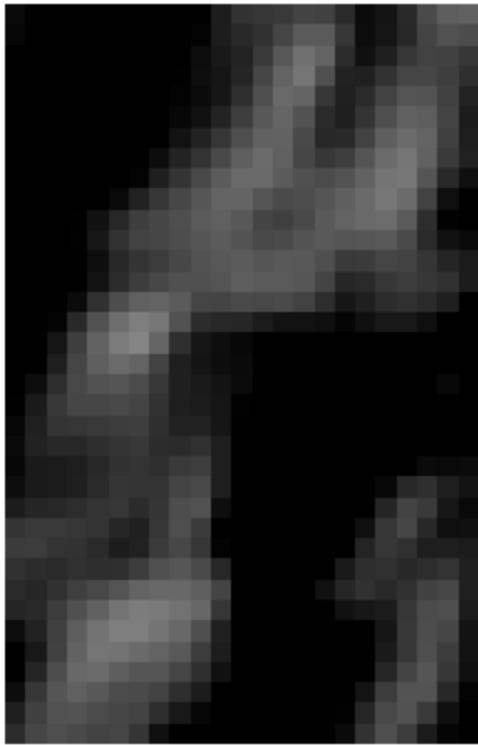


Image 1 - Width: 19, Height: 23

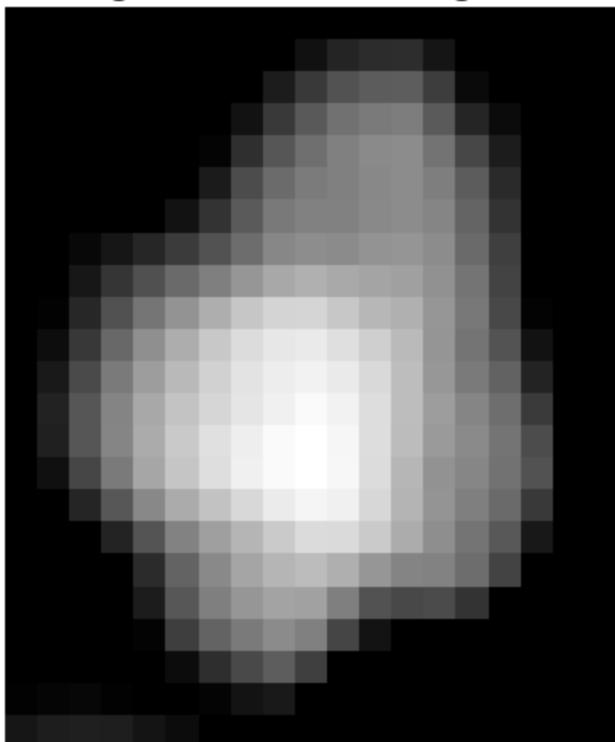


Image 1 - Width: 71, Height: 80



Image 1 - Width: 31, Height: 46

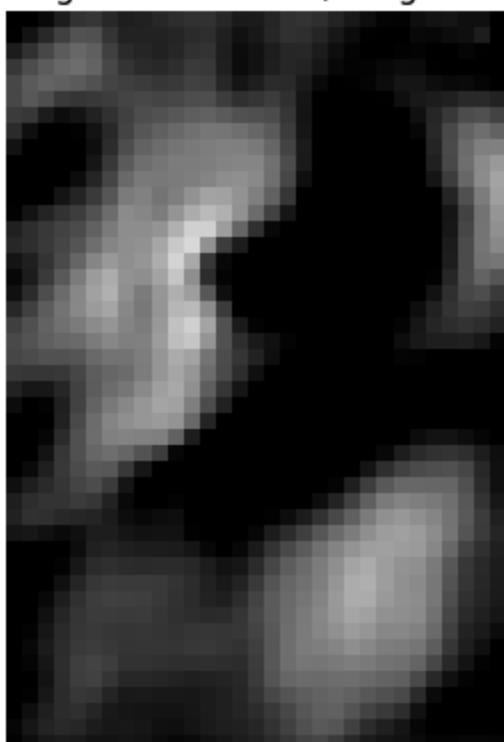


Image 1 - Width: 16, Height: 24

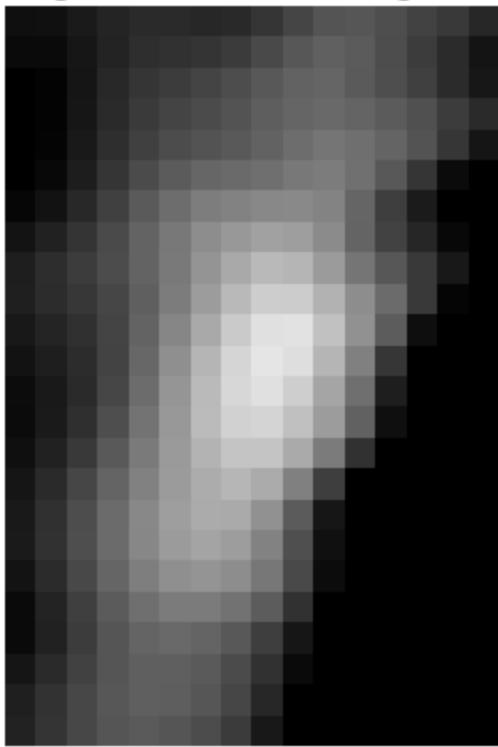


Image 1 - Width: 21, Height: 39

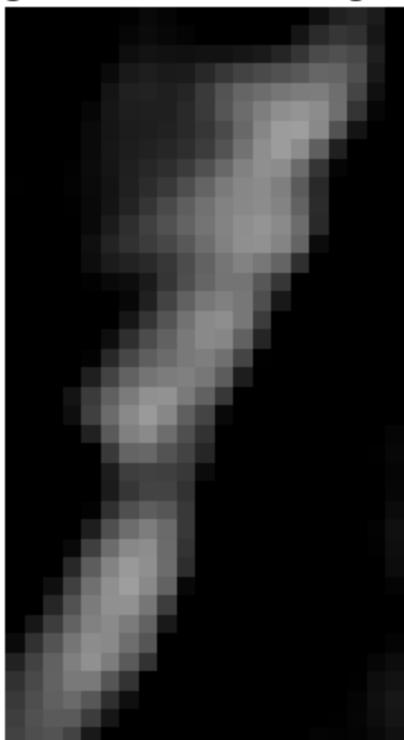


Image 1 - Width: 75, Height: 59

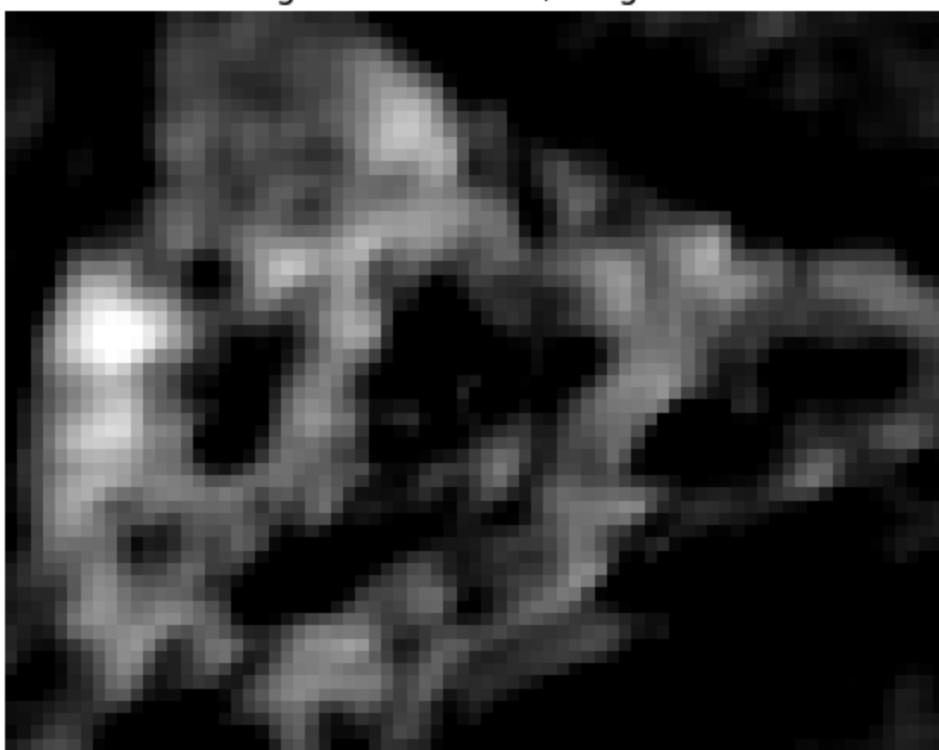


Image 1 - Width: 29, Height: 108

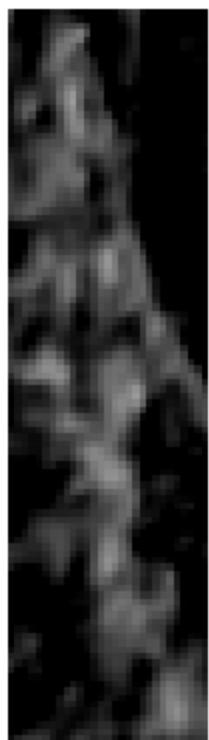


Image 1 - Width: 18, Height: 25

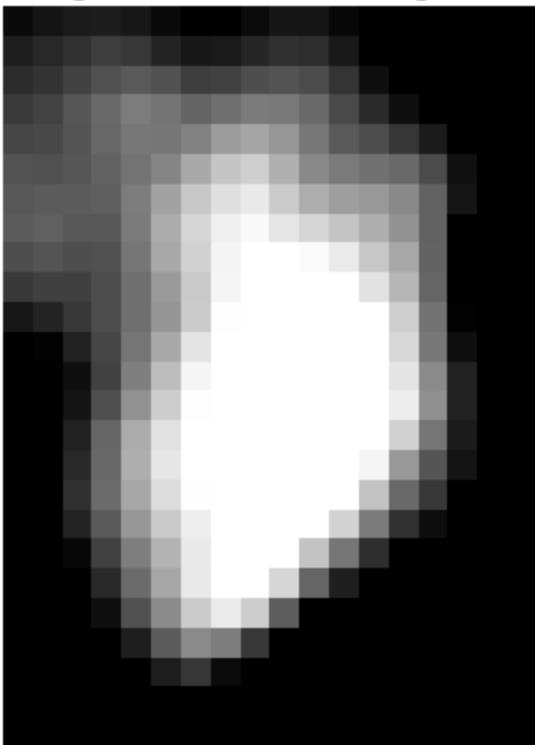


Image 1 - Width: 16, Height: 25

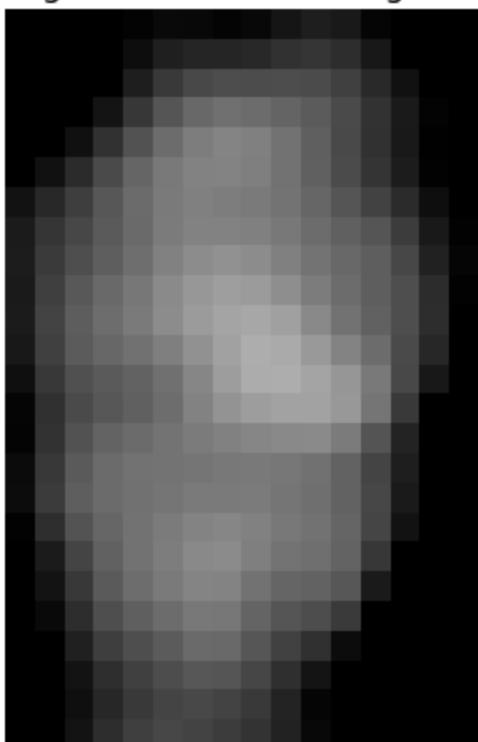


Image 1 - Width: 27, Height: 23

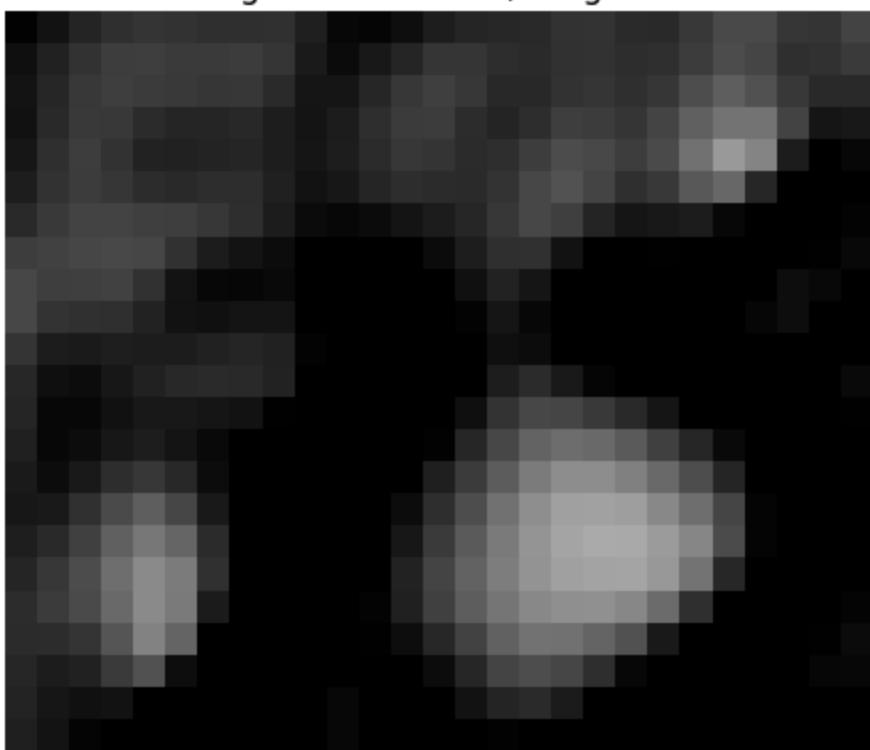


Image 1 - Width: 14, Height: 29

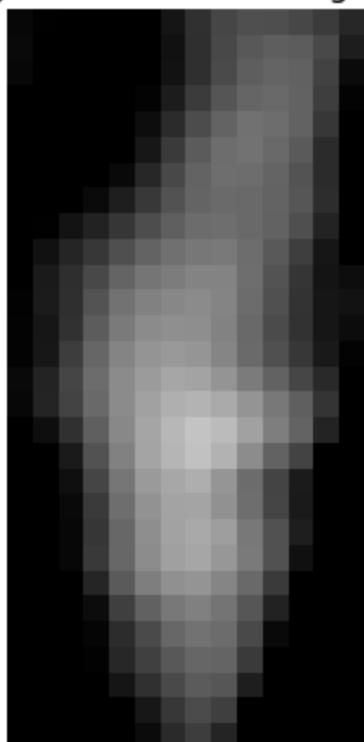


Image 1 - Width: 34, Height: 35

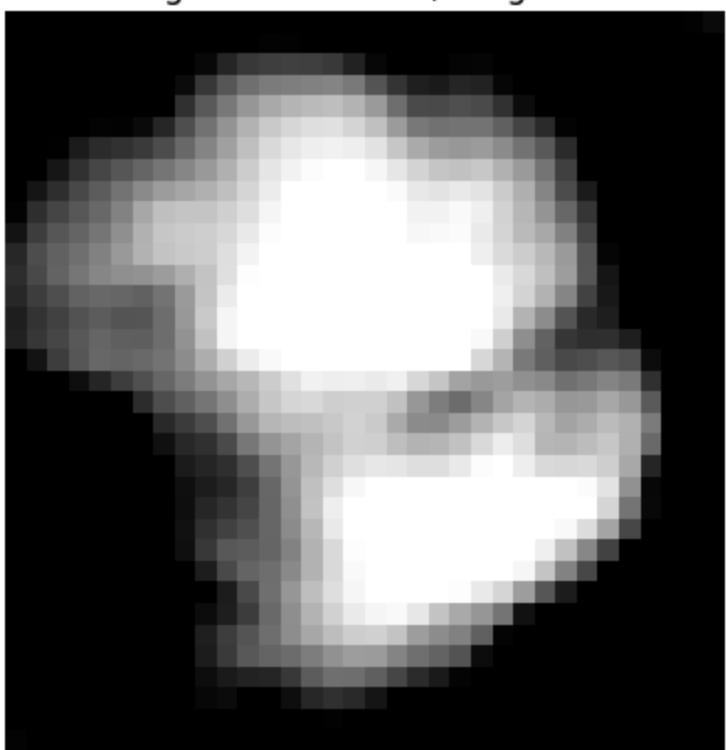


Image 1 - Width: 57, Height: 154

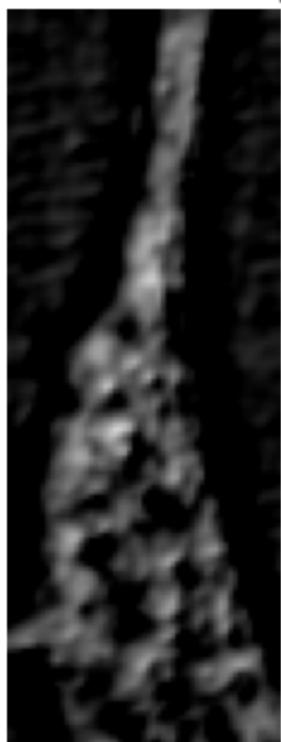


Image 1 - Width: 69, Height: 31



Image 1 - Width: 23, Height: 27

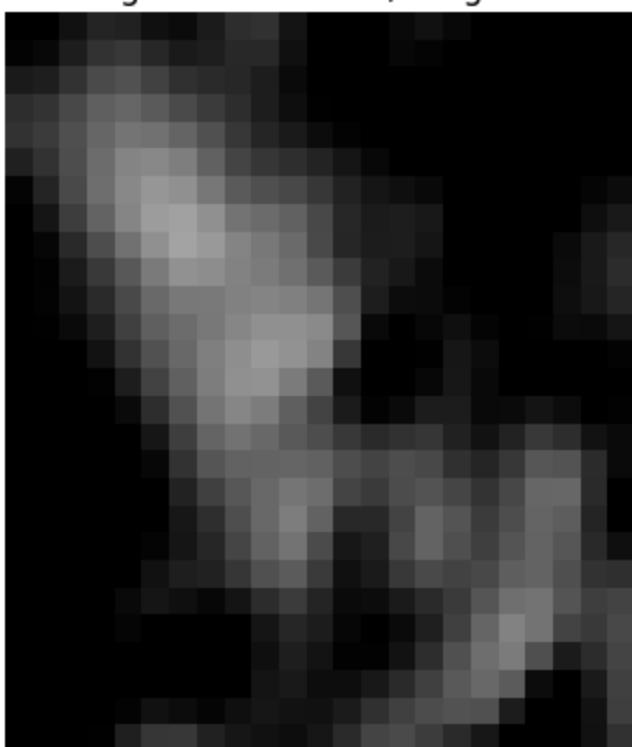


Image 1 - Width: 35, Height: 23

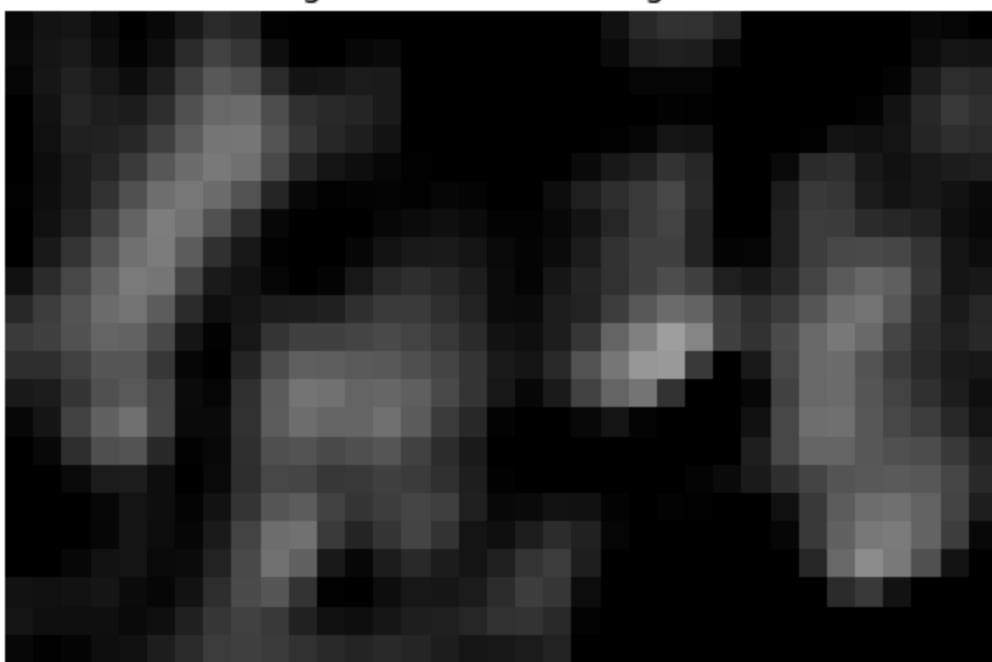


Image 1 - Width: 29, Height: 19

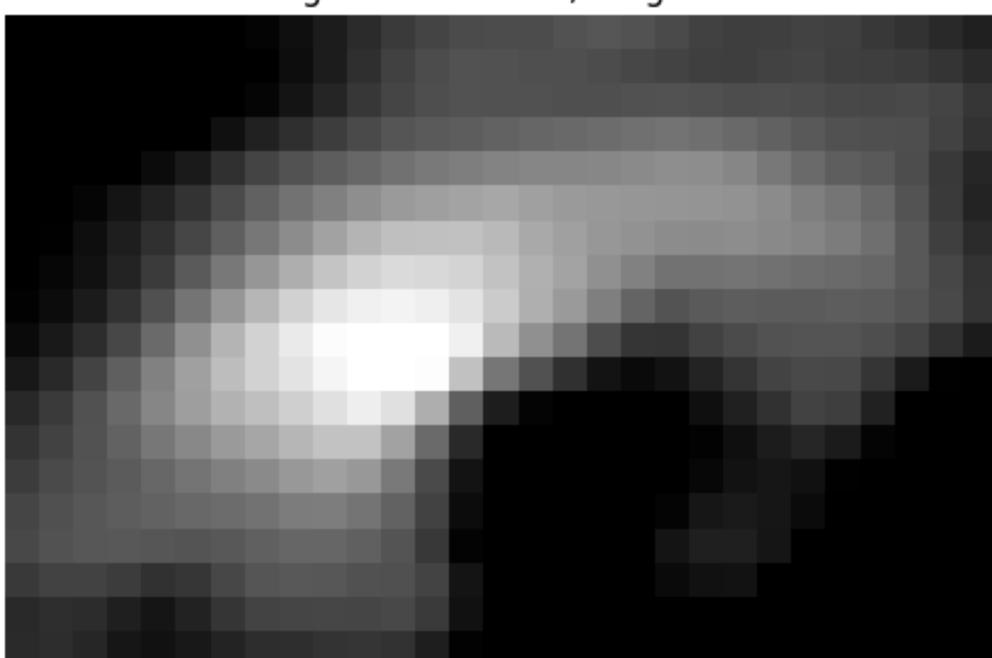


Image 1 - Width: 31, Height: 22

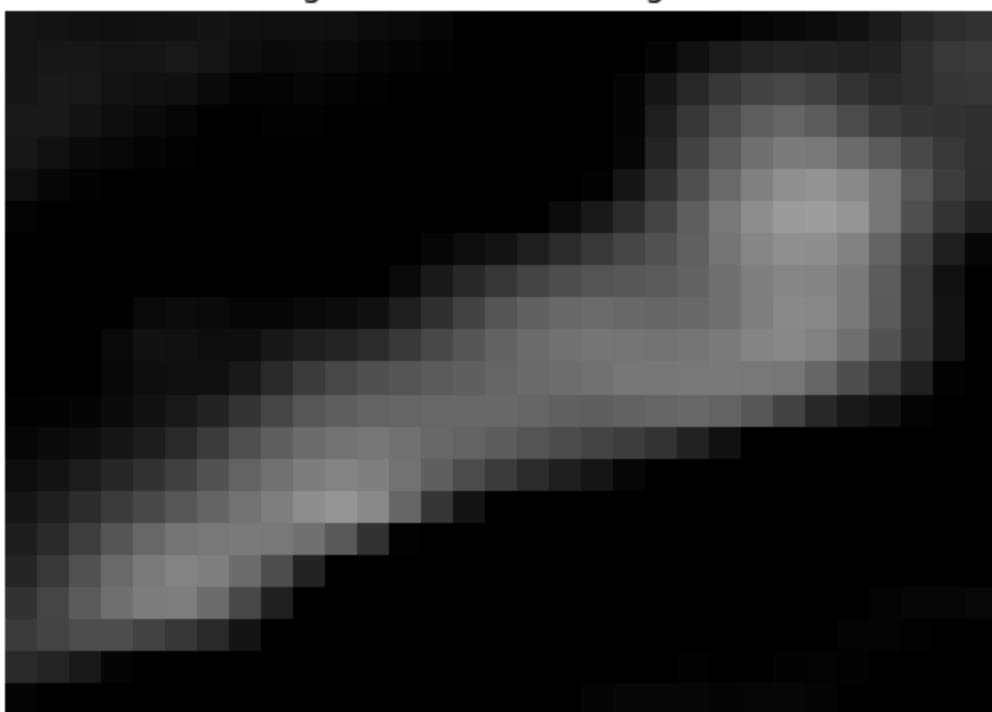


Image 1 - Width: 22, Height: 31

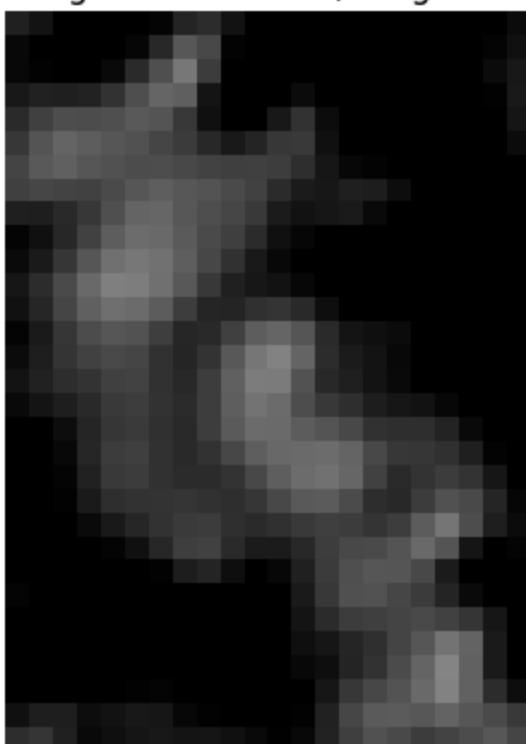


Image 1 - Width: 61, Height: 18

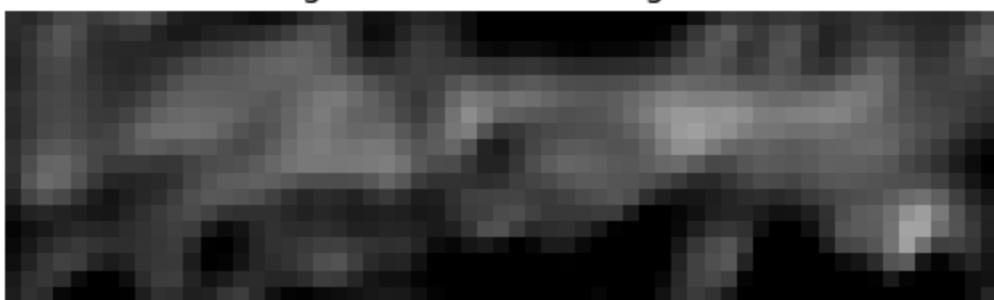


Image 1 - Width: 29, Height: 47

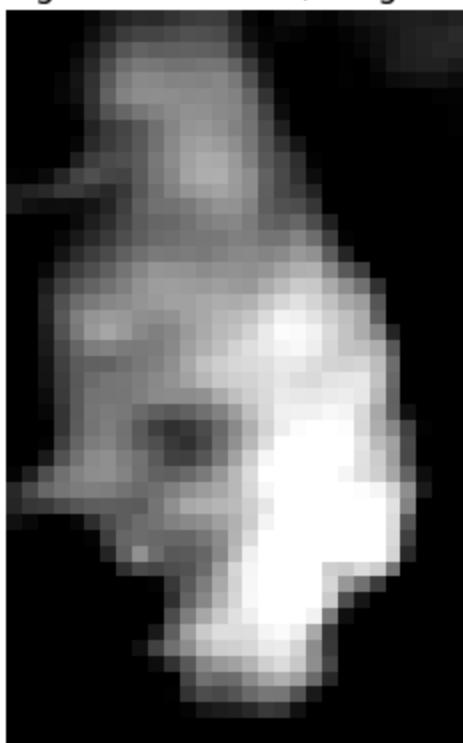


Image 1 - Width: 111, Height: 154

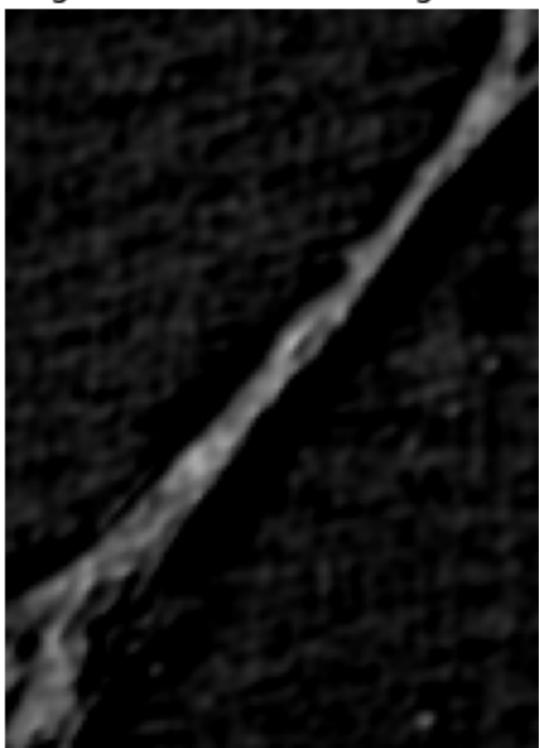


Image 1 - Width: 35, Height: 22

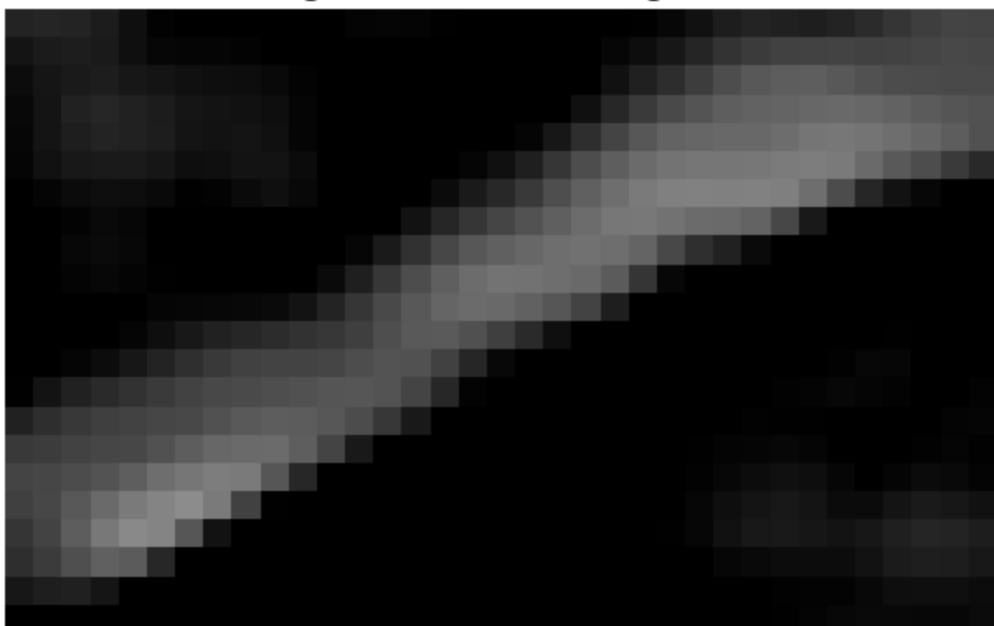


Image 1 - Width: 41, Height: 40

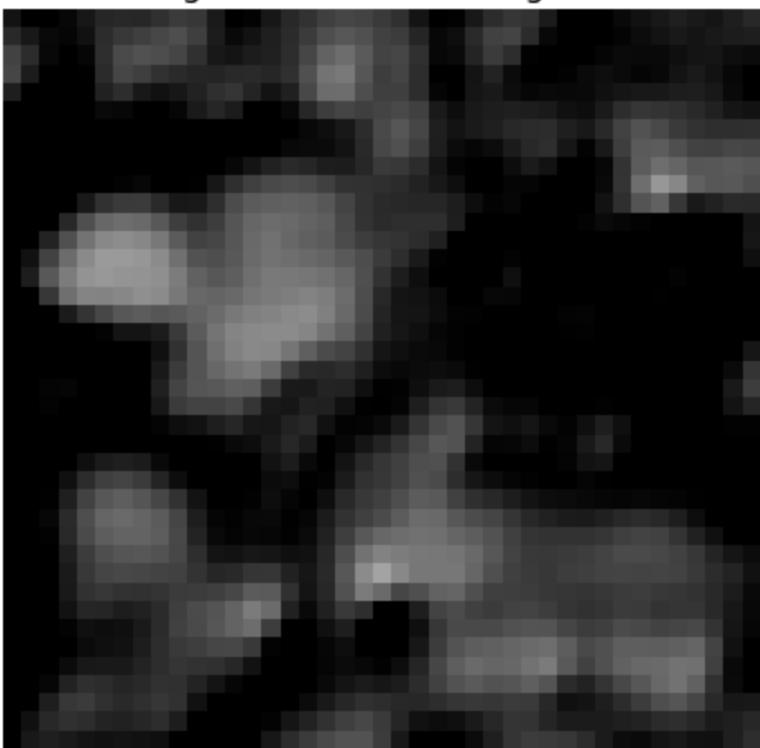


Image 1 - Width: 65, Height: 40

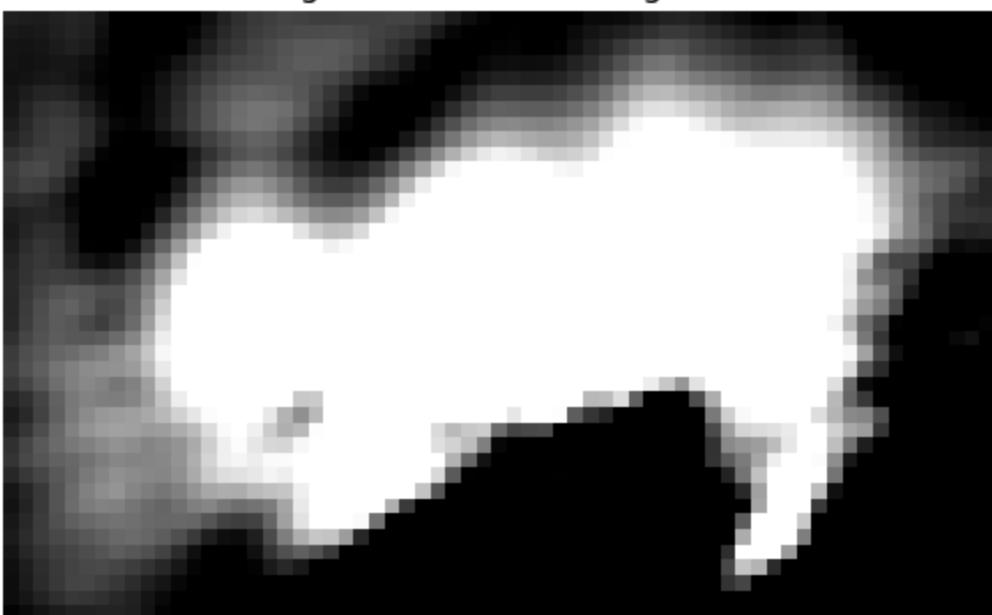


Image 1 - Width: 76, Height: 87

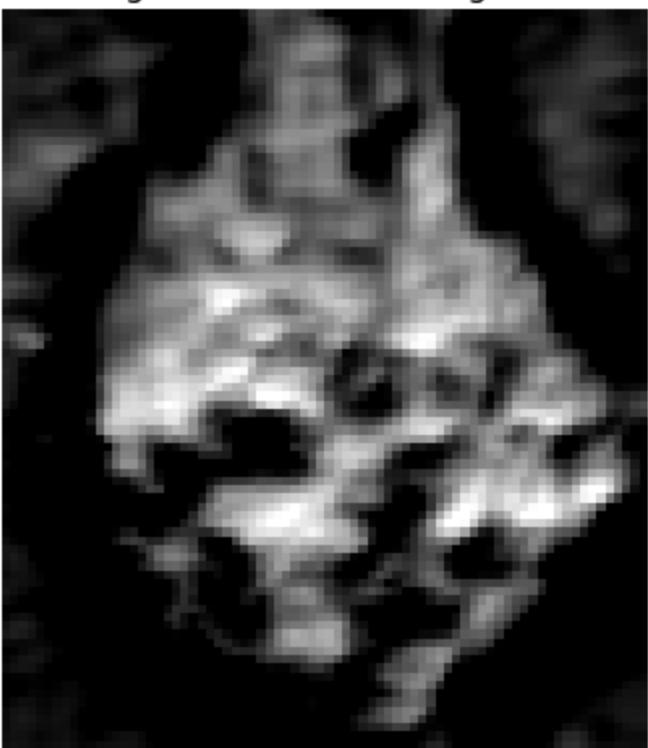


Image 1 - Width: 24, Height: 28

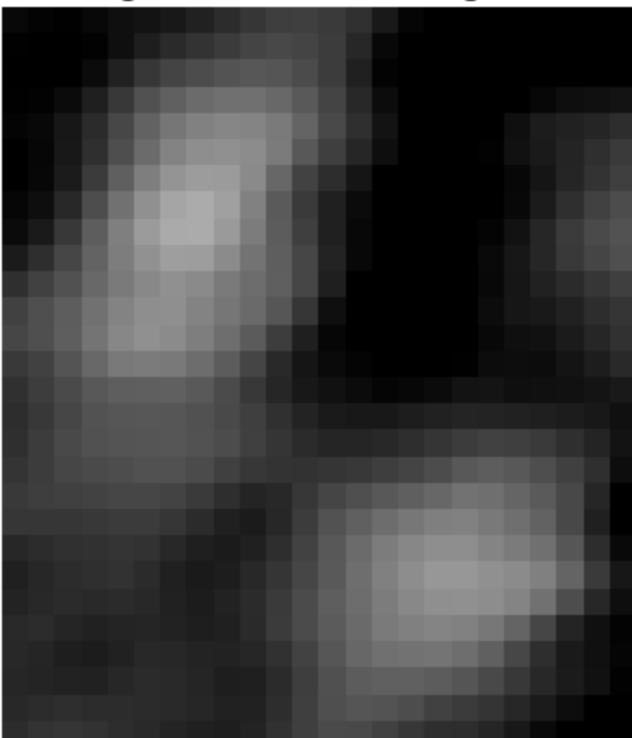


Image 1 - Width: 67, Height: 105

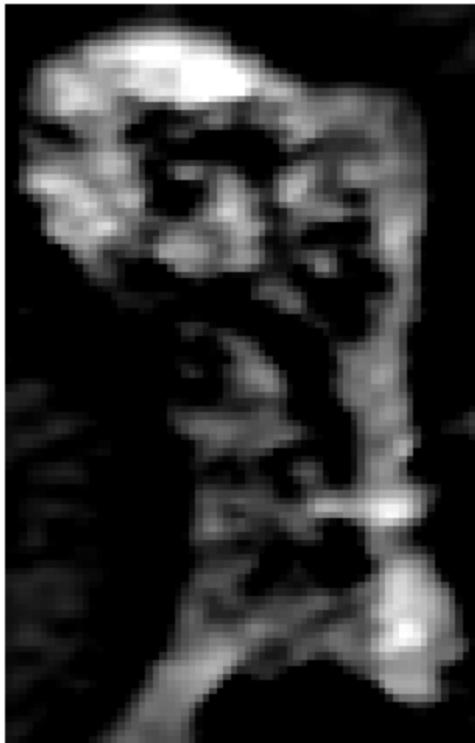


Image 1 - Width: 38, Height: 44

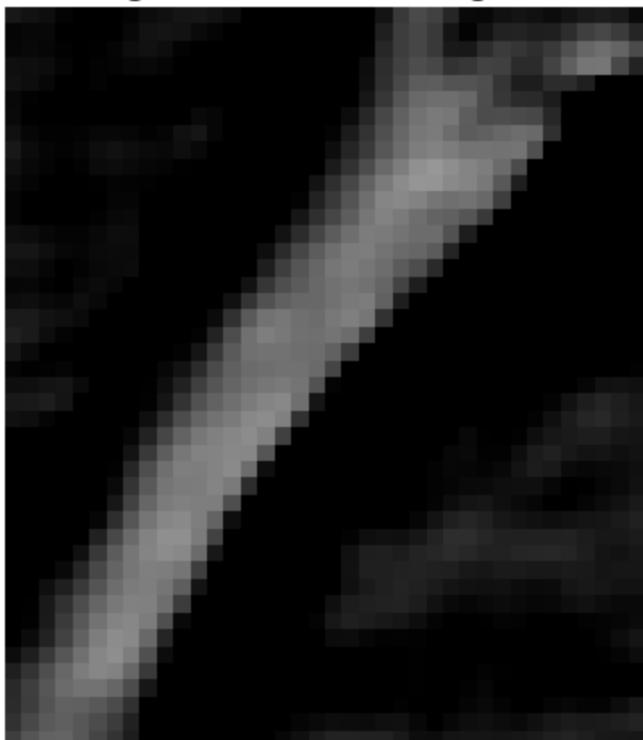


Image 1 - Width: 24, Height: 28

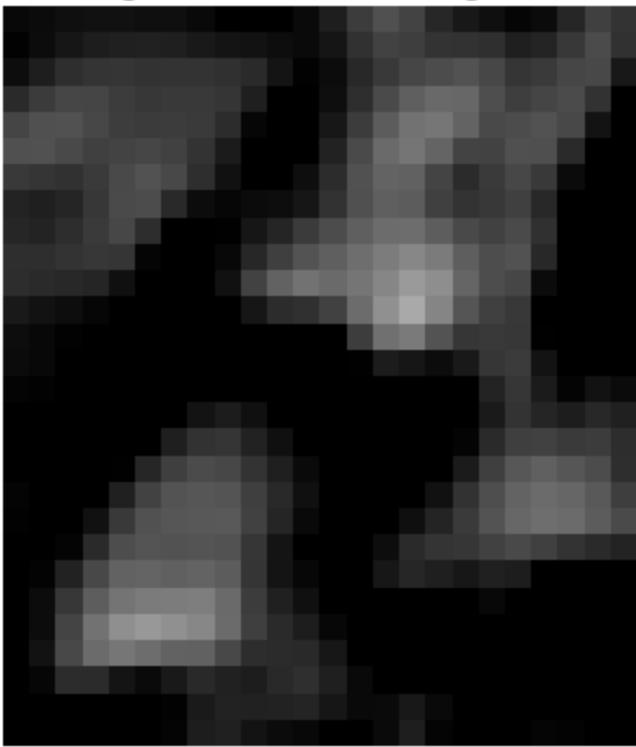


Image 1 - Width: 27, Height: 21

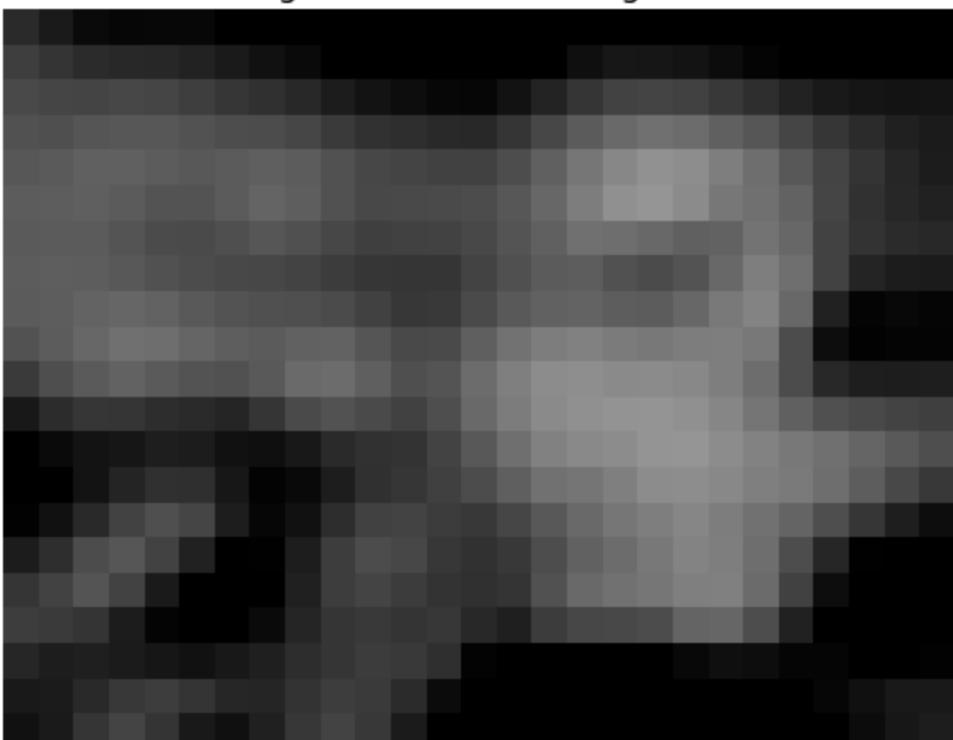


Image 1 - Width: 43, Height: 49



Image 1 - Width: 35, Height: 33

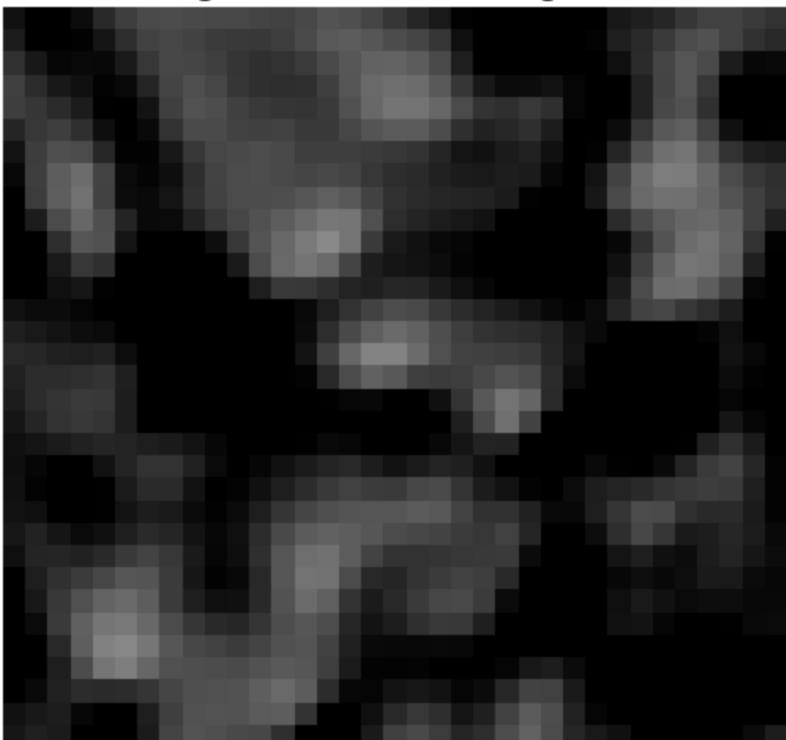


Image 1 - Width: 26, Height: 30

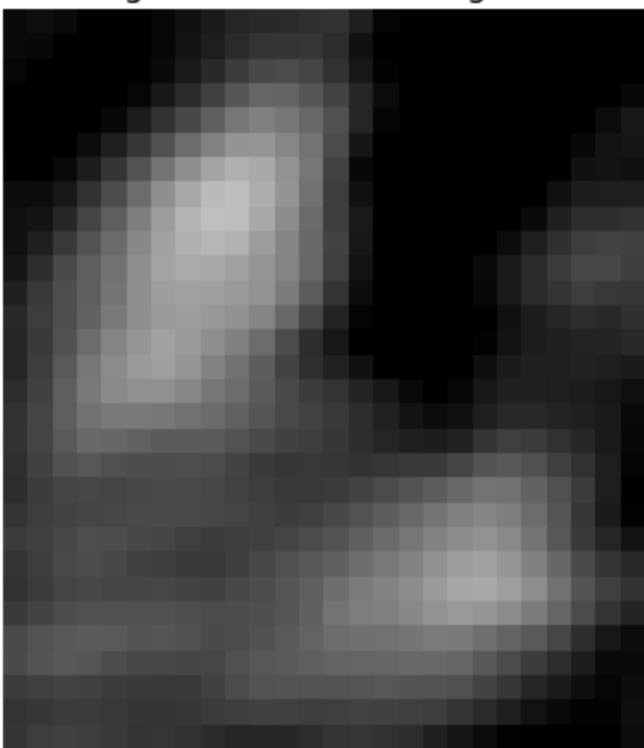


Image 1 - Width: 22, Height: 21

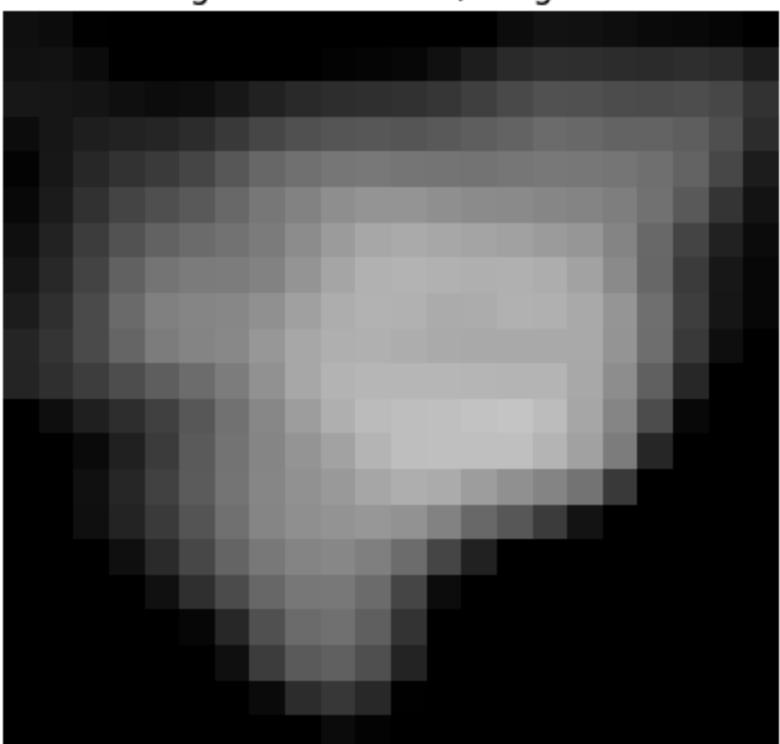


Image 1 - Width: 43, Height: 83

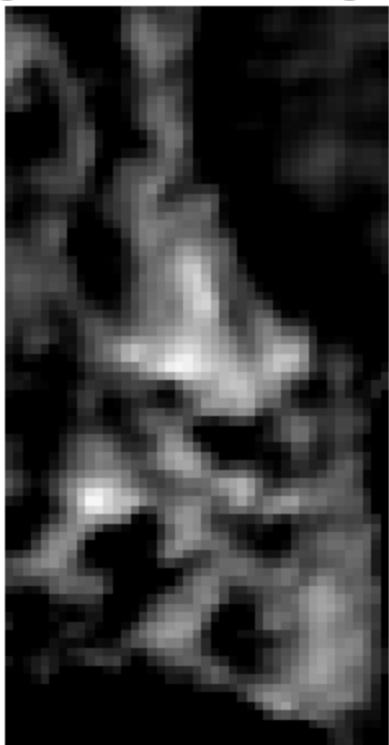


Image 1 - Width: 80, Height: 190

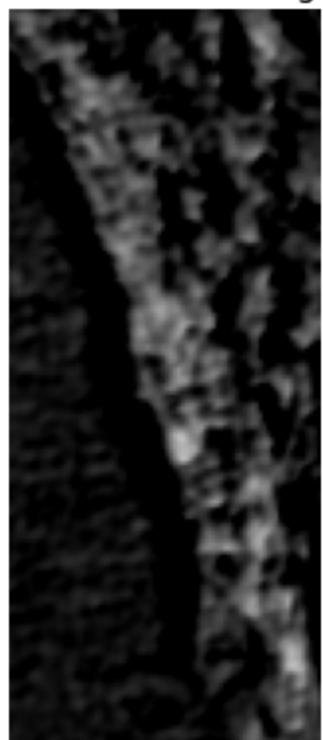


Image 1 - Width: 41, Height: 120

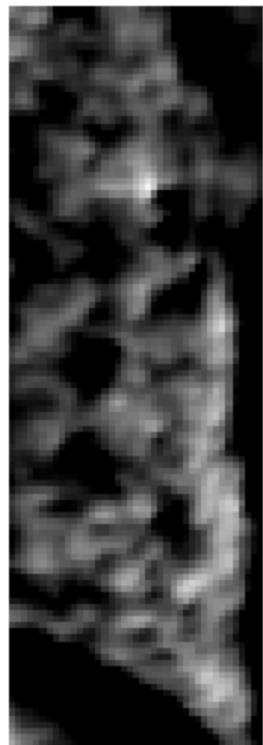


Image 1 - Width: 31, Height: 27

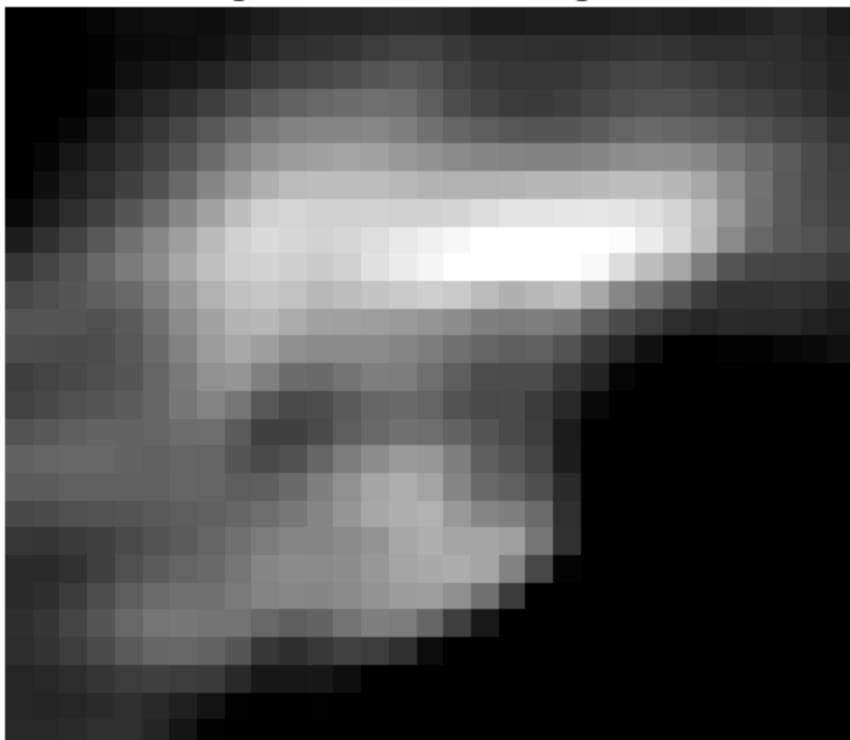


Image 1 - Width: 41, Height: 22

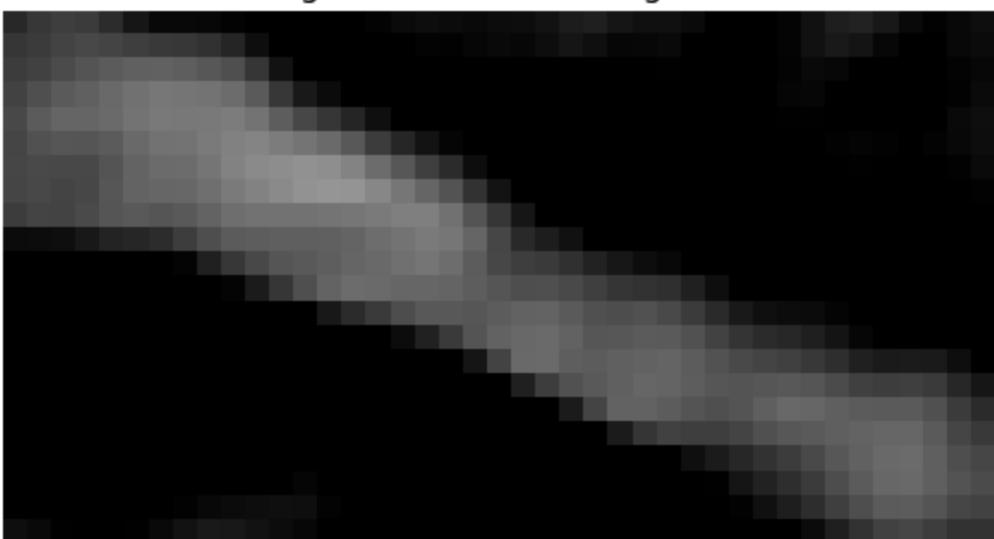


Image 1 - Width: 51, Height: 52

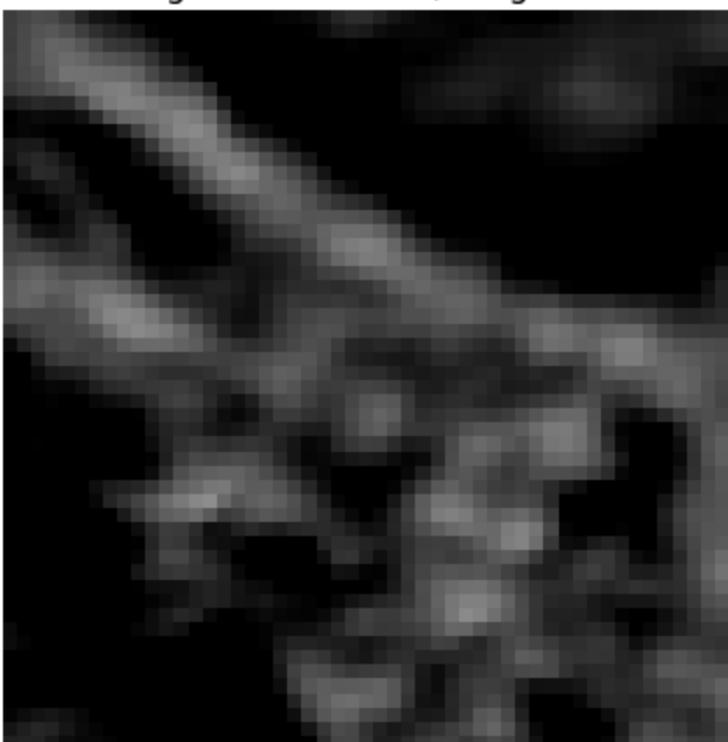


Image 1 - Width: 27, Height: 52

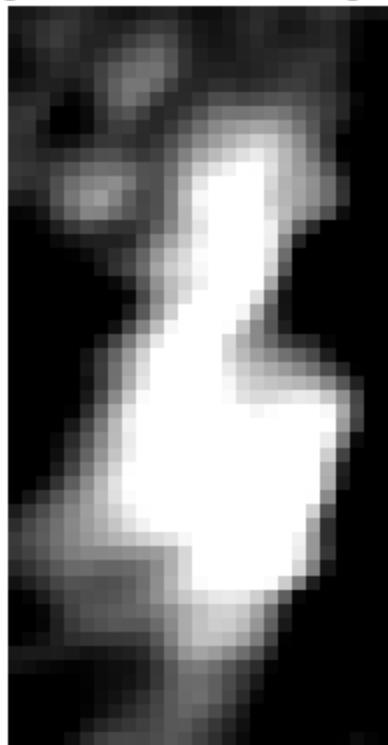


Image 1 - Width: 157, Height: 141

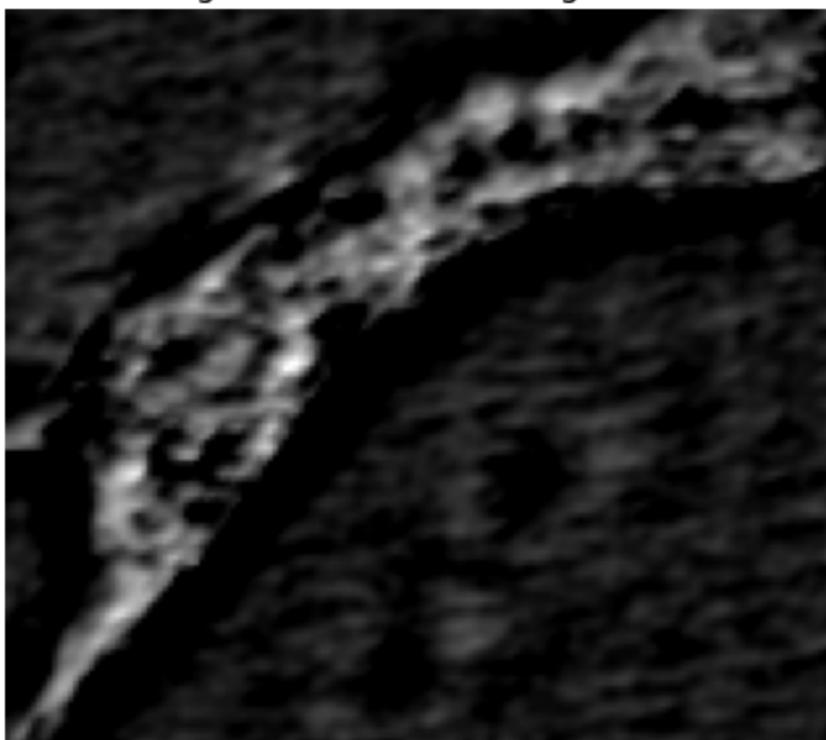


Image 1 - Width: 44, Height: 17

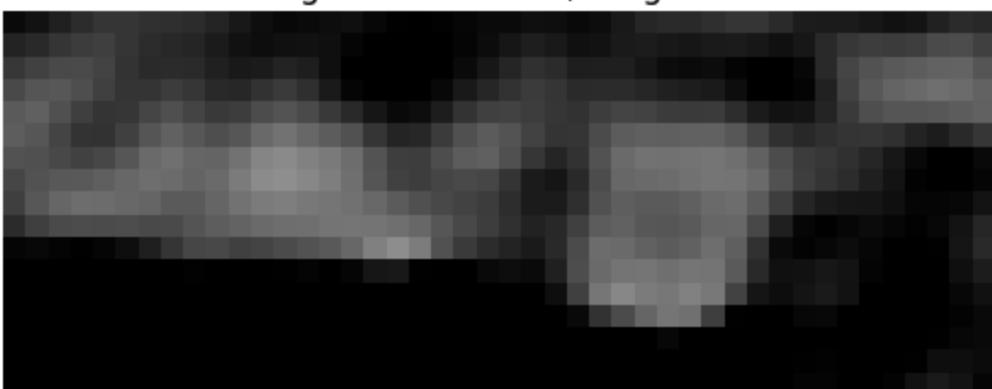


Image 1 - Width: 27, Height: 23

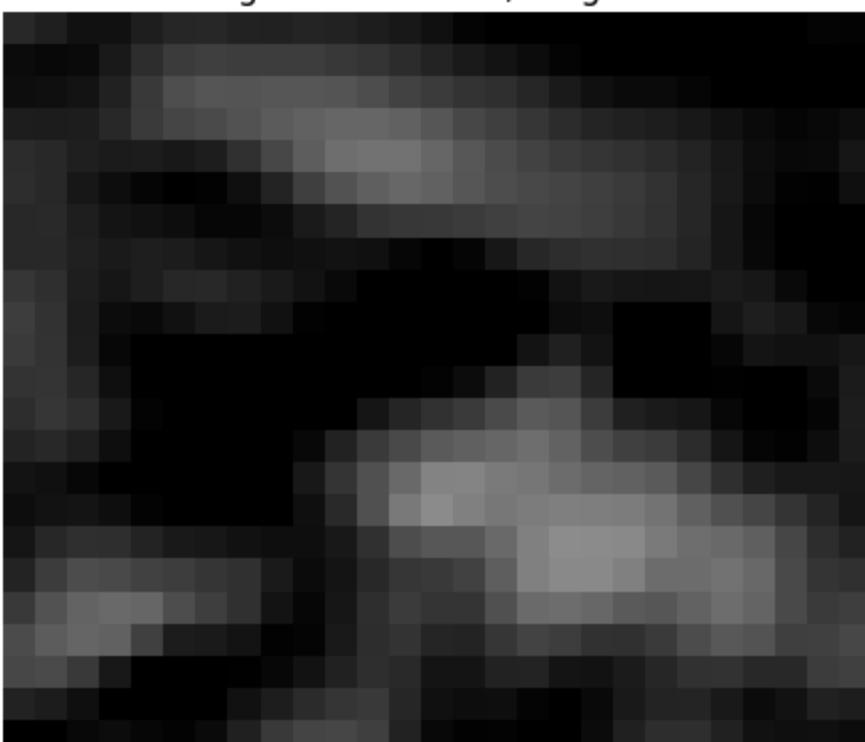


Image 1 - Width: 62, Height: 28

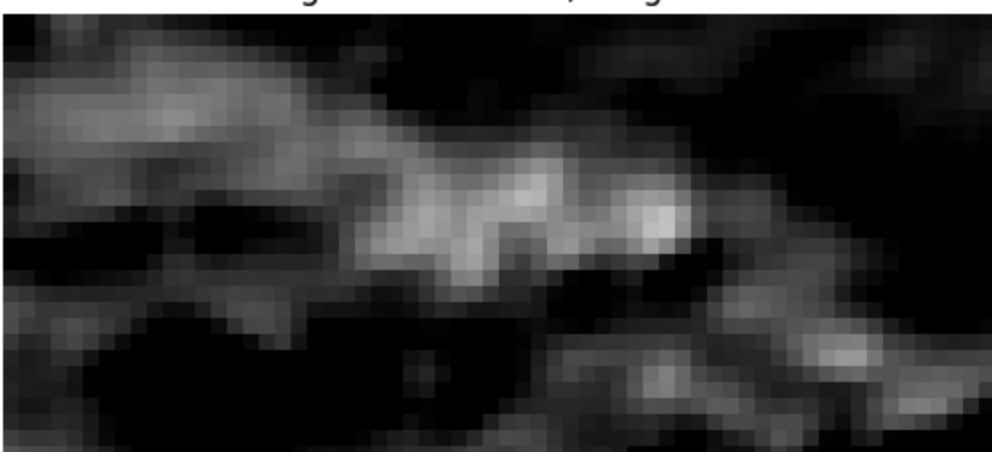


Image 1 - Width: 34, Height: 34

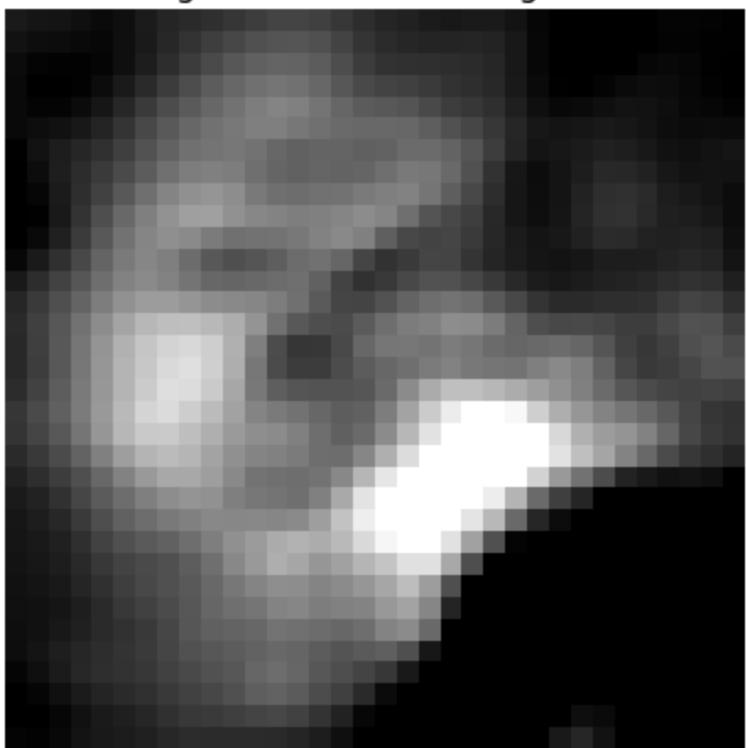


Image 1 - Width: 20, Height: 36

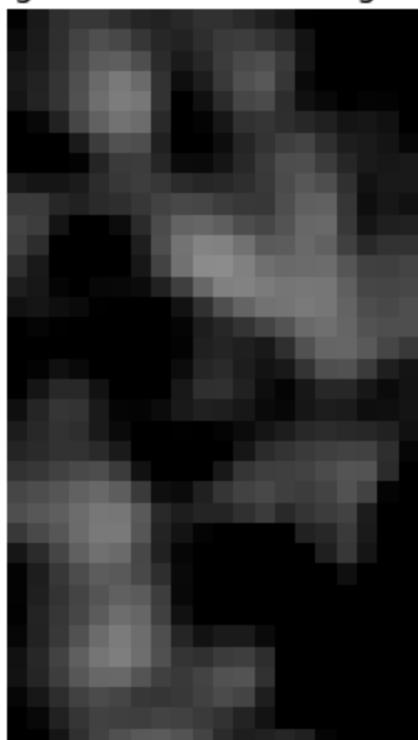


Image 1 - Width: 37, Height: 49

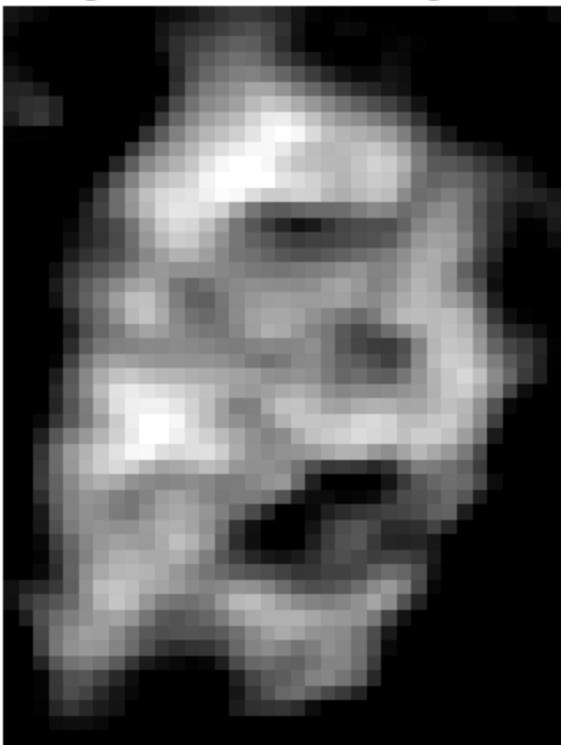


Image 1 - Width: 44, Height: 30

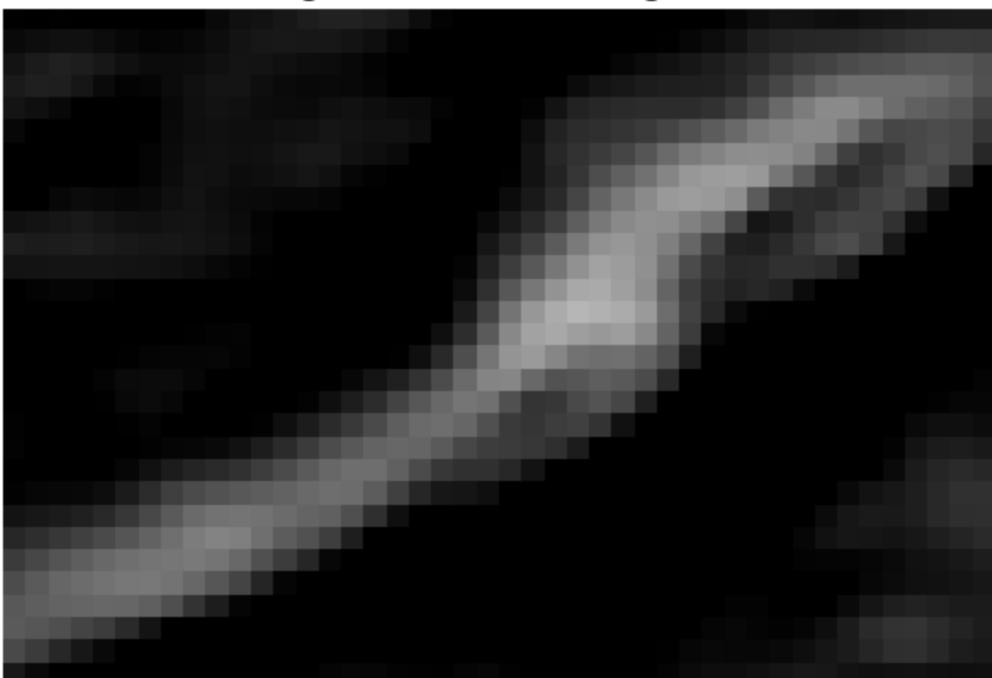


Image 1 - Width: 25, Height: 31

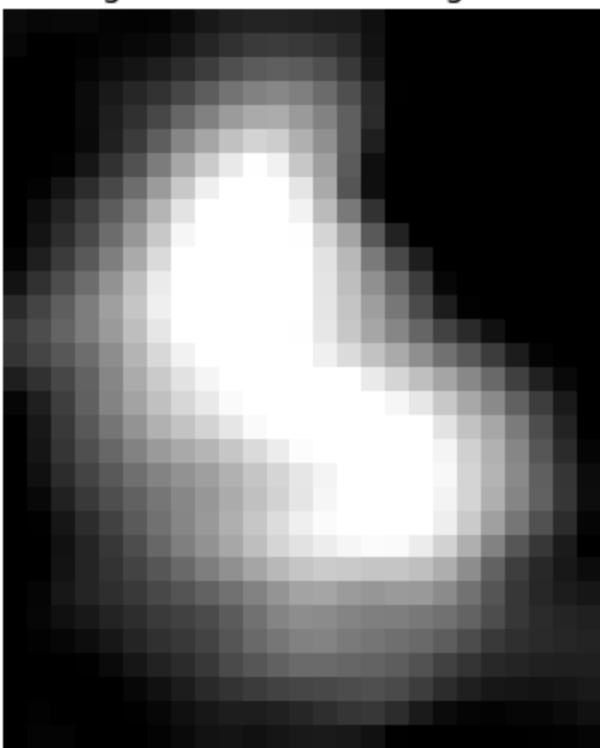


Image 1 - Width: 35, Height: 40



Image 1 - Width: 15, Height: 30

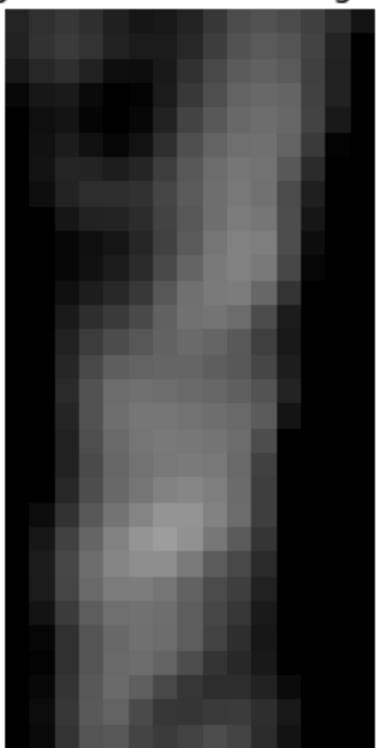


Image 1 - Width: 51, Height: 151



Image 1 - Width: 30, Height: 14

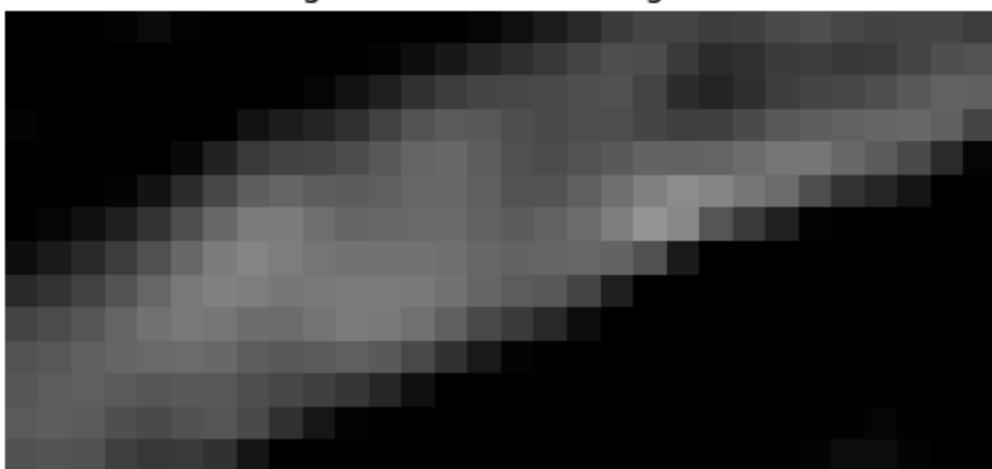


Image 1 - Width: 51, Height: 178



Image 1 - Width: 40, Height: 23

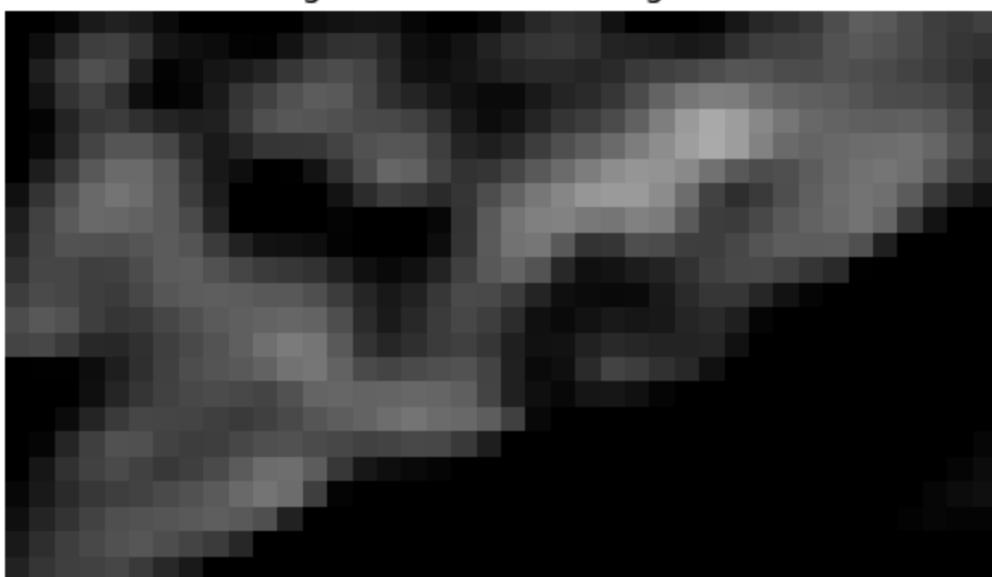


Image 1 - Width: 32, Height: 19

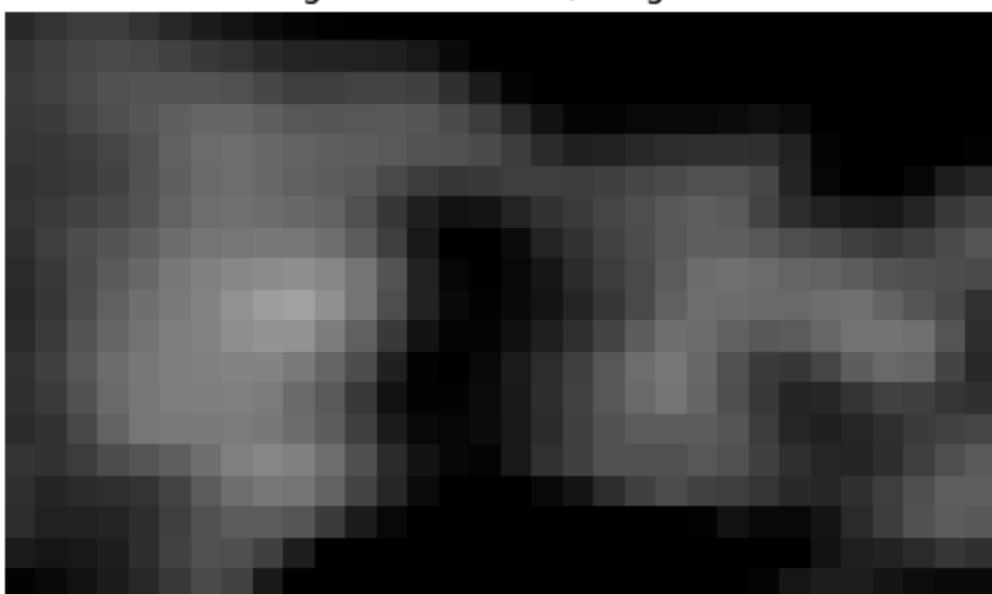


Image 1 - Width: 26, Height: 21

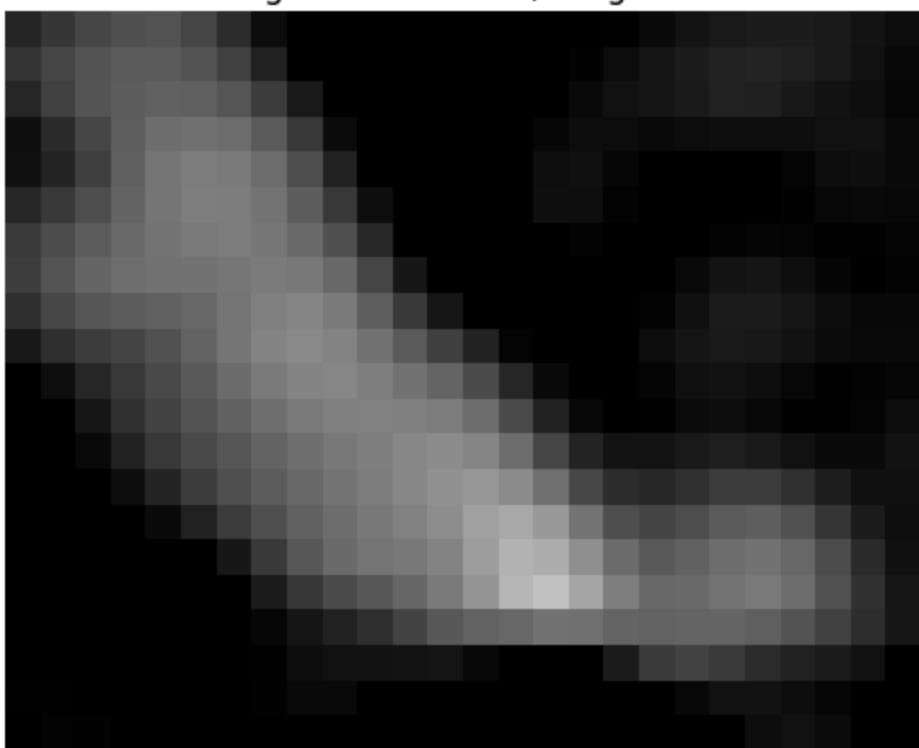


Image 1 - Width: 42, Height: 84

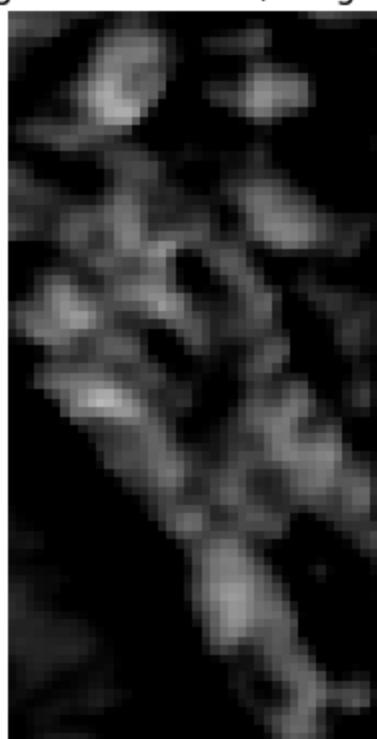


Image 1 - Width: 40, Height: 43

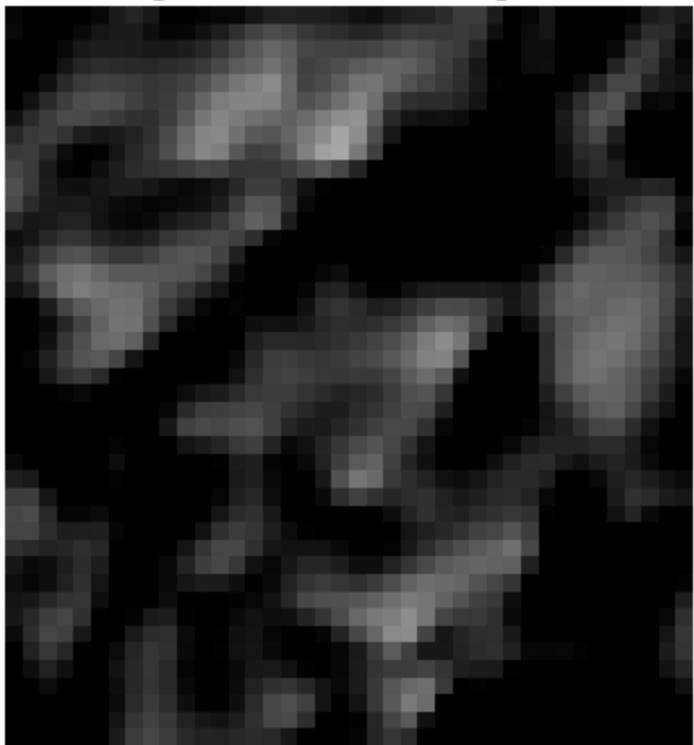


Image 1 - Width: 20, Height: 25

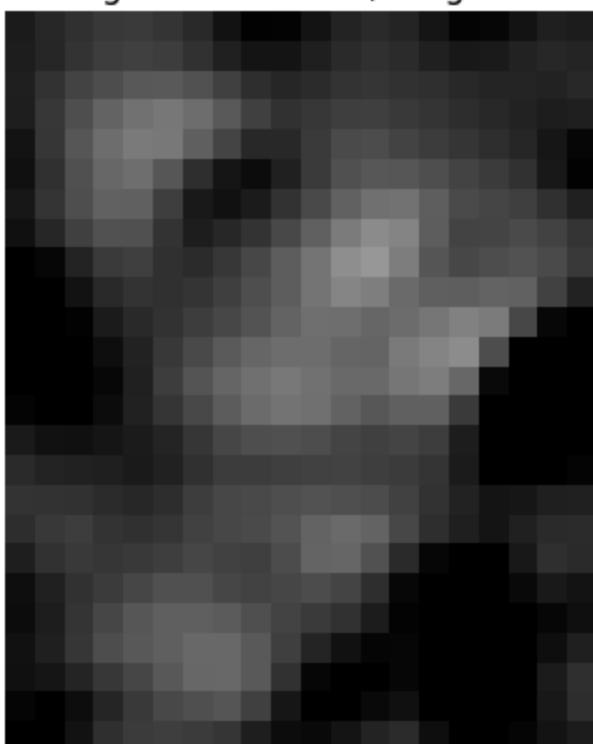


Image 1 - Width: 33, Height: 20

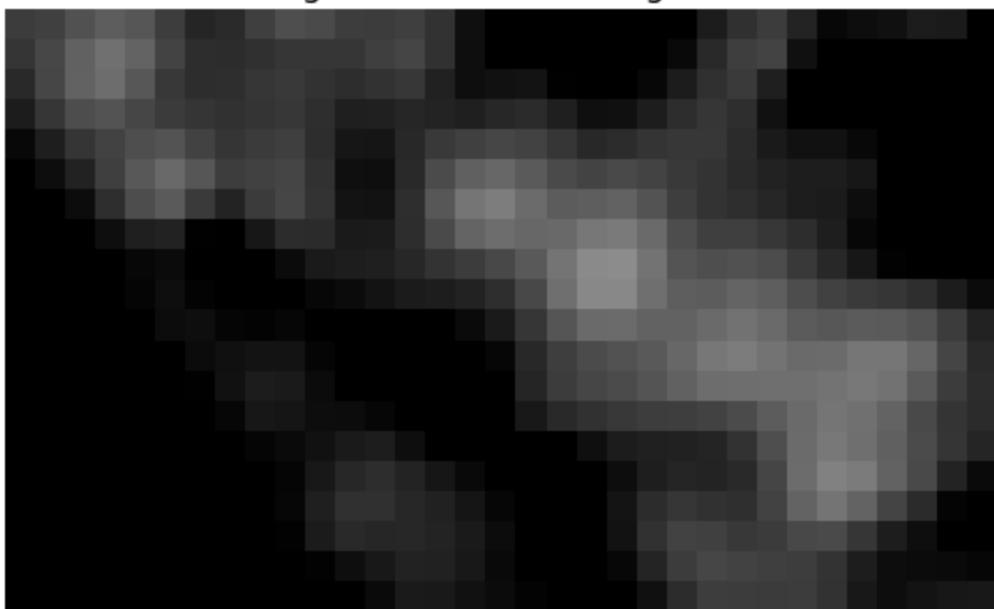


Image 1 - Width: 22, Height: 22

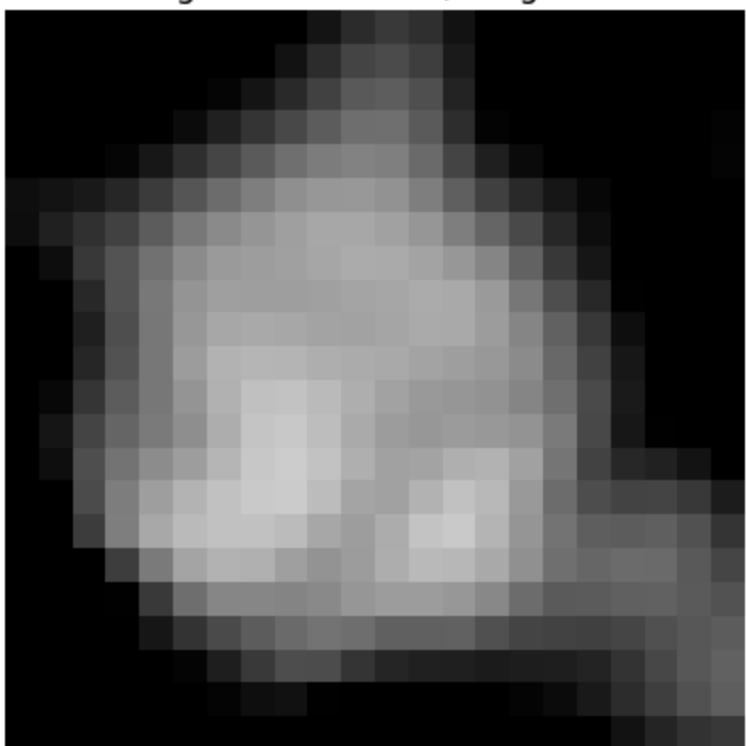


Image 1 - Width: 38, Height: 28

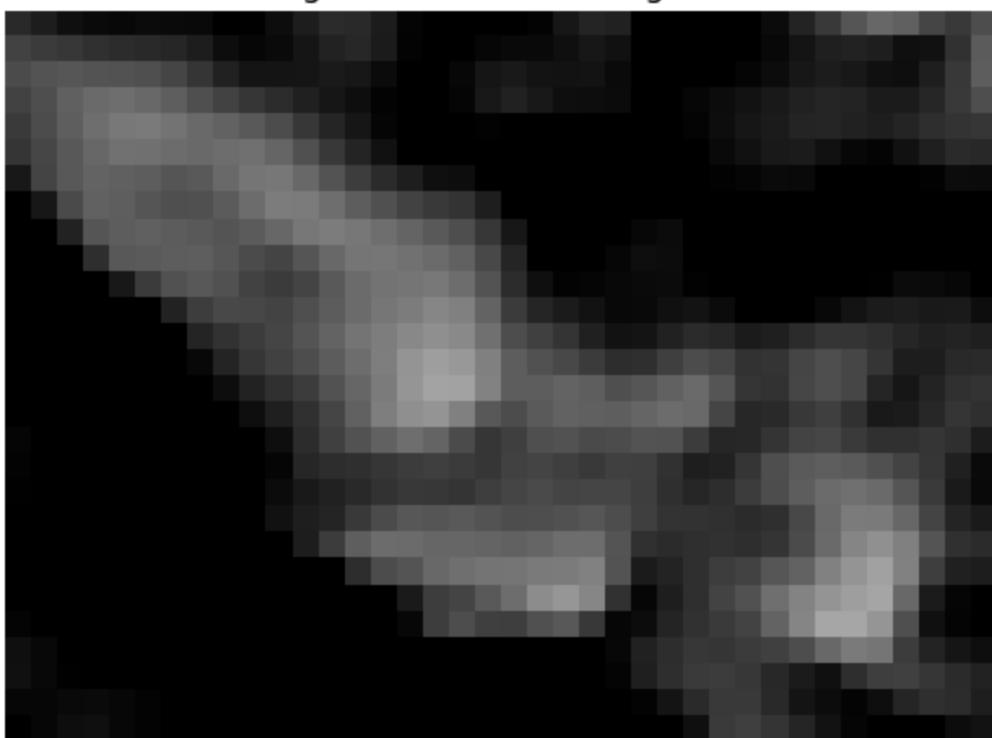


Image 1 - Width: 42, Height: 111



Image 1 - Width: 31, Height: 21

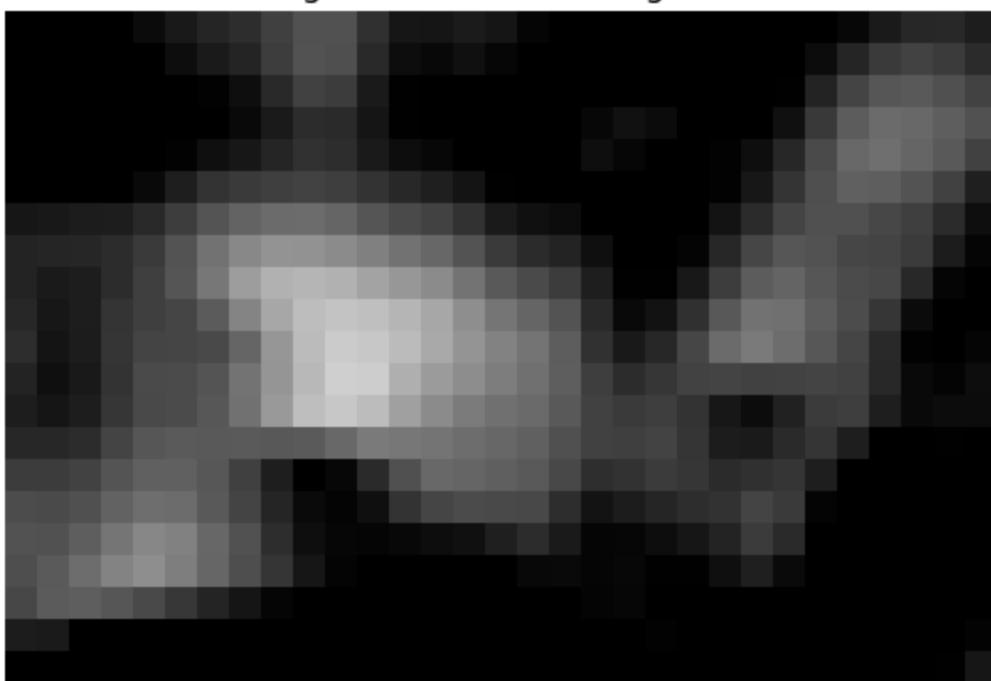


Image 1 - Width: 125, Height: 84

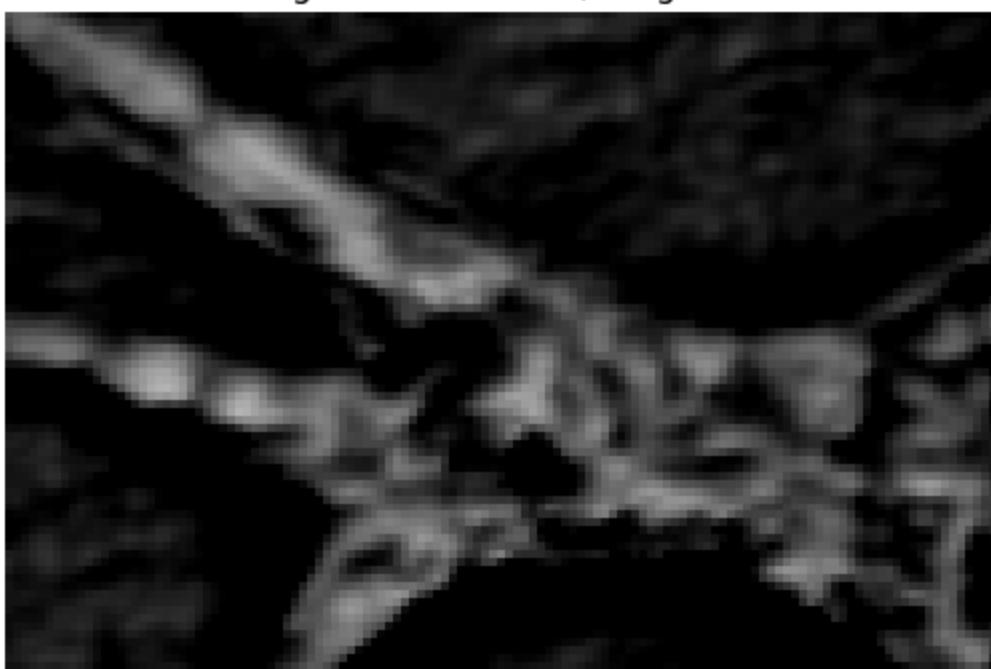


Image 1 - Width: 110, Height: 102

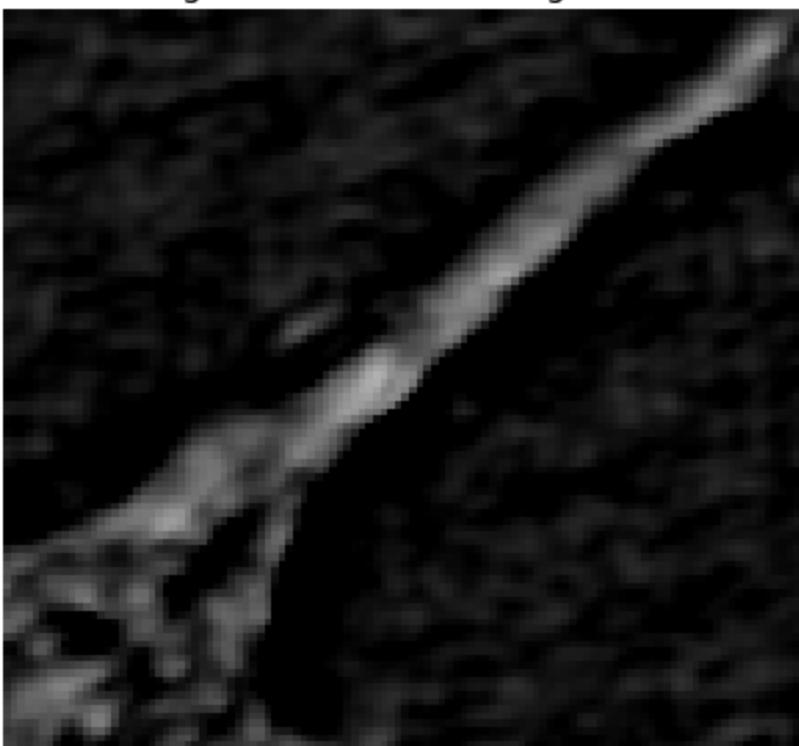


Image 1 - Width: 43, Height: 49

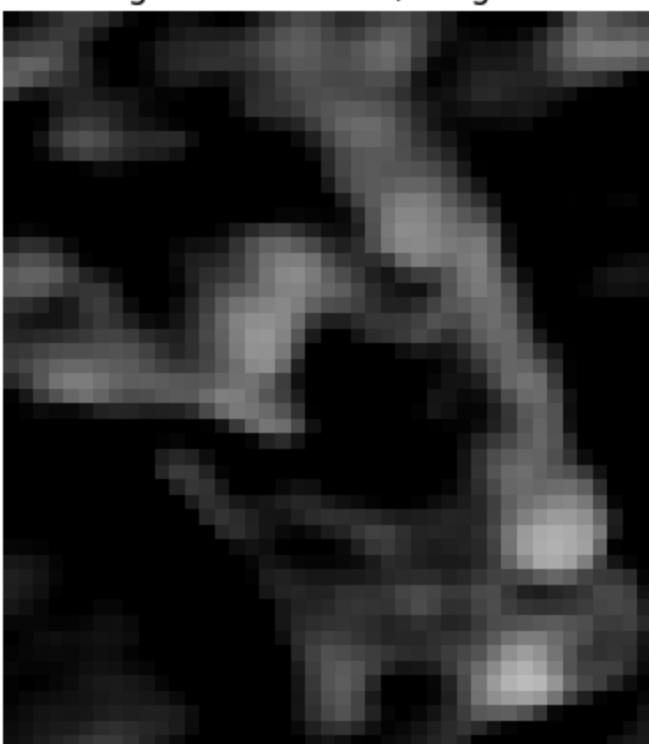


Image 1 - Width: 40, Height: 35

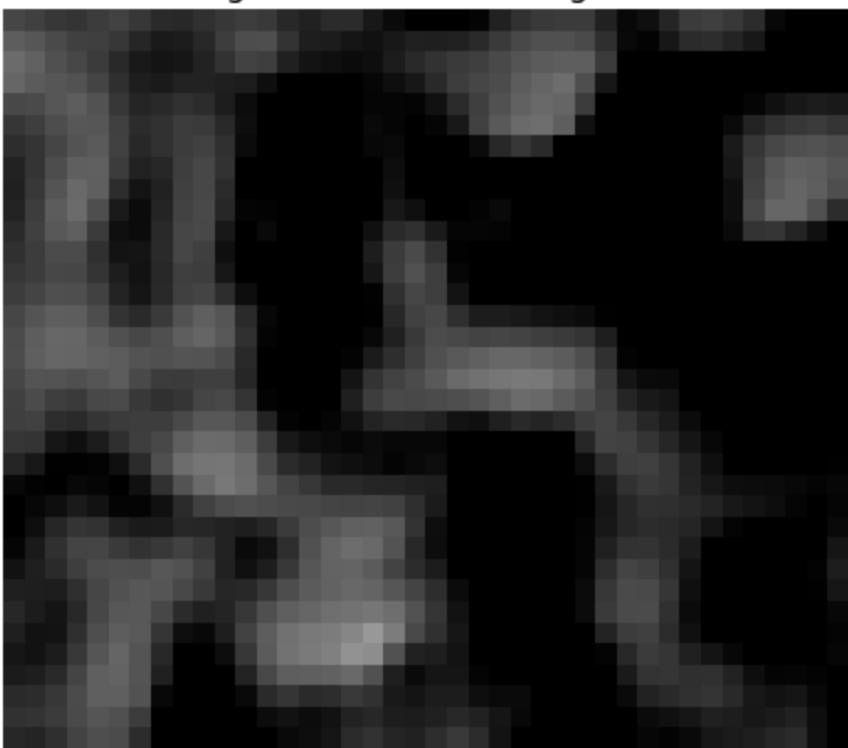


Image 1 - Width: 38, Height: 24

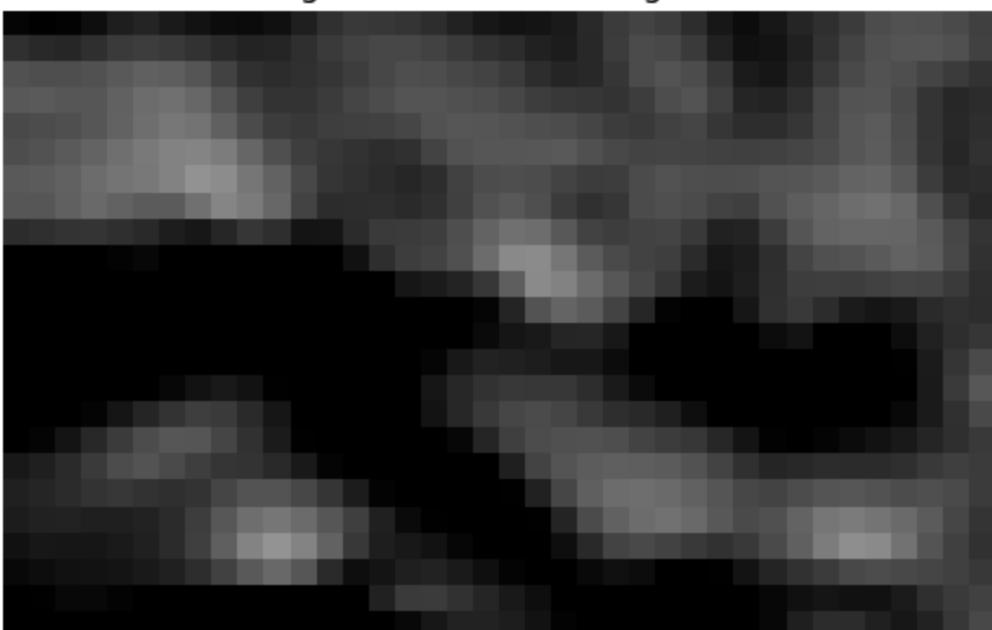


Image 1 - Width: 34, Height: 21

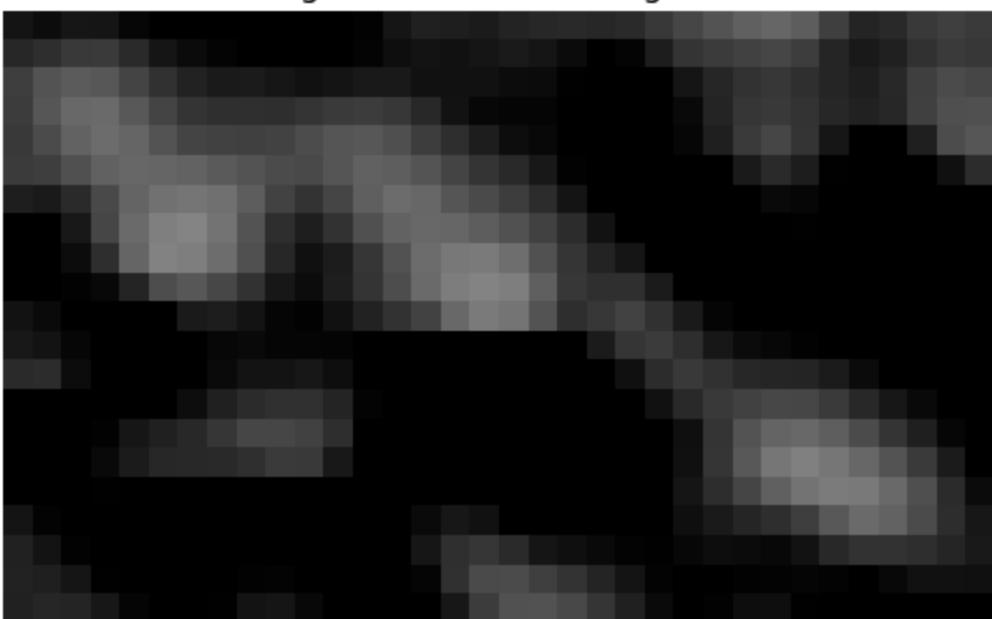


Image 1 - Width: 25, Height: 36

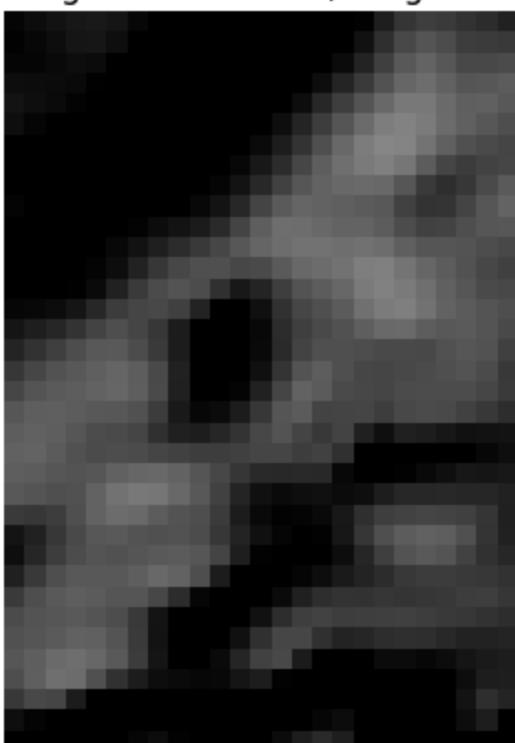


Image 1 - Width: 23, Height: 19

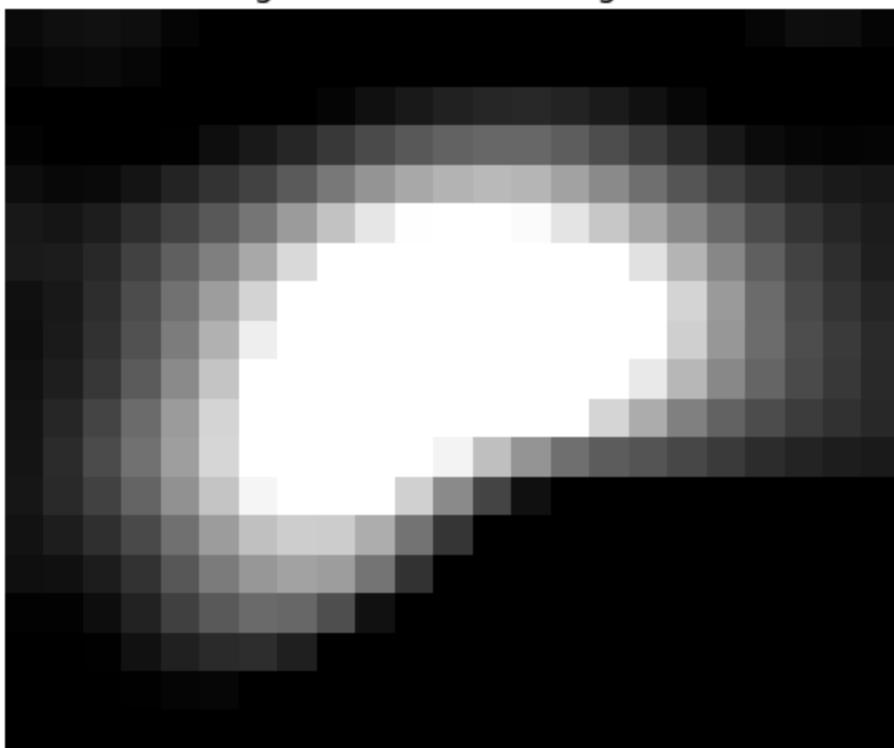


Image 1 - Width: 24, Height: 33

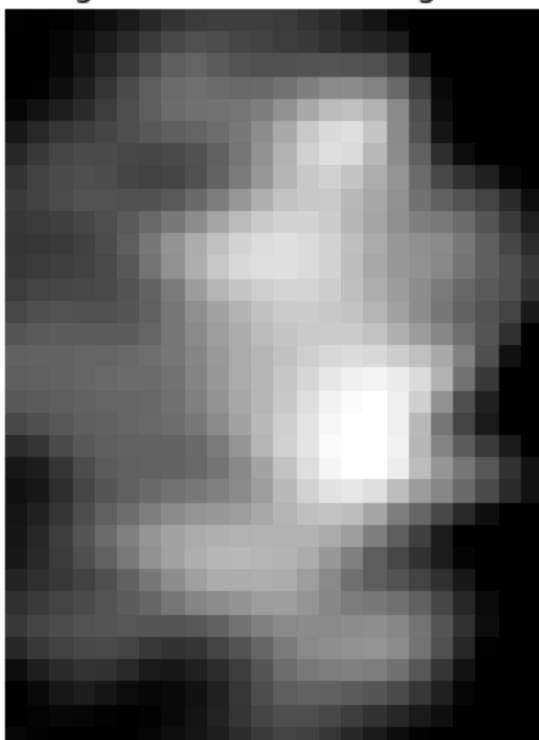


Image 1 - Width: 35, Height: 23

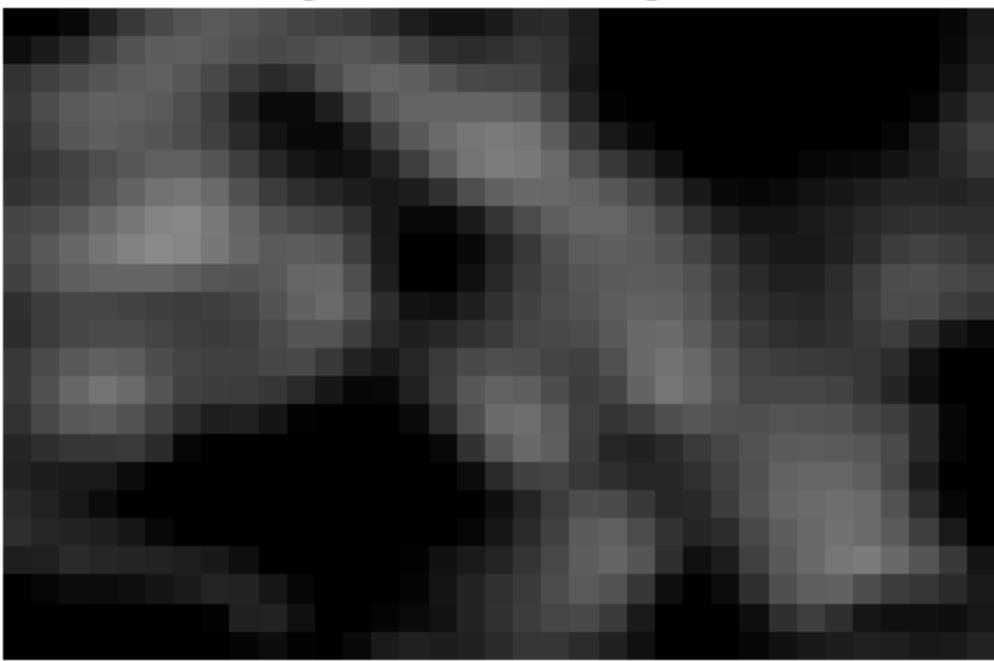


Image 1 - Width: 28, Height: 34

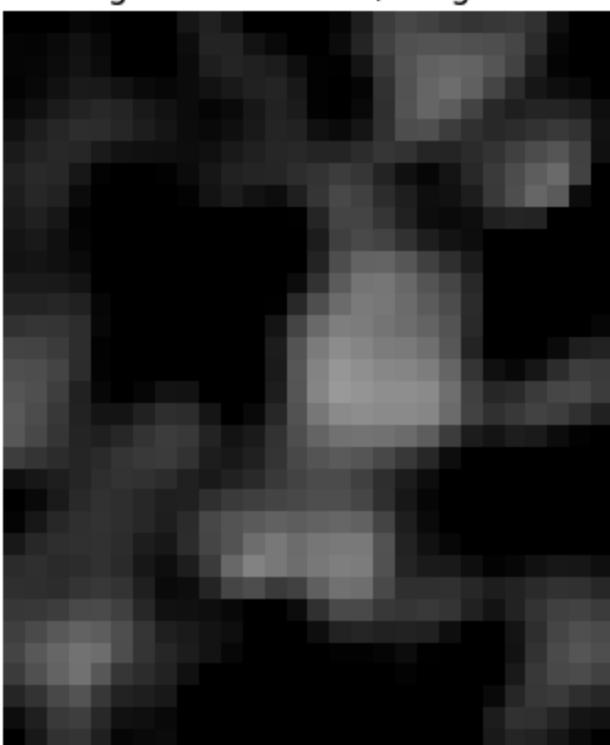


Image 1 - Width: 29, Height: 15

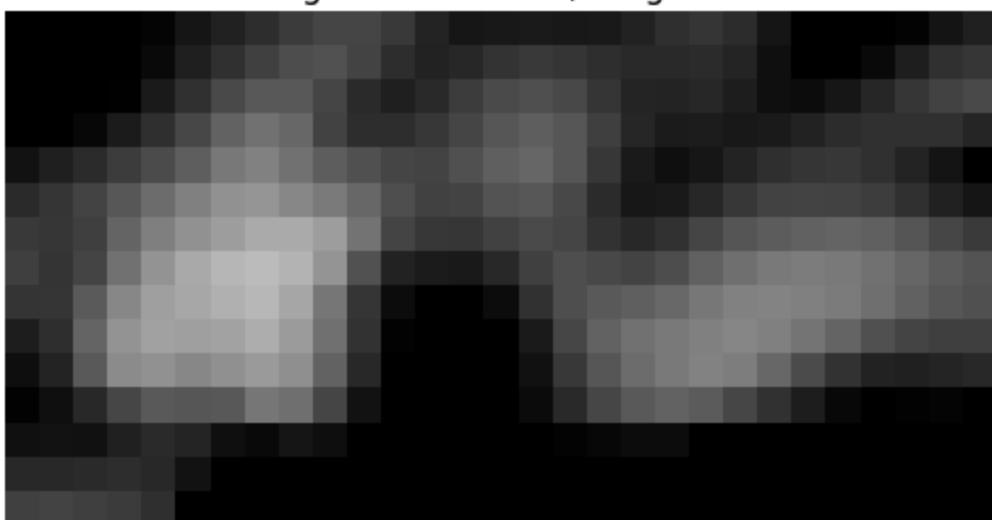


Image 1 - Width: 27, Height: 15

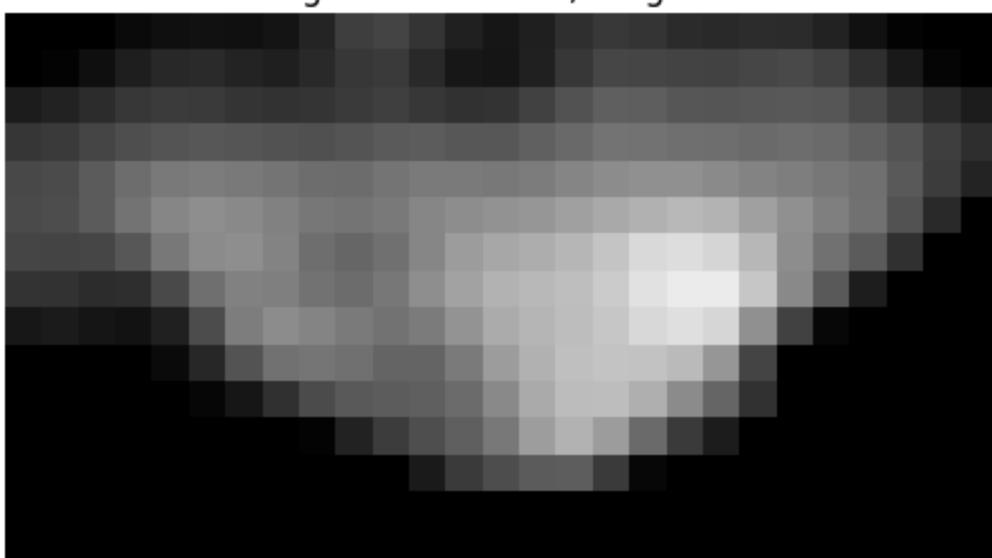


Image 1 - Width: 52, Height: 77



Image 1 - Width: 53, Height: 30

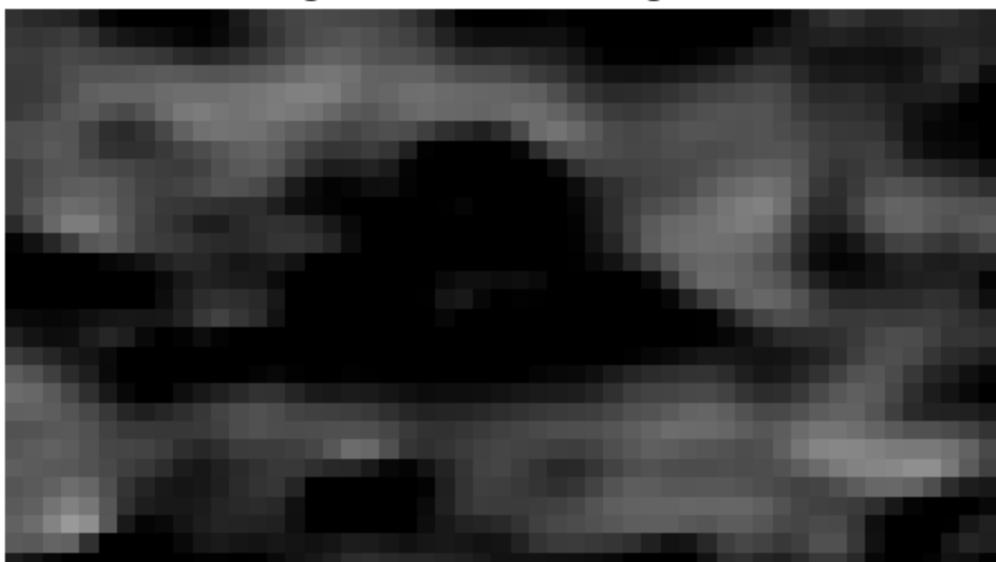


Image 1 - Width: 25, Height: 27

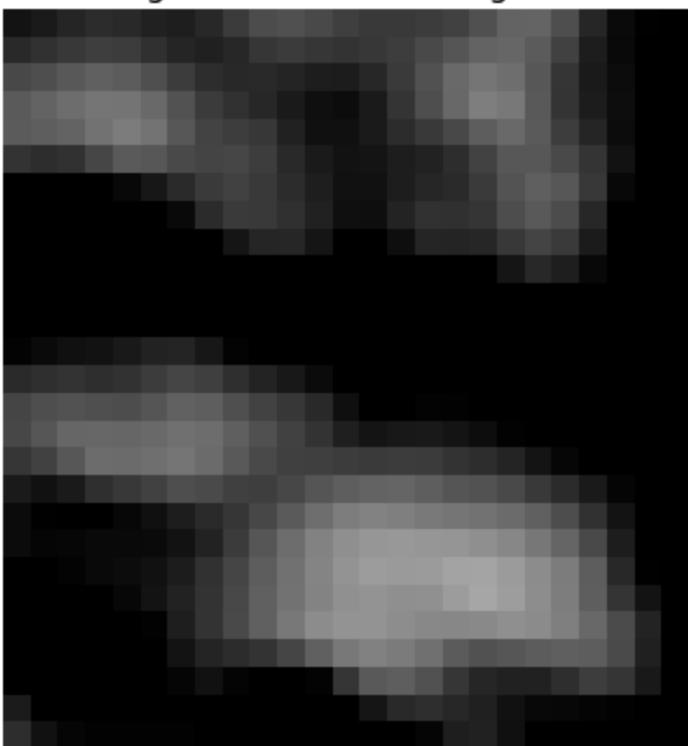


Image 1 - Width: 19, Height: 26

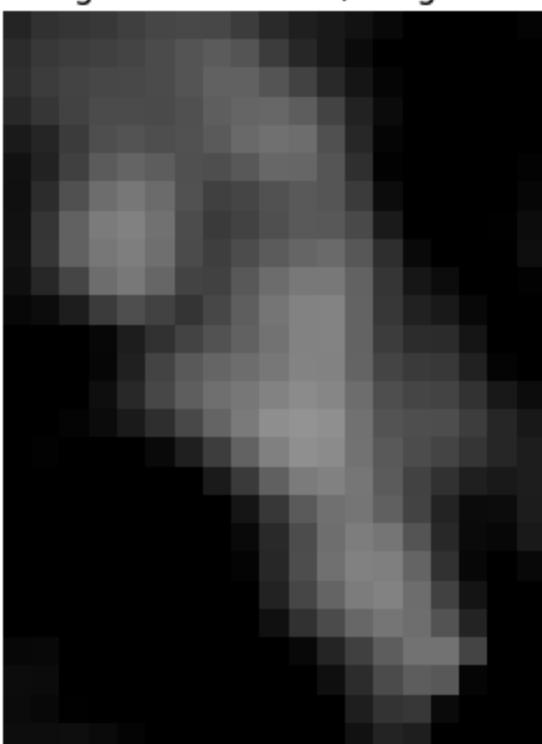


Image 1 - Width: 24, Height: 33

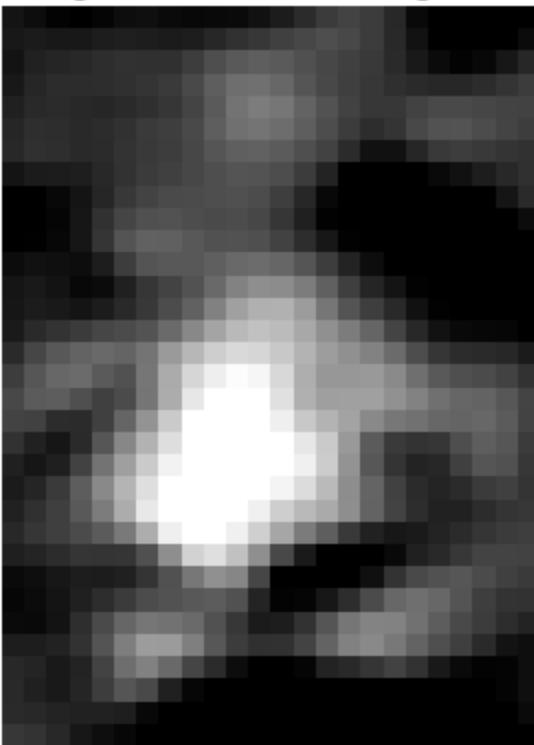


Image 1 - Width: 44, Height: 37

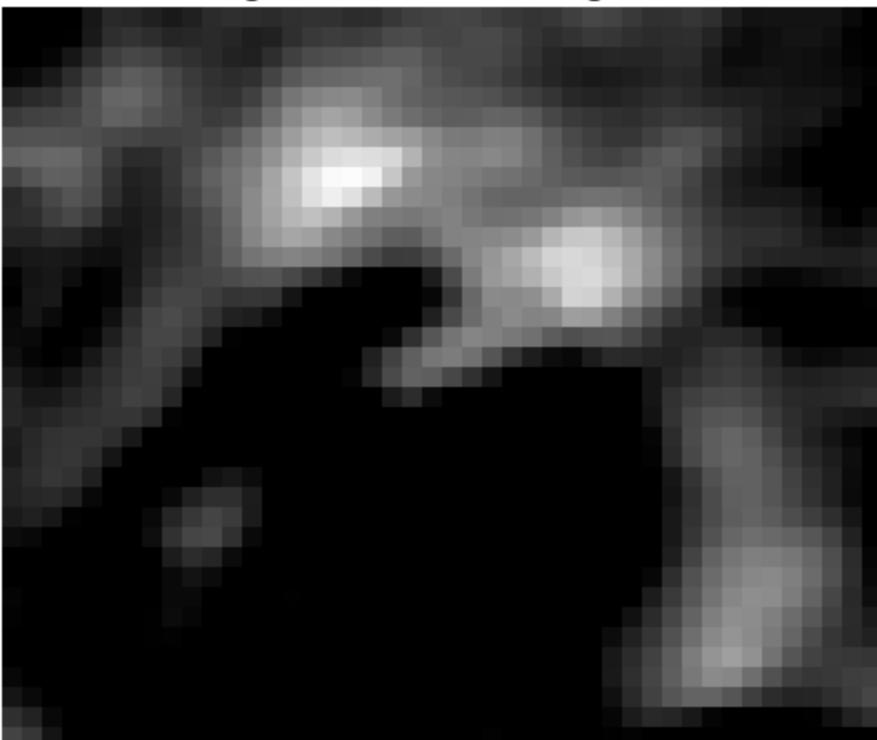


Image 1 - Width: 32, Height: 24

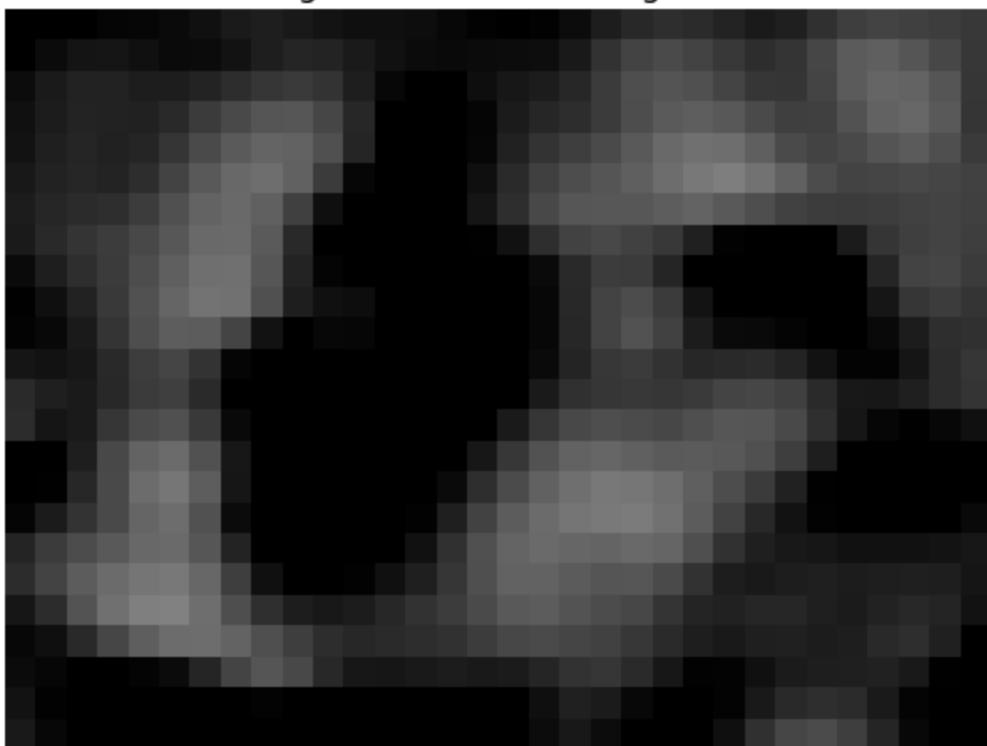


Image 1 - Width: 26, Height: 30

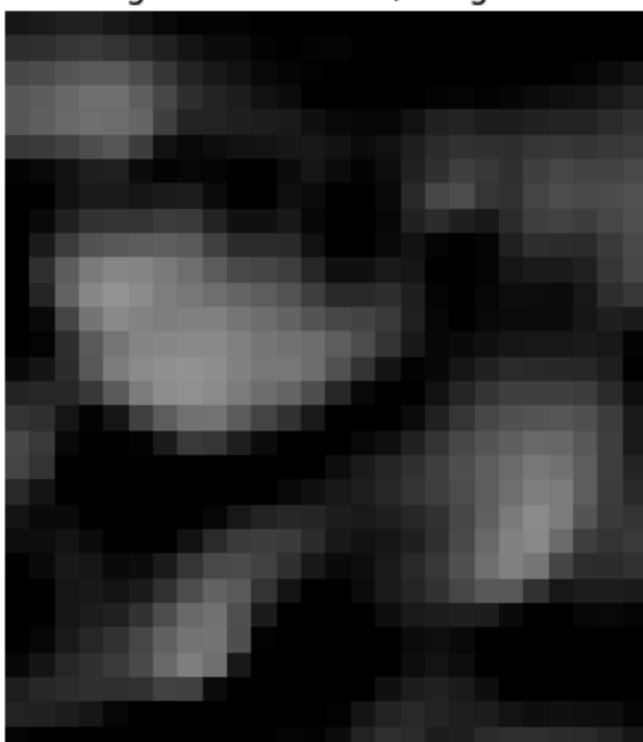


Image 1 - Width: 24, Height: 22

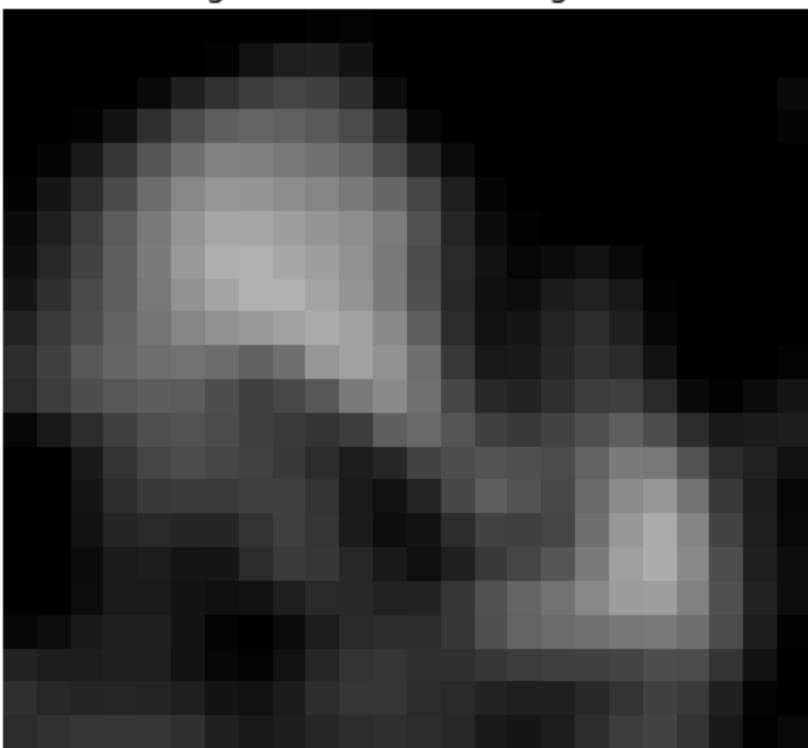


Image 1 - Width: 59, Height: 41

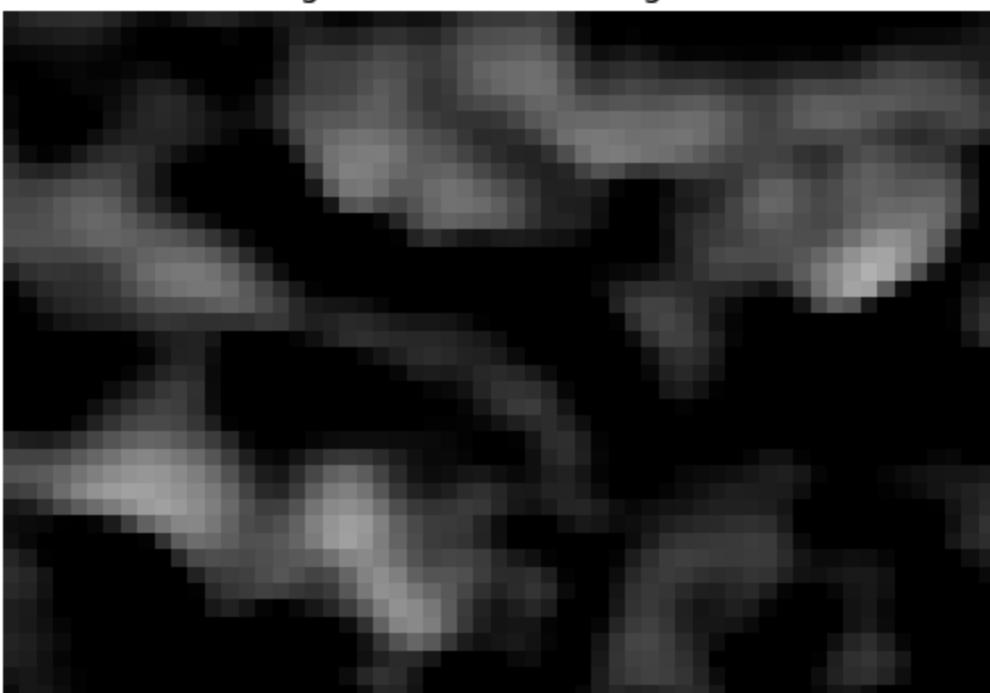


Image 1 - Width: 20, Height: 22

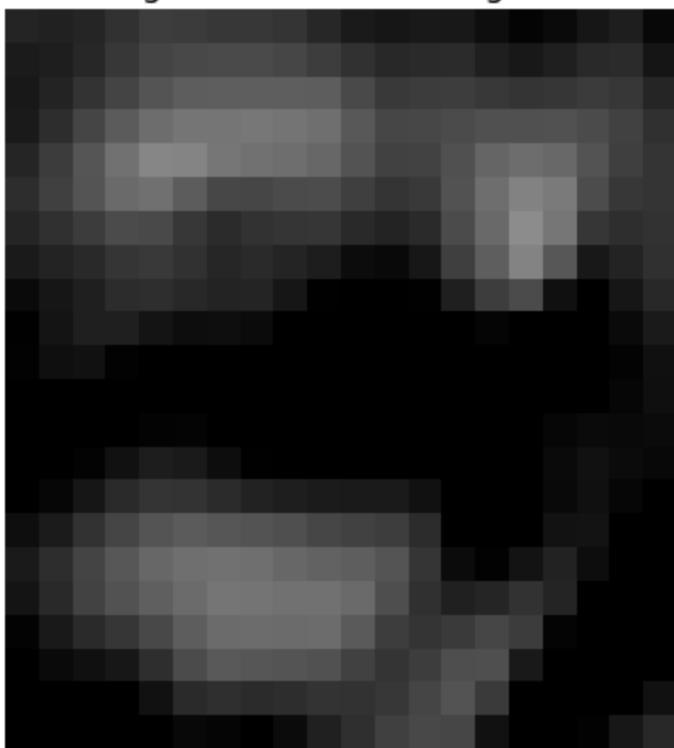


Image 1 - Width: 33, Height: 32

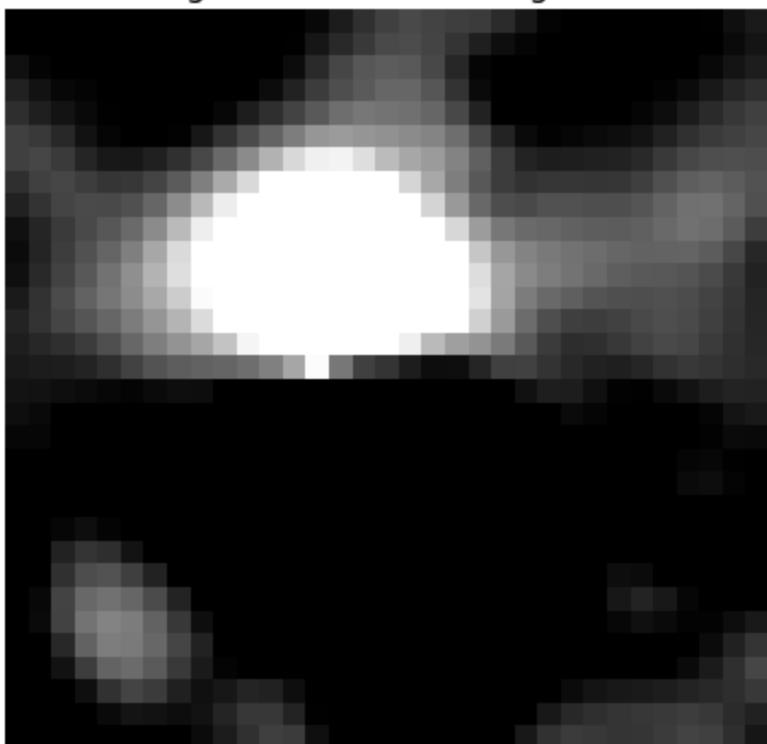


Image 1 - Width: 27, Height: 54

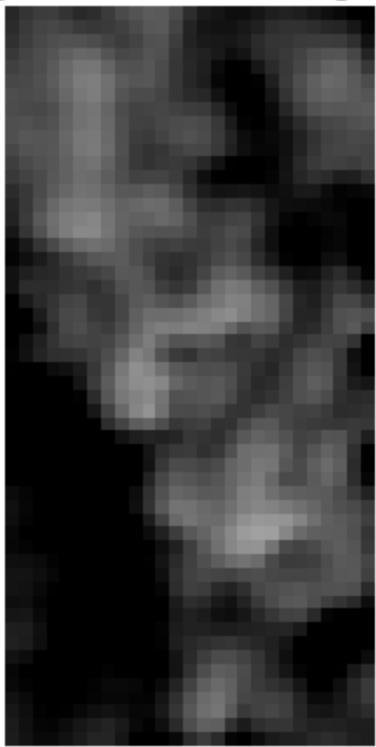


Image 1 - Width: 31, Height: 35

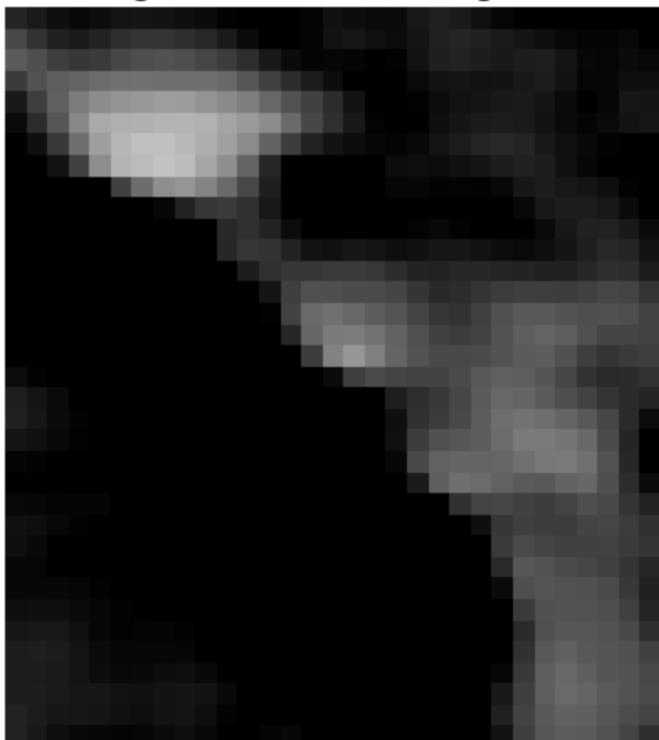


Image 1 - Width: 46, Height: 23



Image 1 - Width: 37, Height: 19

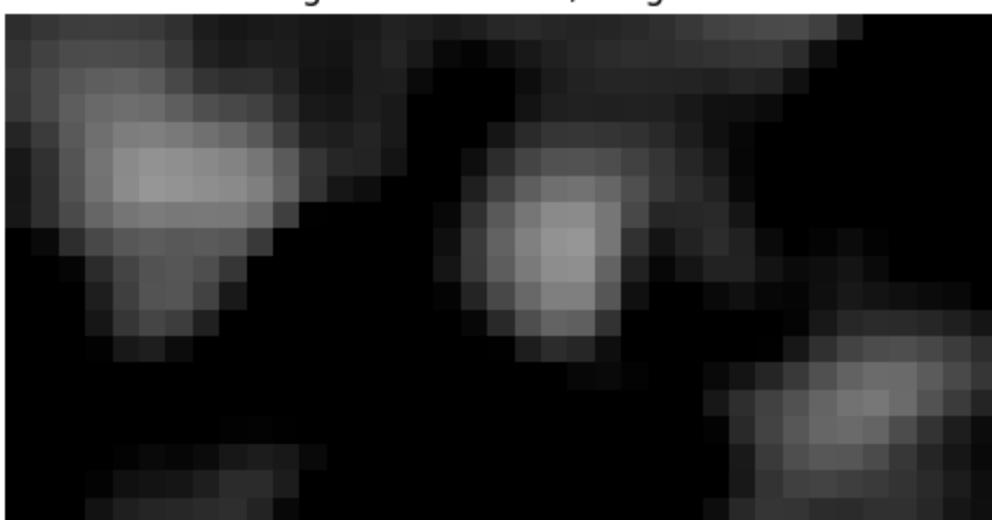


Image 1 - Width: 15, Height: 49

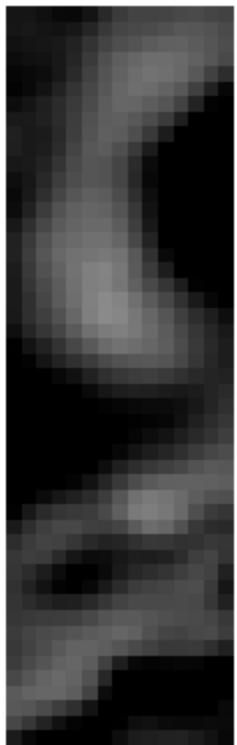


Image 1 - Width: 82, Height: 15



Image 1 - Width: 47, Height: 19

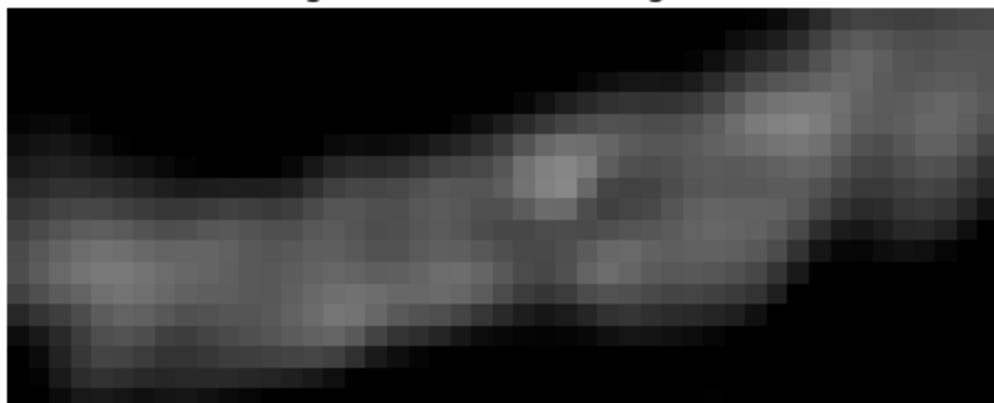


Image 1 - Width: 56, Height: 32

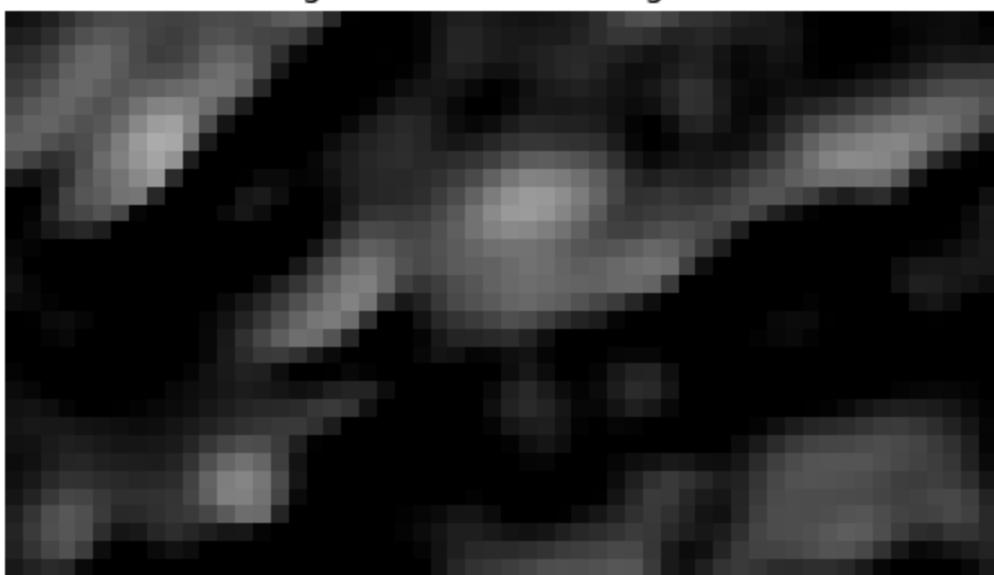


Image 1 - Width: 29, Height: 38



Image 1 - Width: 40, Height: 29

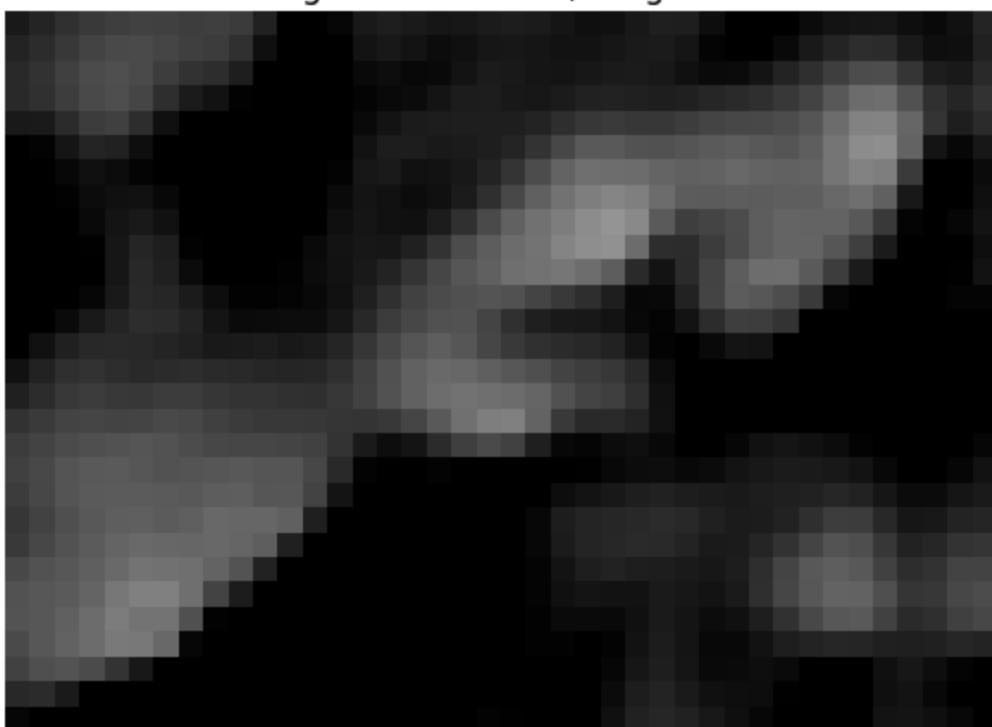


Image 1 - Width: 38, Height: 35

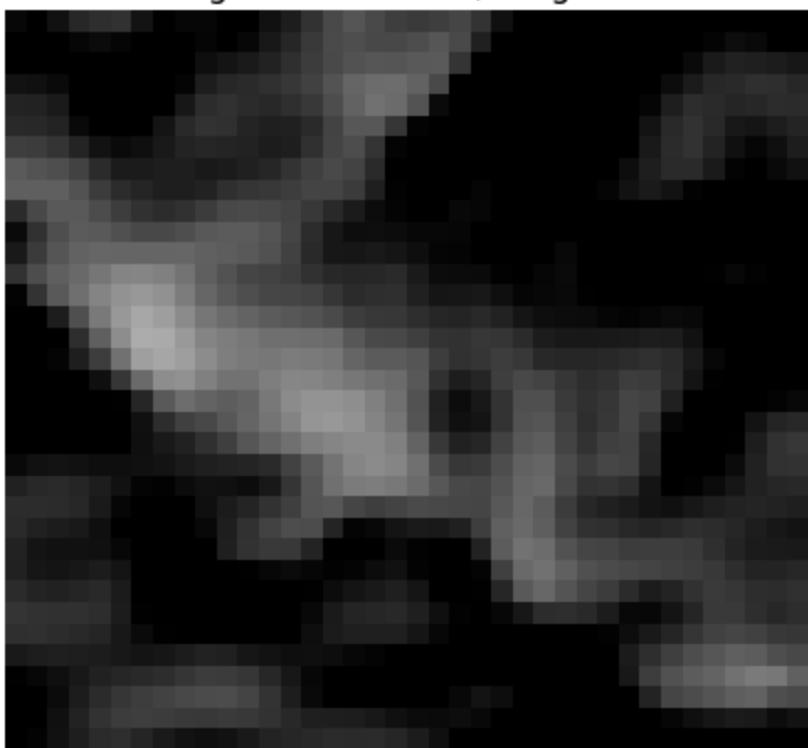


Image 1 - Width: 26, Height: 34

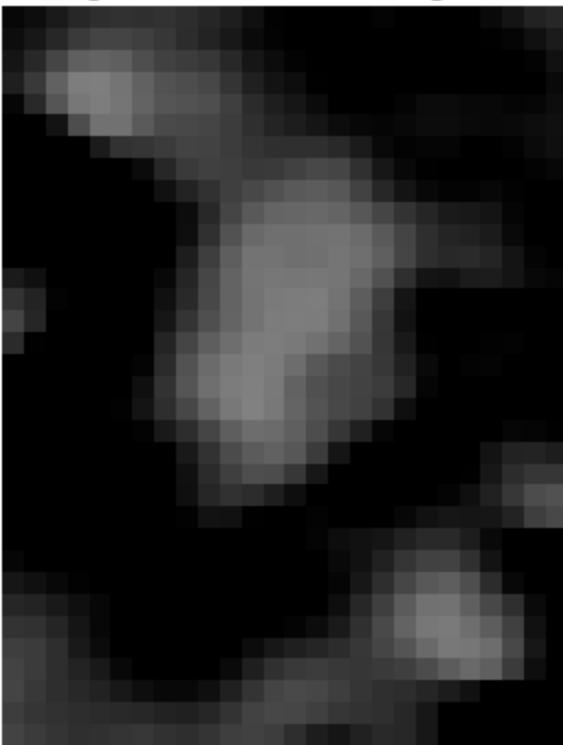


Image 1 - Width: 66, Height: 110

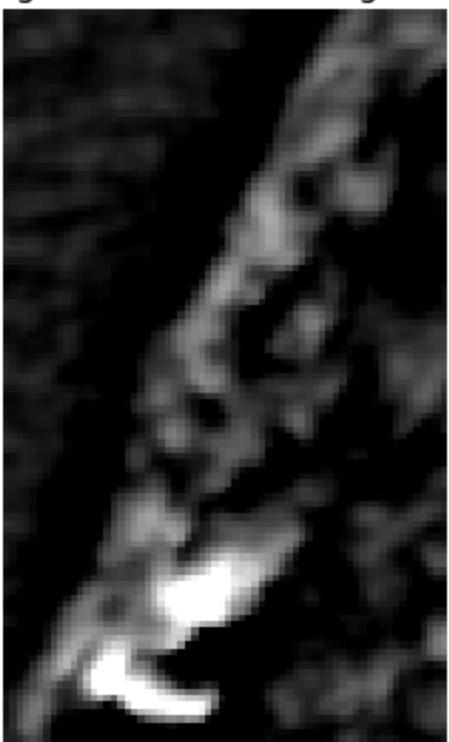


Image 1 - Width: 95, Height: 98

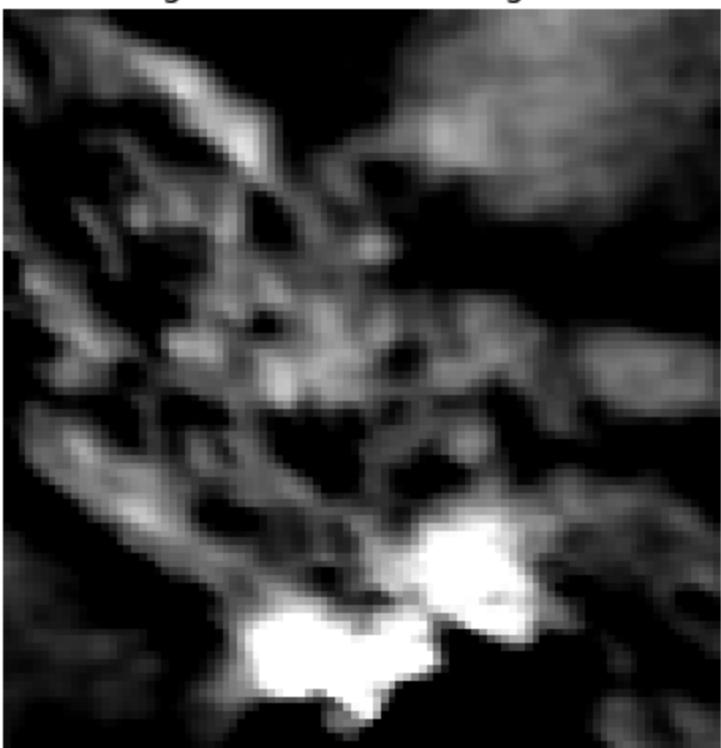


Image 1 - Width: 29, Height: 29

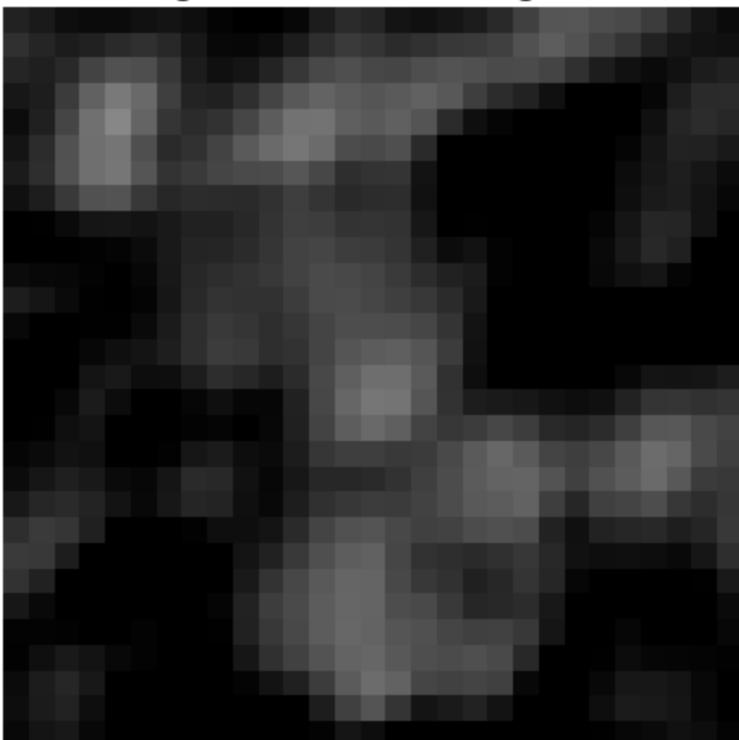


Image 1 - Width: 29, Height: 20

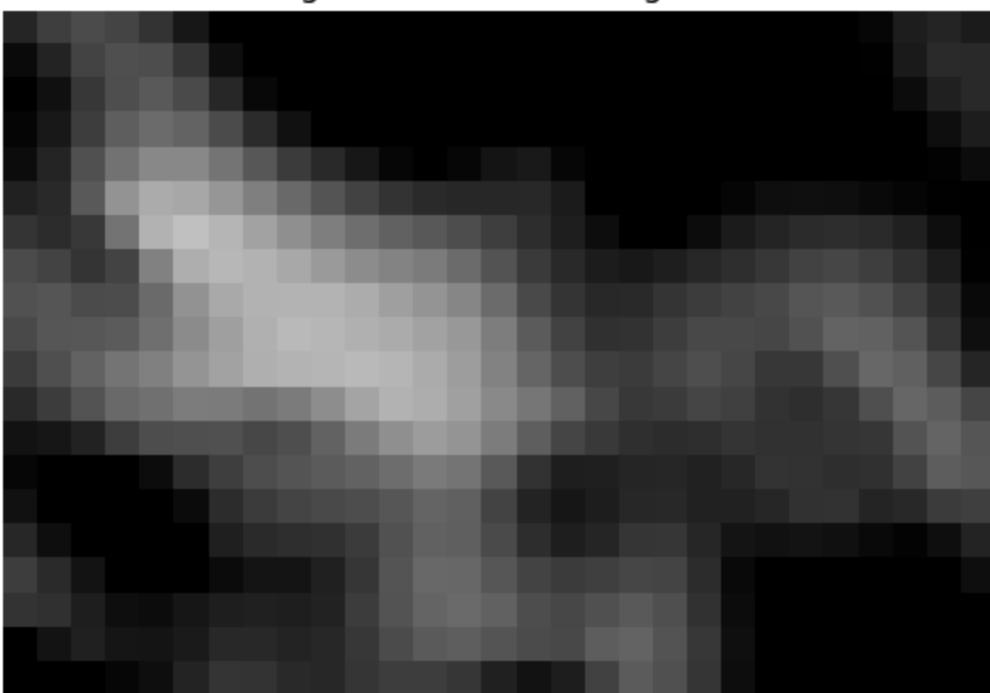


Image 1 - Width: 34, Height: 15



Image 1 - Width: 27, Height: 33

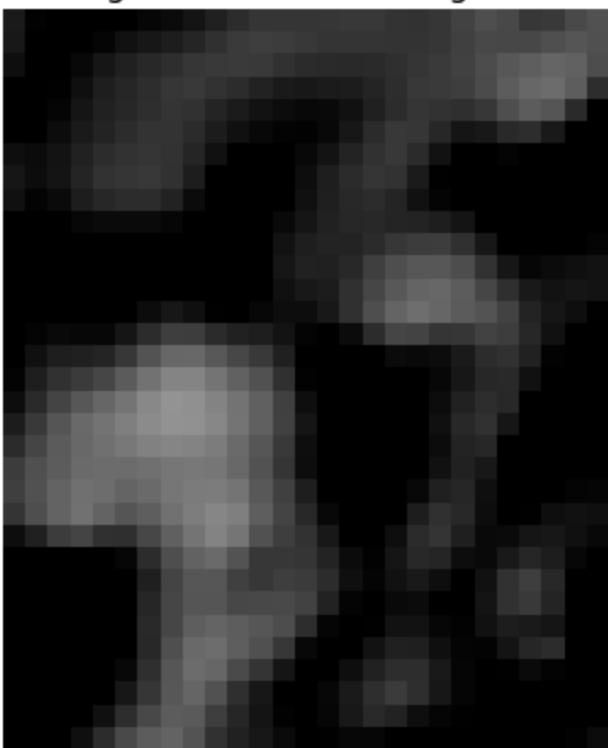


Image 1 - Width: 17, Height: 47

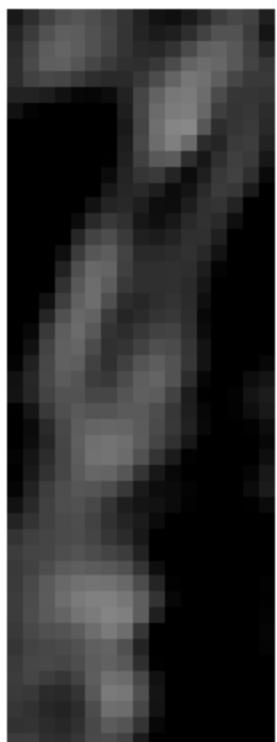


Image 1 - Width: 34, Height: 23

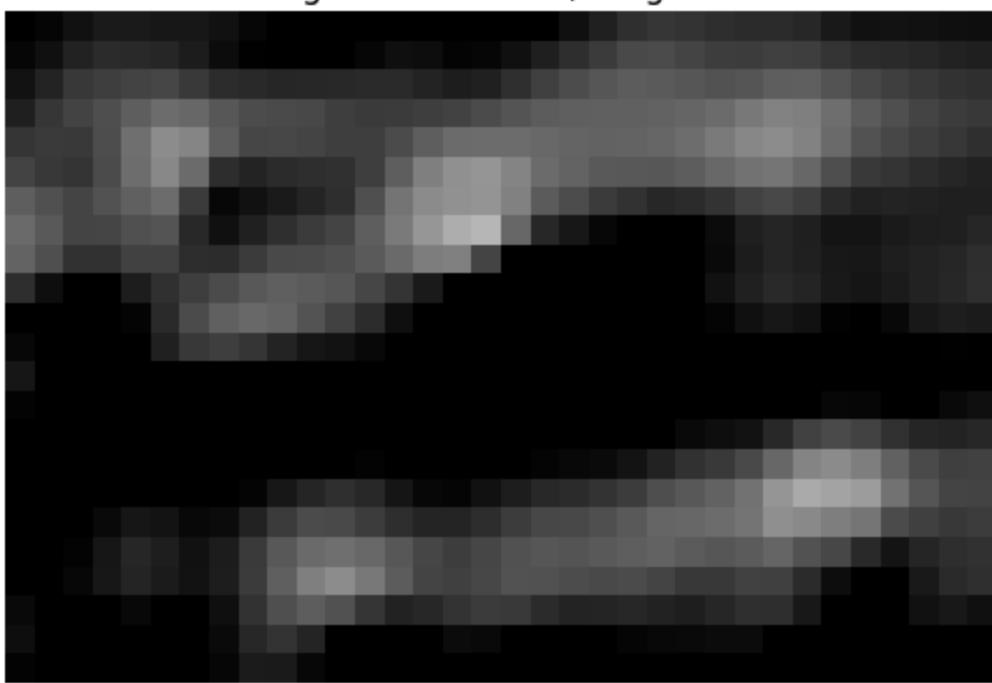


Image 1 - Width: 34, Height: 37

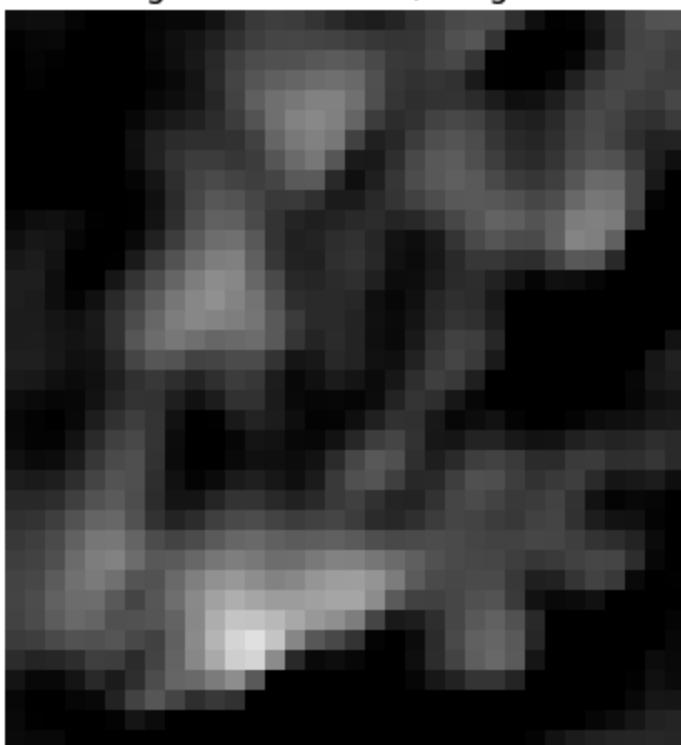


Image 1 - Width: 20, Height: 20

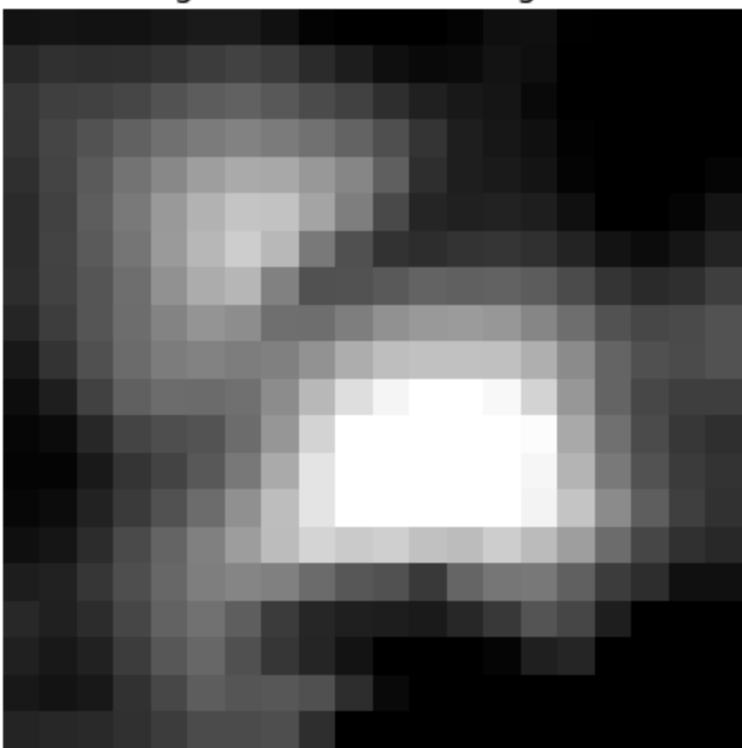


Image 1 - Width: 41, Height: 59

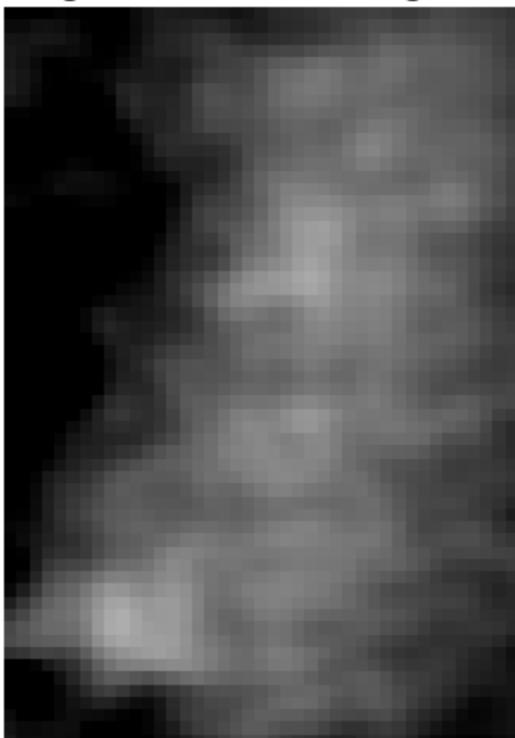


Image 1 - Width: 33, Height: 27

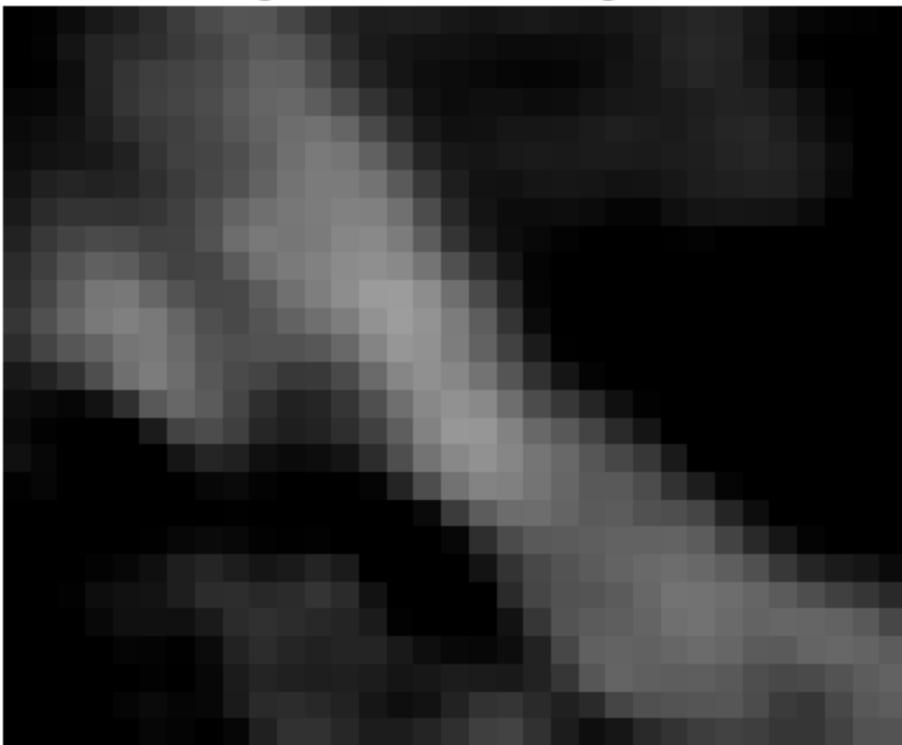


Image 1 - Width: 32, Height: 11

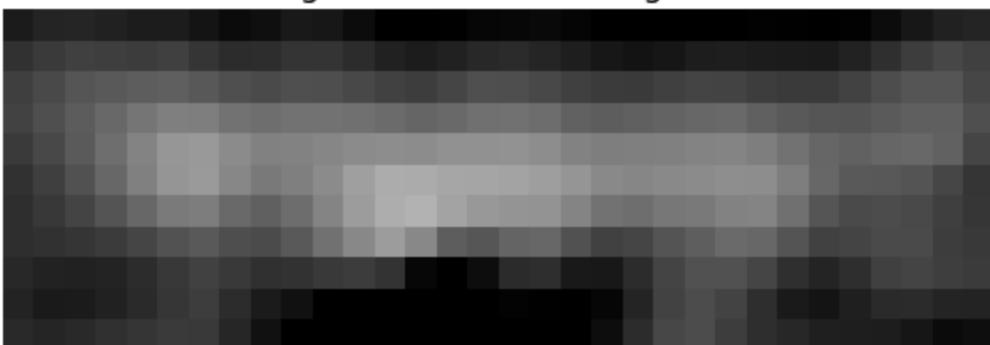


Image 1 - Width: 40, Height: 15

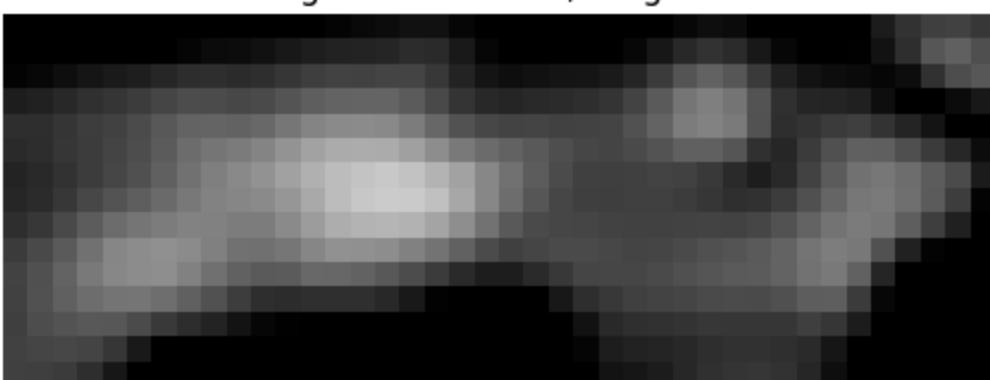


Image 1 - Width: 46, Height: 23

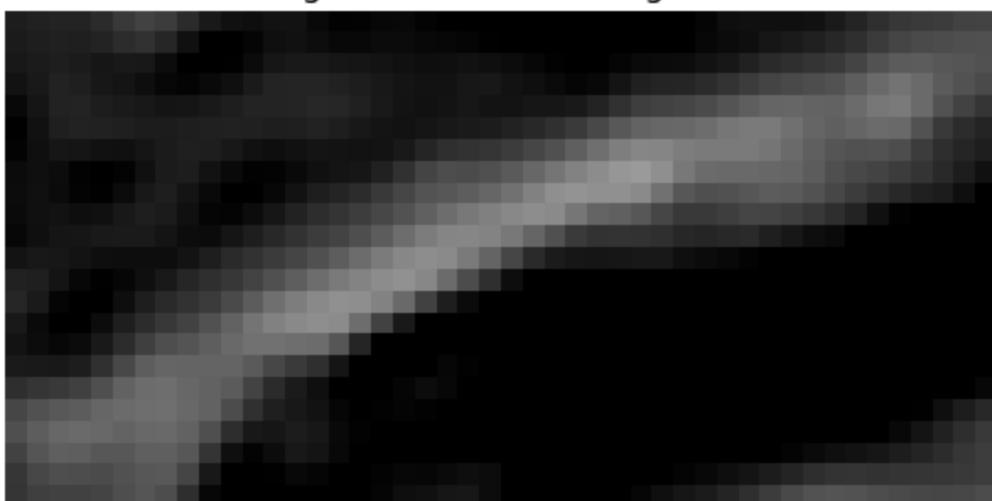


Image 1 - Width: 17, Height: 23

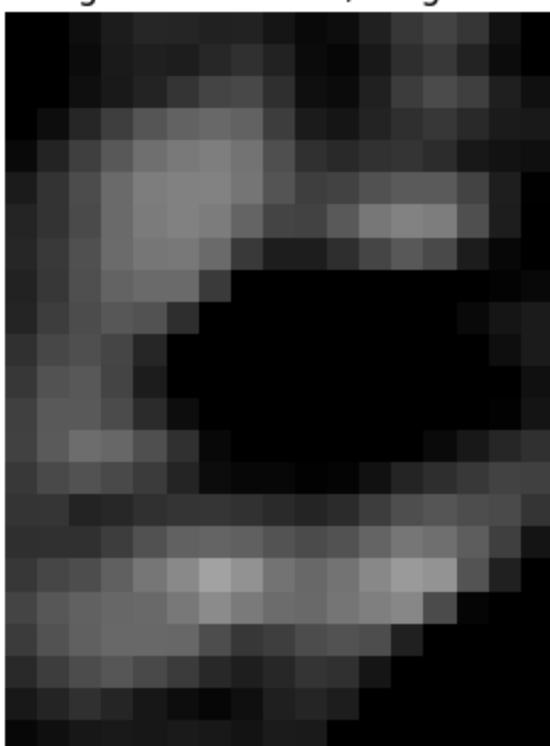


Image 1 - Width: 29, Height: 34

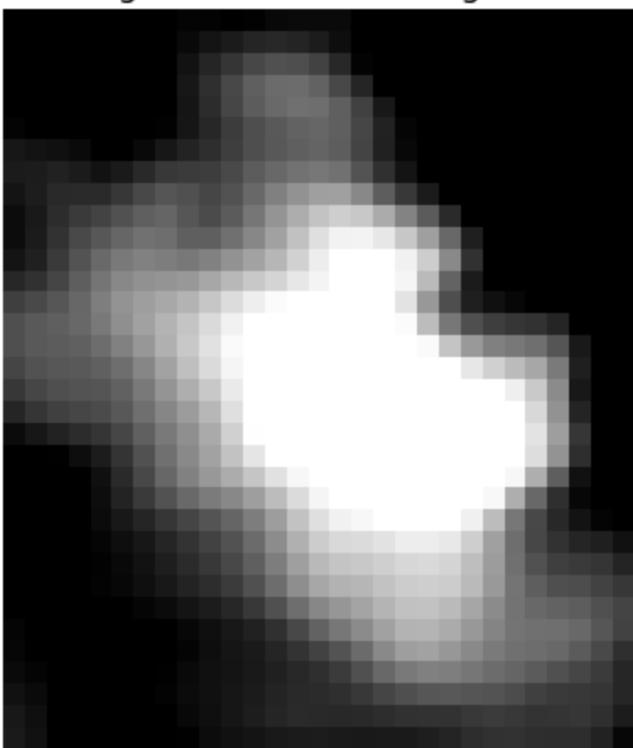


Image 1 - Width: 52, Height: 46



Image 1 - Width: 36, Height: 16

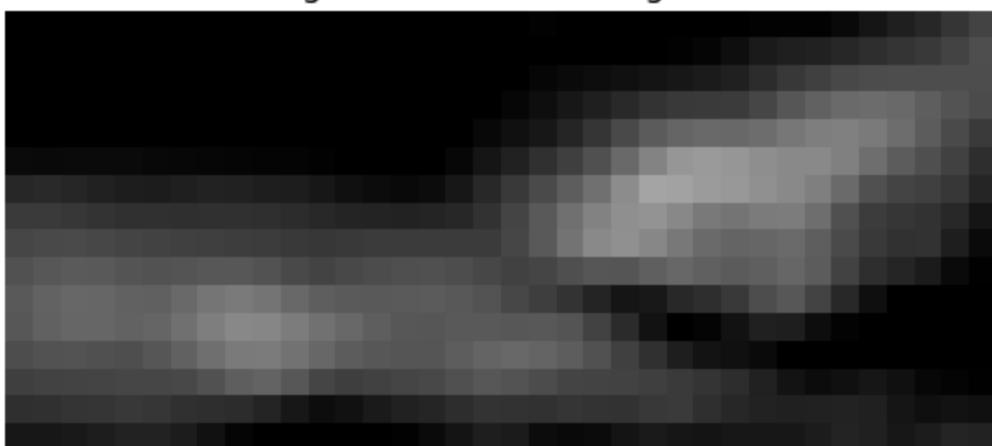


Image 1 - Width: 27, Height: 32

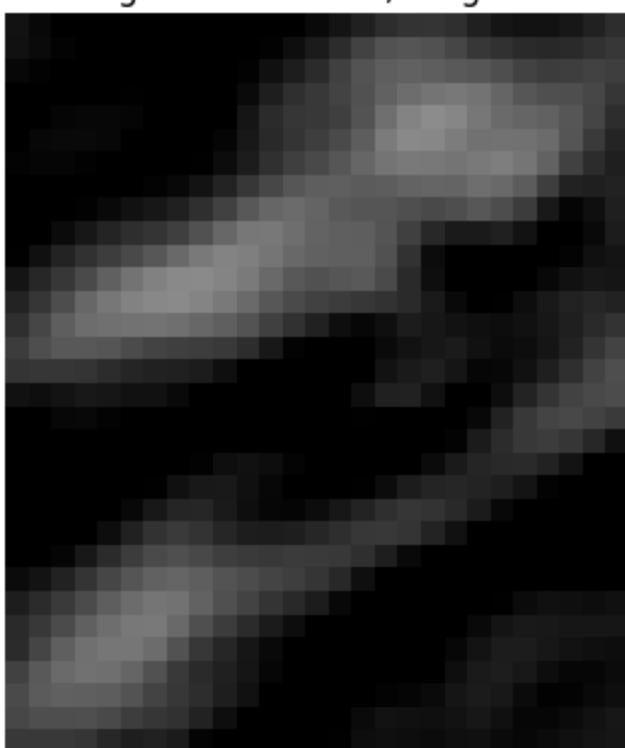


Image 1 - Width: 48, Height: 34

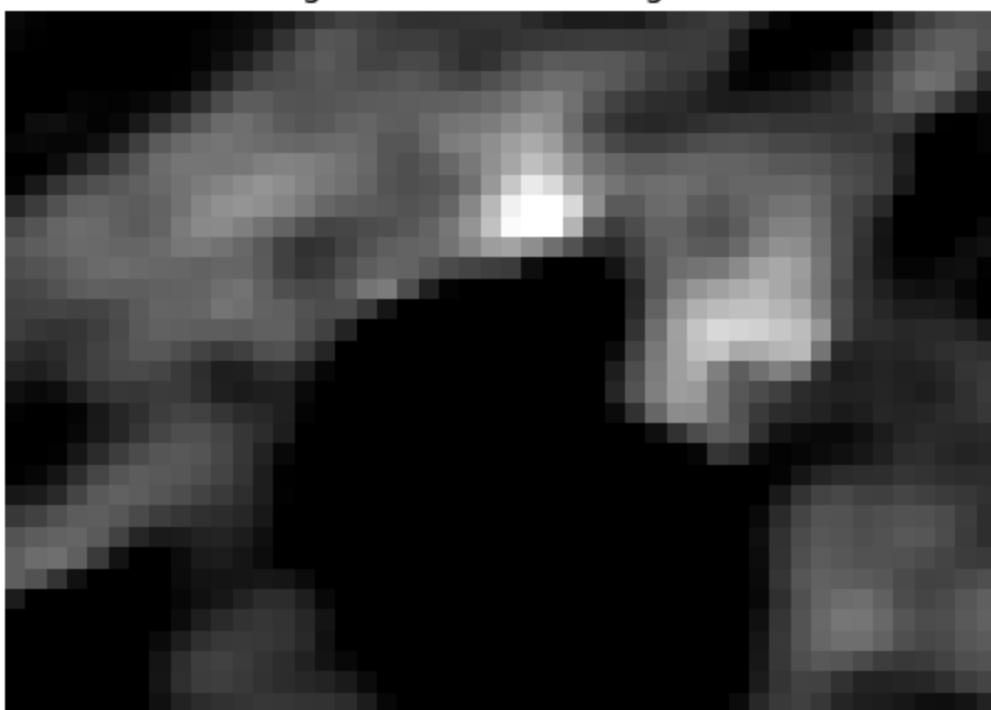


Image 1 - Width: 28, Height: 26

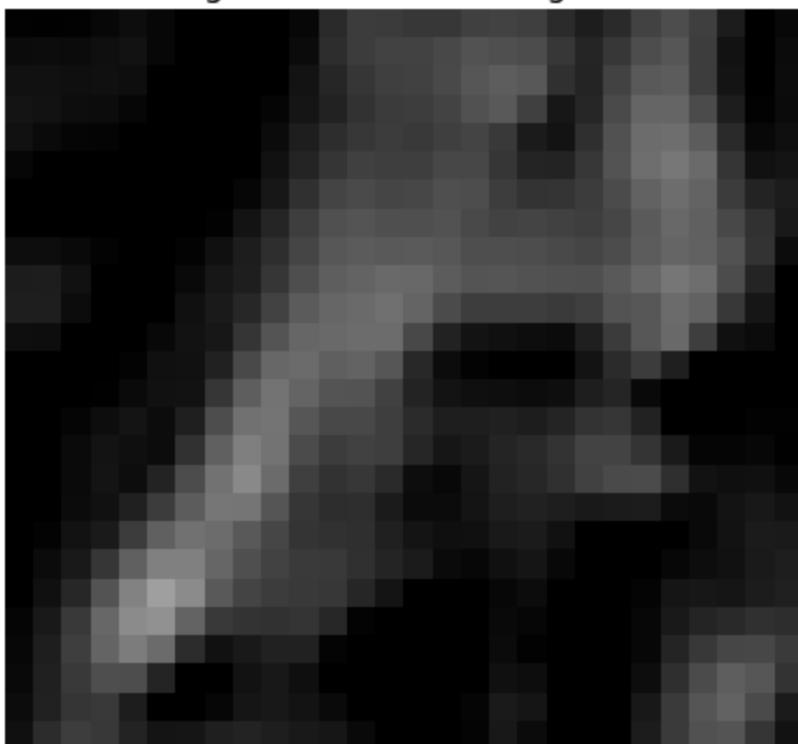


Image 1 - Width: 29, Height: 16

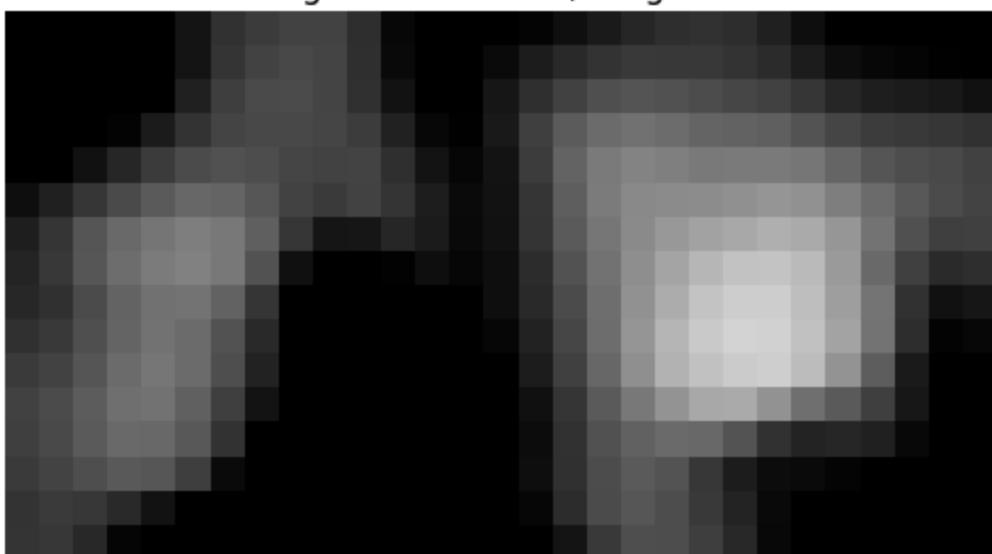


Image 1 - Width: 22, Height: 31



Image 1 - Width: 34, Height: 15

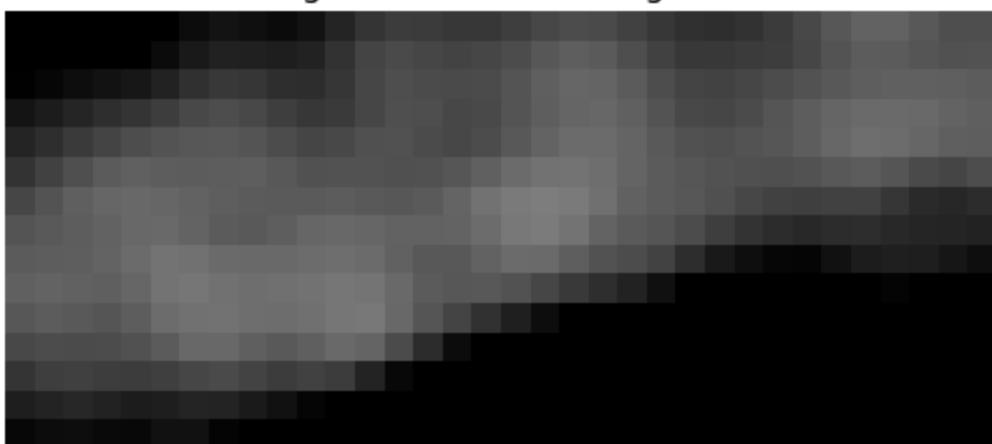


Image 1 - Width: 31, Height: 18

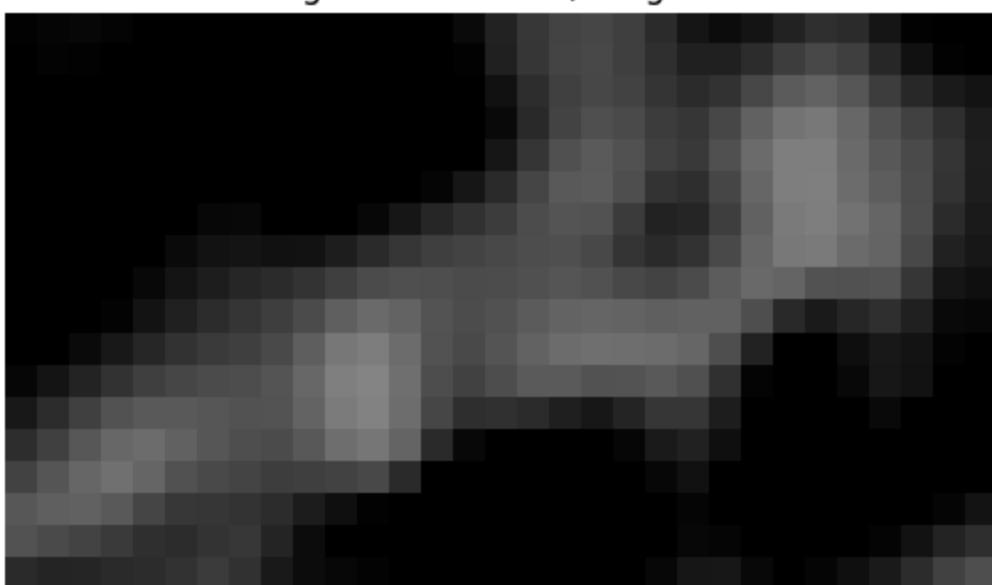


Image 1 - Width: 33, Height: 14

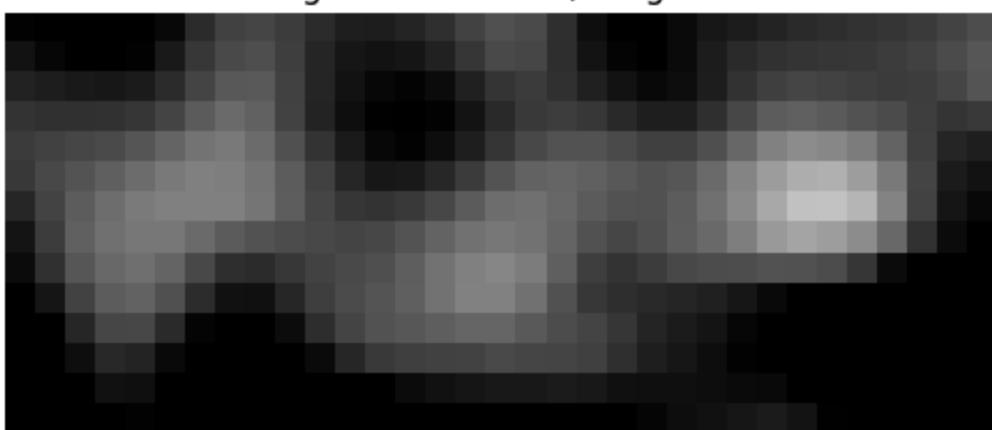


Image 1 - Width: 32, Height: 21

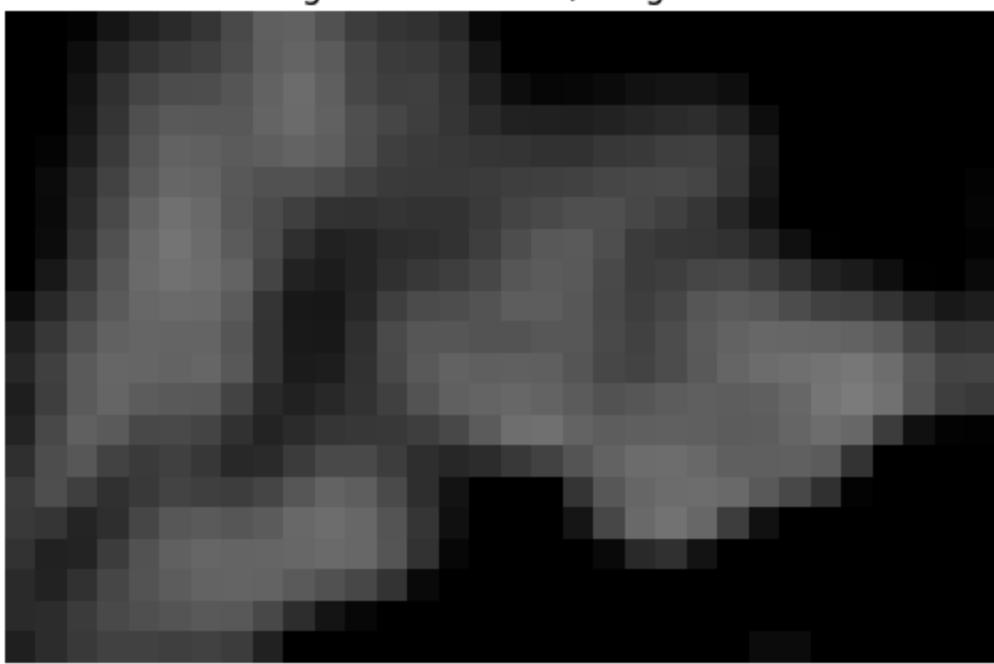


Image 1 - Width: 26, Height: 27

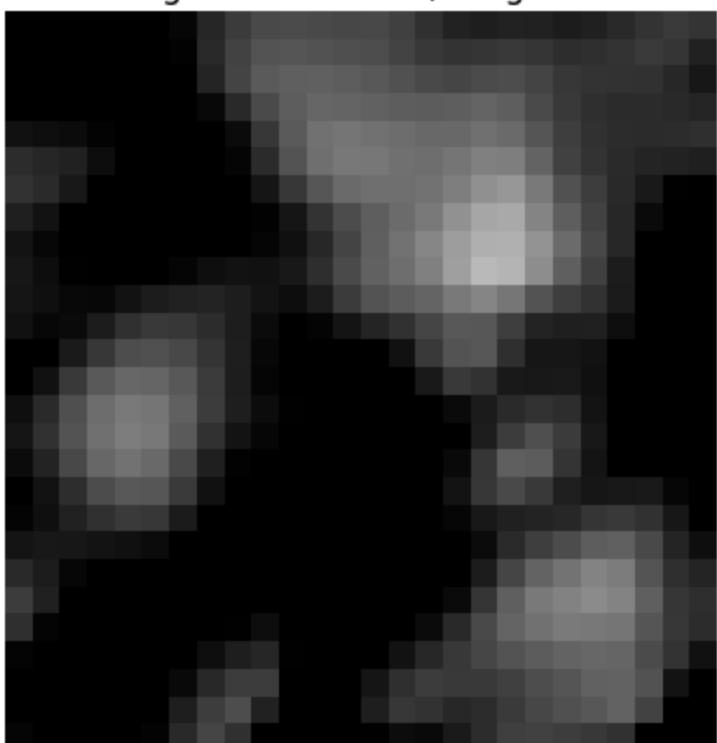


Image 1 - Width: 55, Height: 27

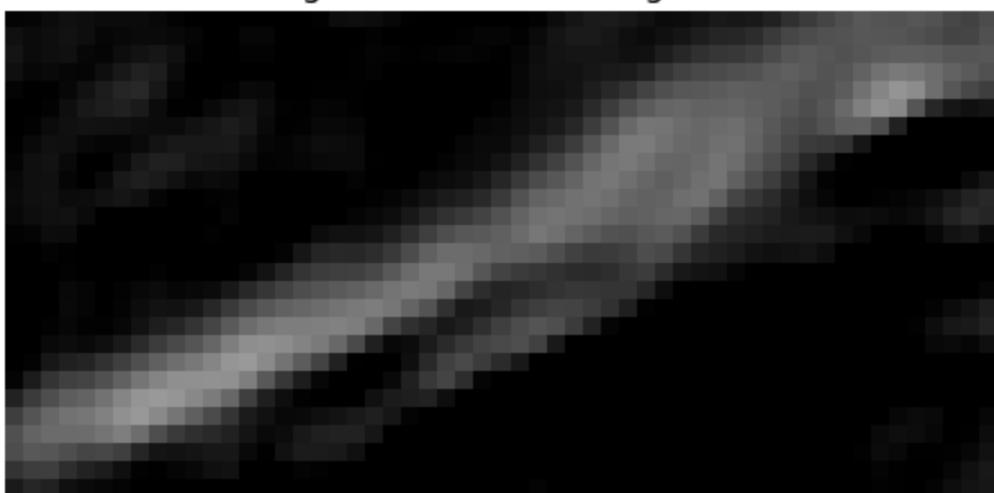


Image 1 - Width: 31, Height: 29

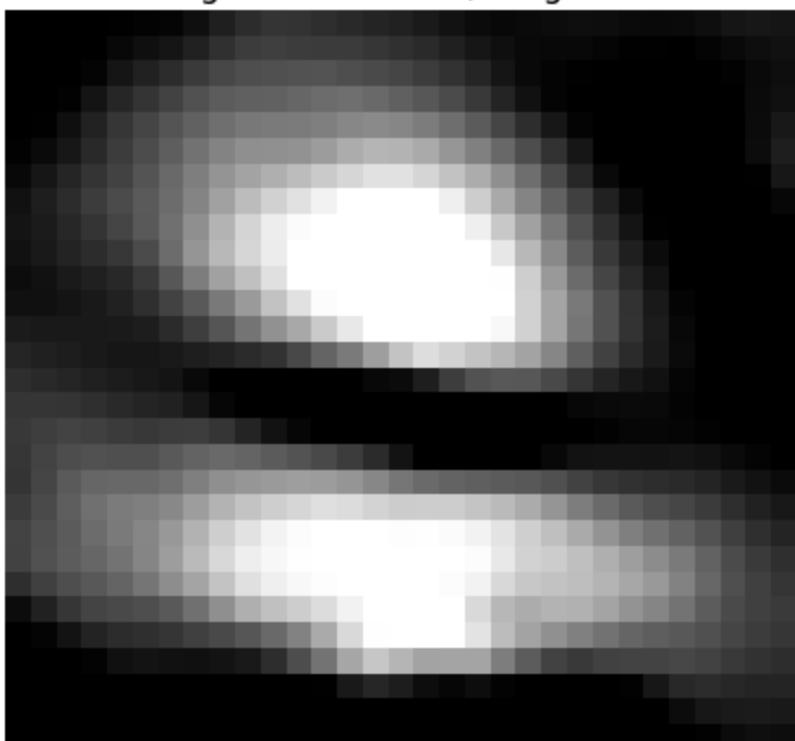


Image 1 - Width: 63, Height: 41

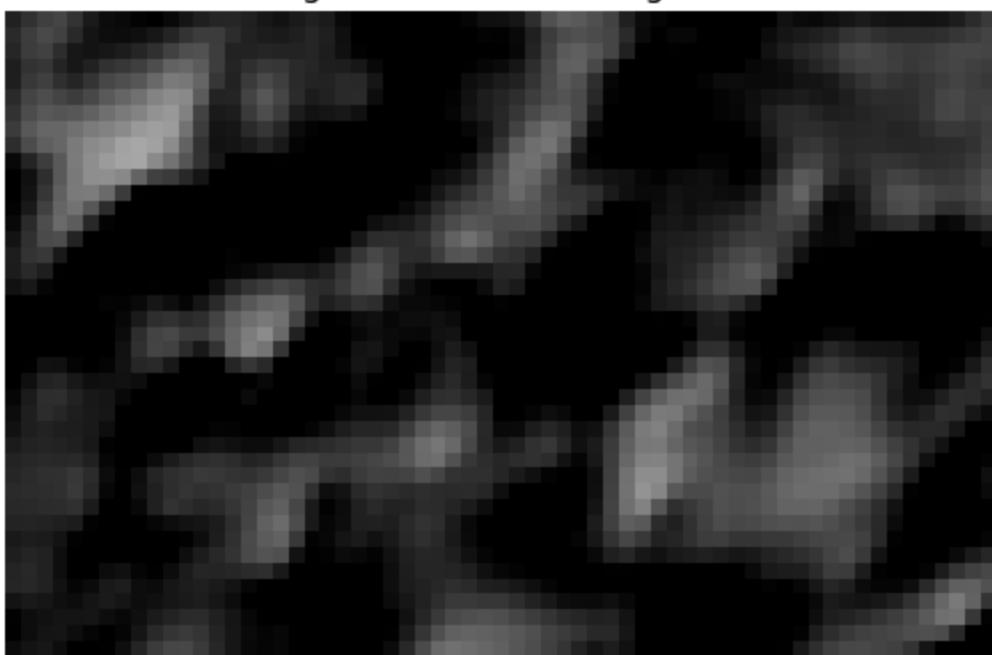


Image 1 - Width: 35, Height: 18

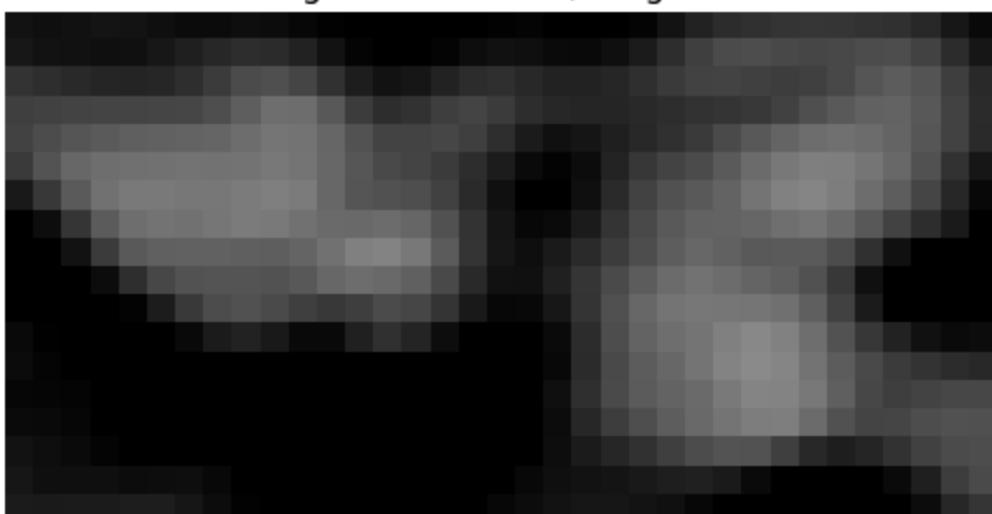


Image 1 - Width: 19, Height: 28

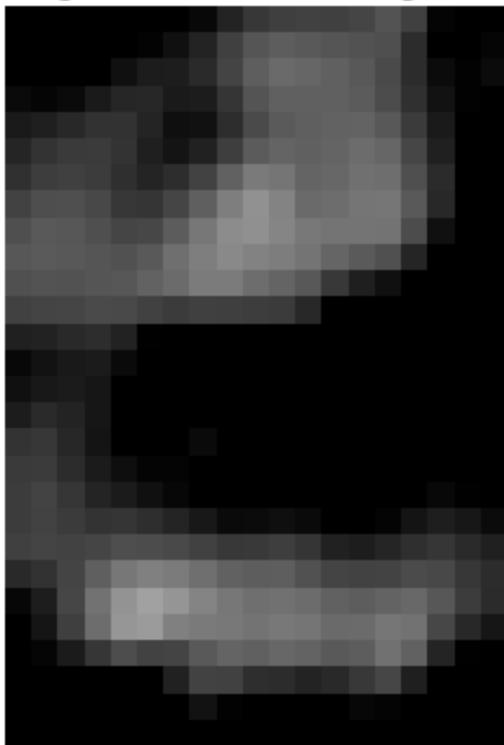


Image 1 - Width: 22, Height: 49

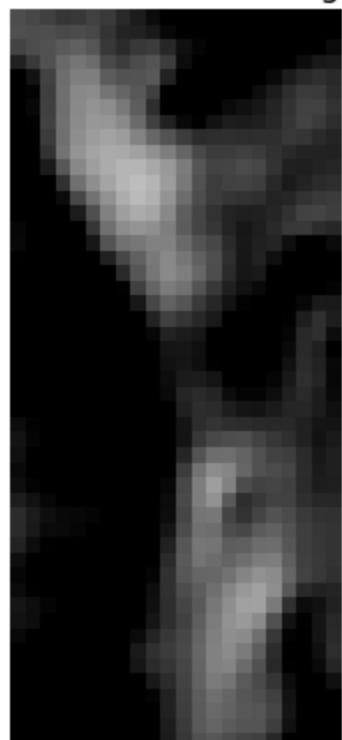


Image 1 - Width: 81, Height: 65

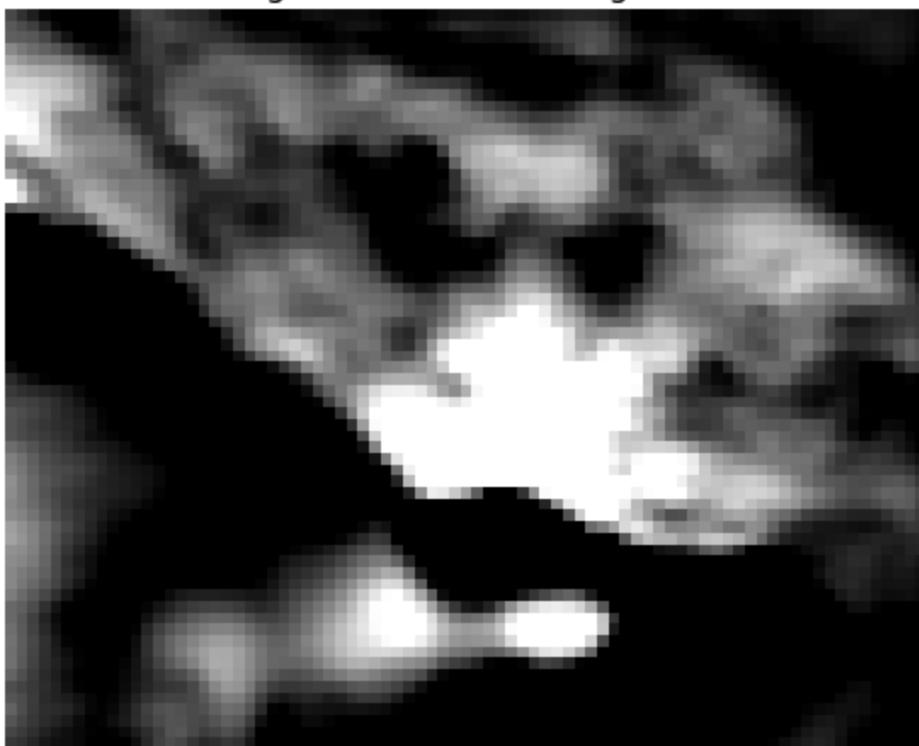


Image 1 - Width: 22, Height: 23

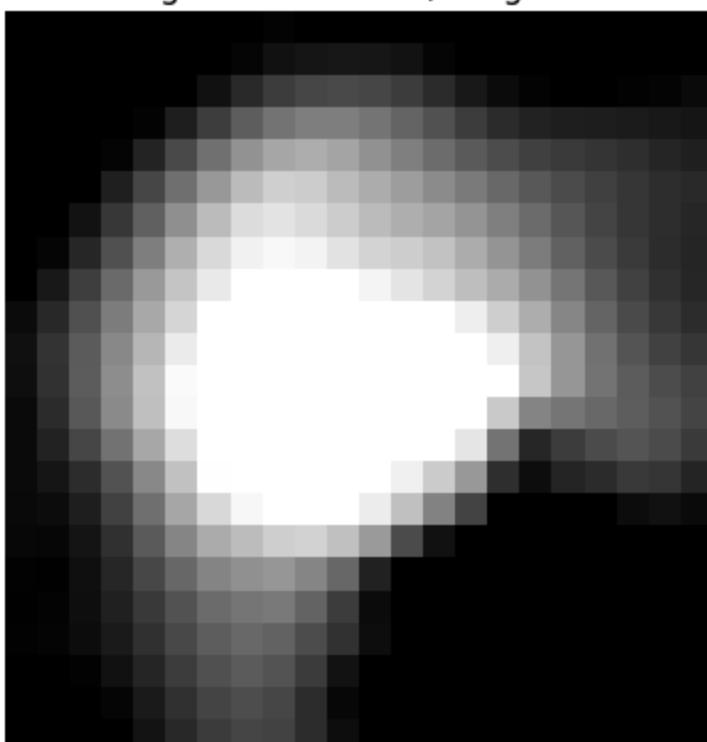


Image 1 - Width: 55, Height: 37

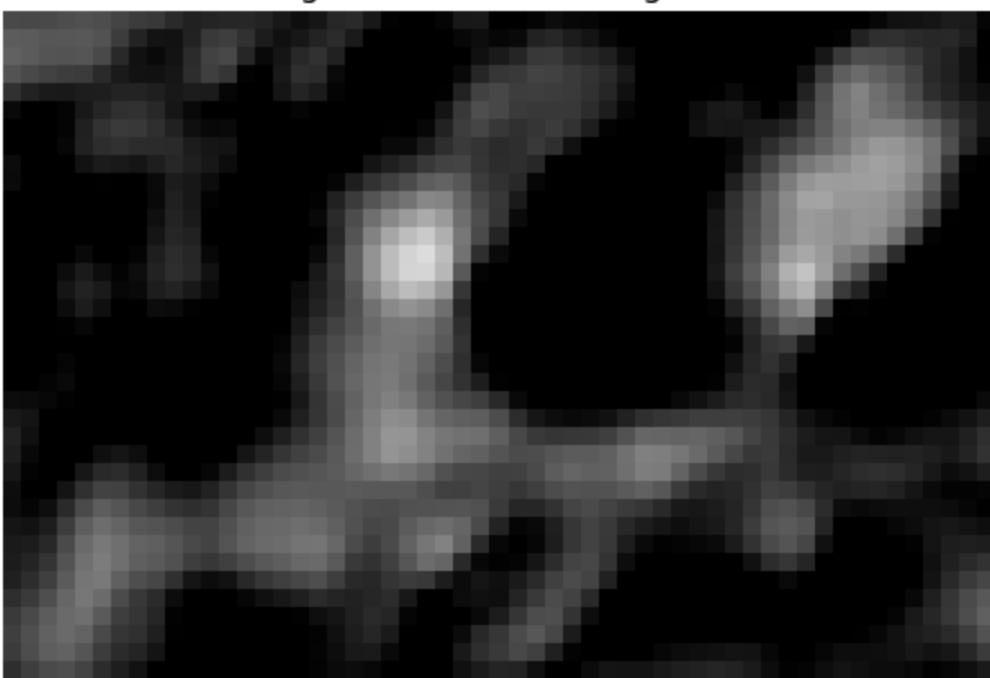


Image 1 - Width: 28, Height: 23

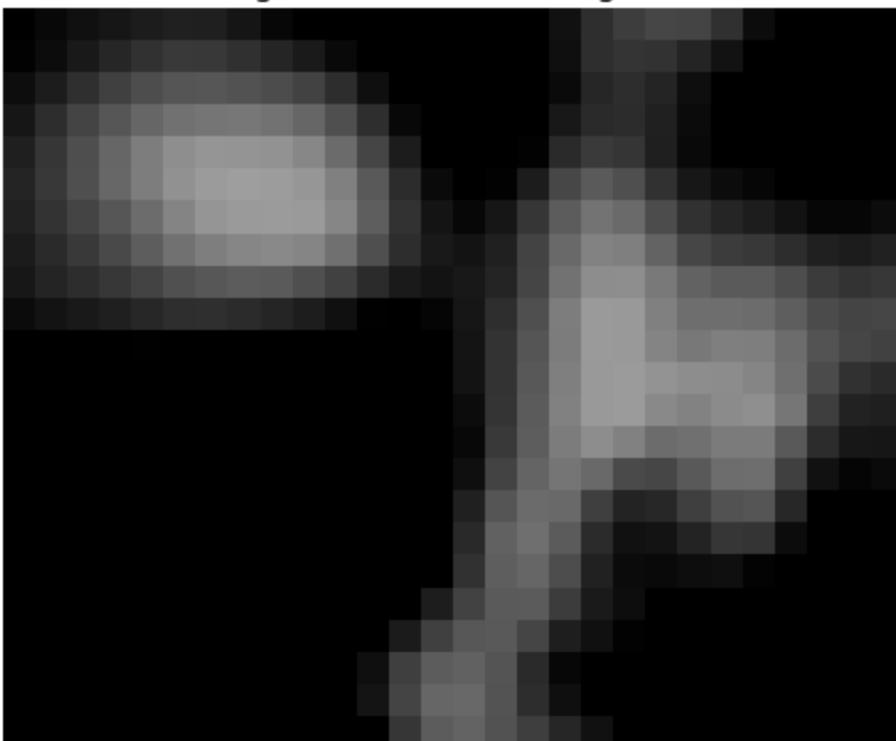


Image 1 - Width: 46, Height: 52



Image 1 - Width: 26, Height: 28

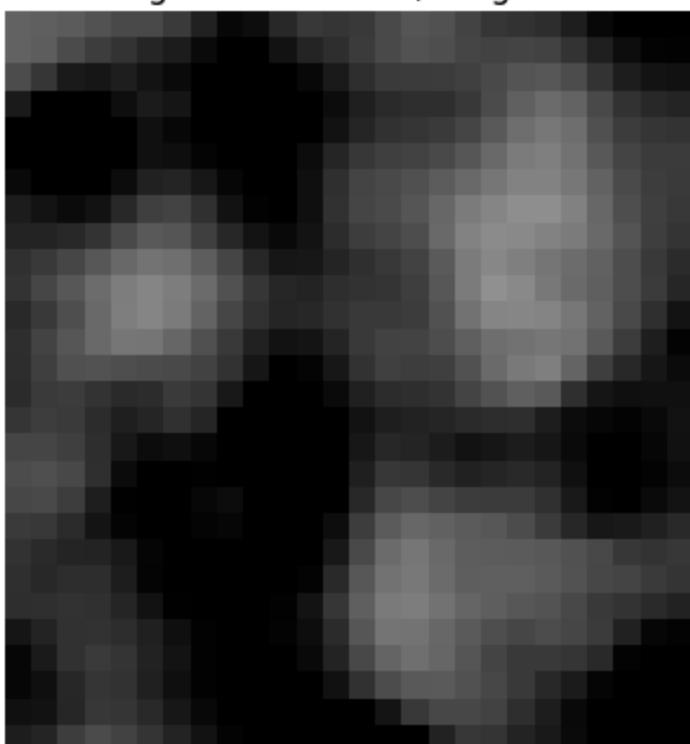


Image 1 - Width: 35, Height: 27

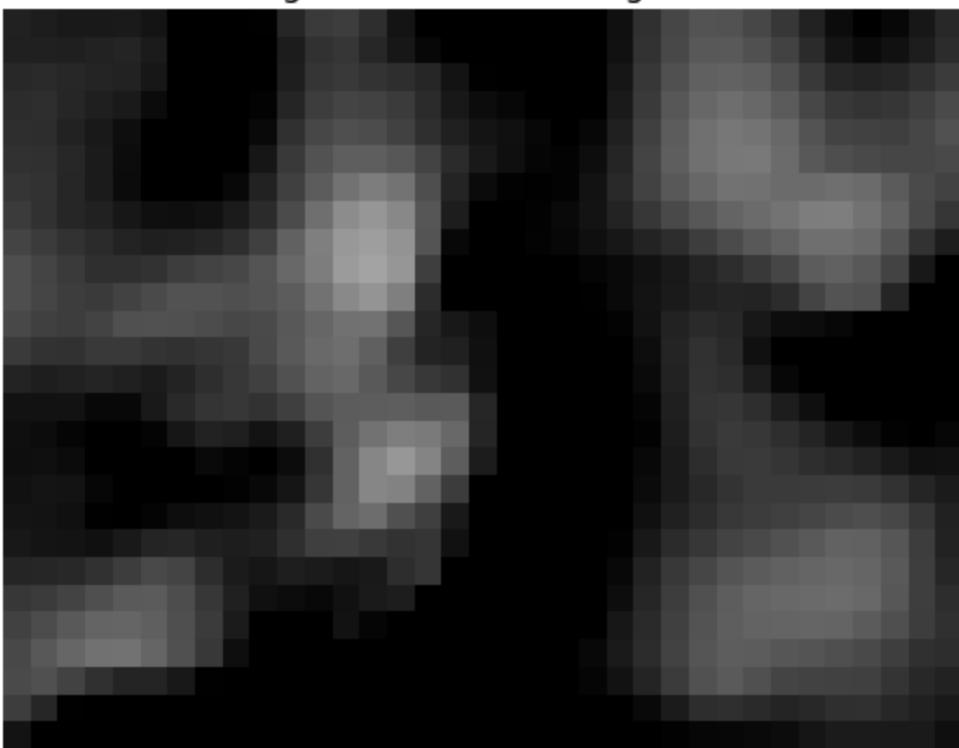


Image 1 - Width: 23, Height: 38

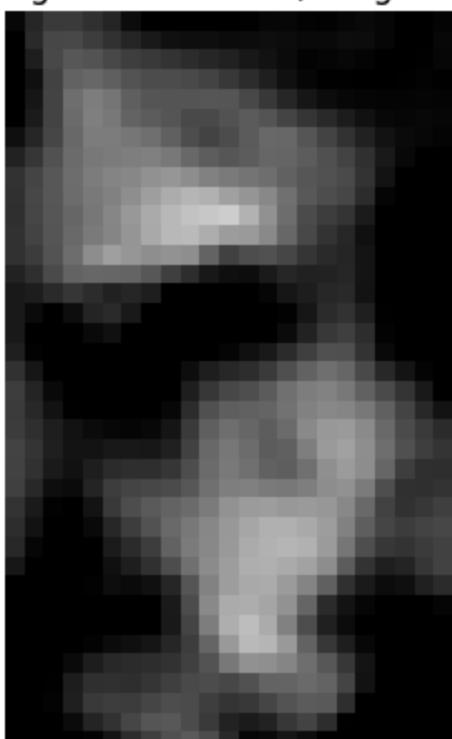


Image 1 - Width: 23, Height: 20

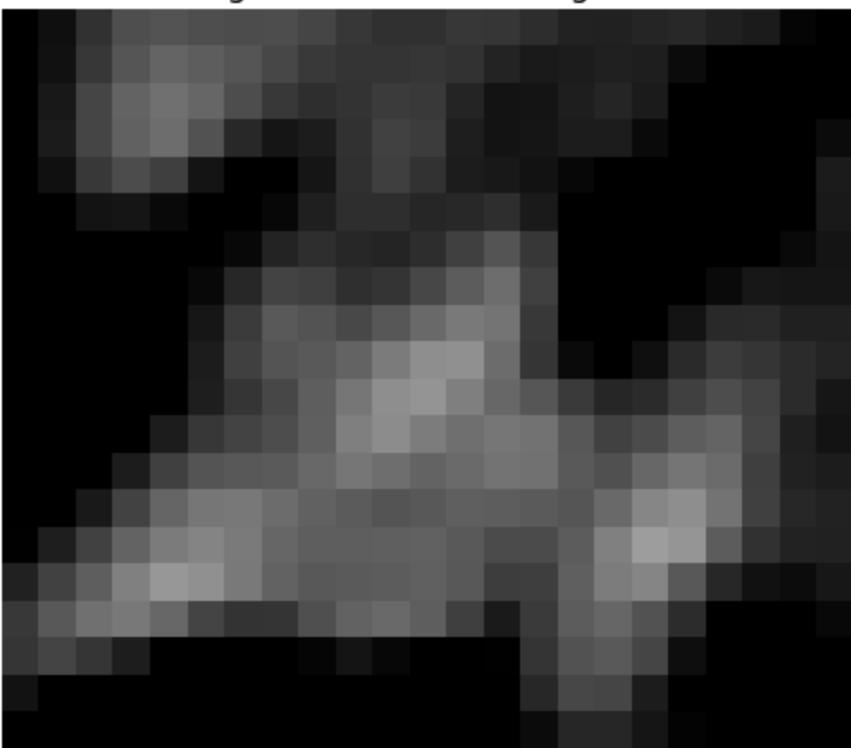


Image 1 - Width: 28, Height: 28

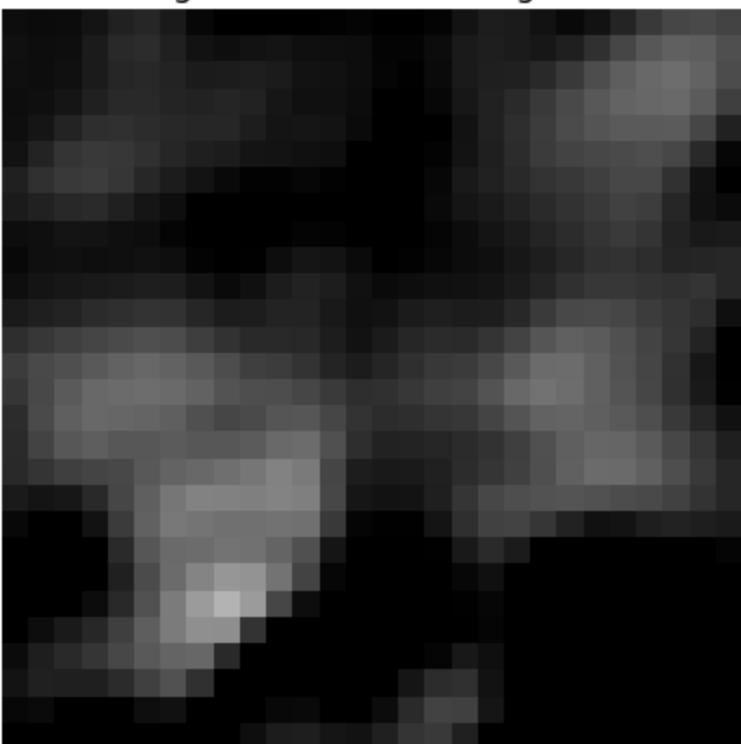


Image 1 - Width: 36, Height: 33

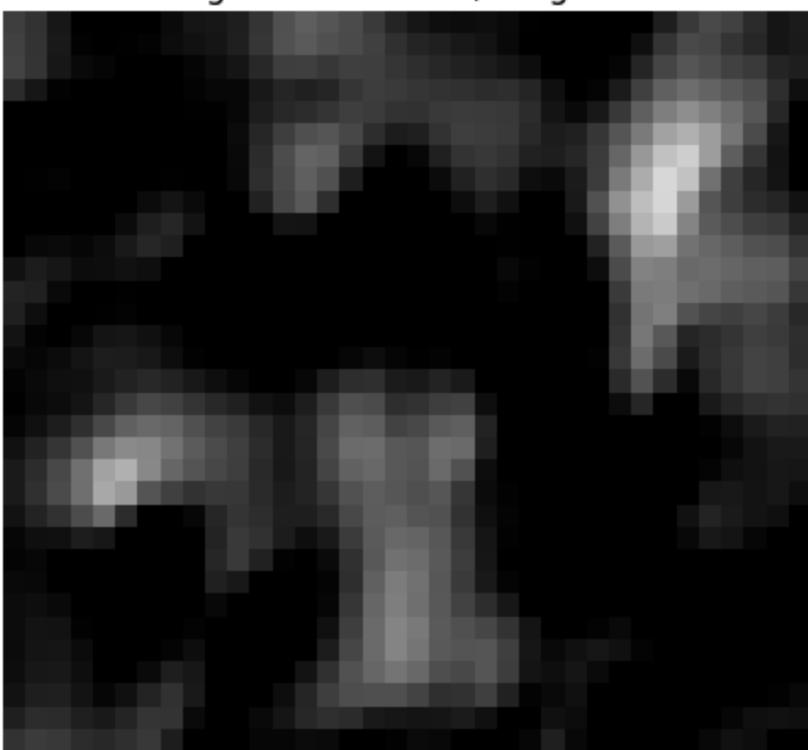


Image 1 - Width: 40, Height: 36



Image 1 - Width: 29, Height: 14

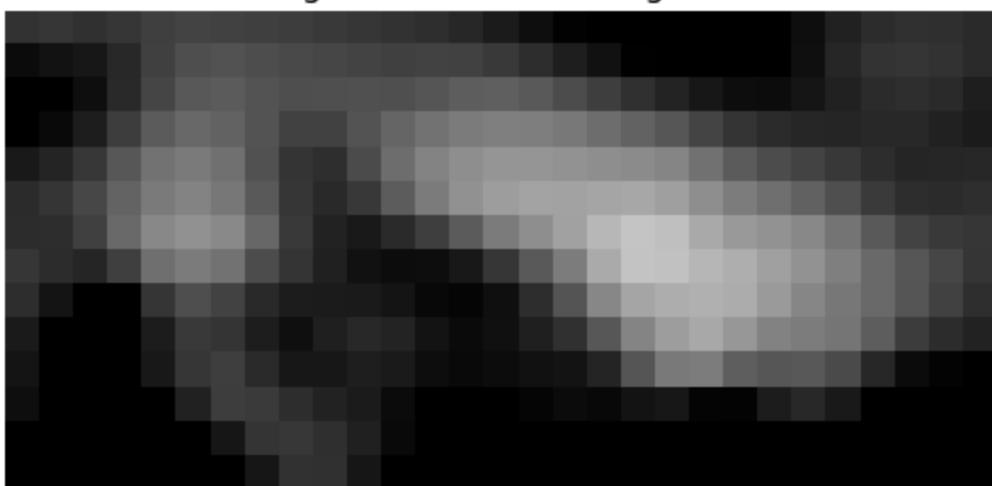


Image 1 - Width: 42, Height: 19

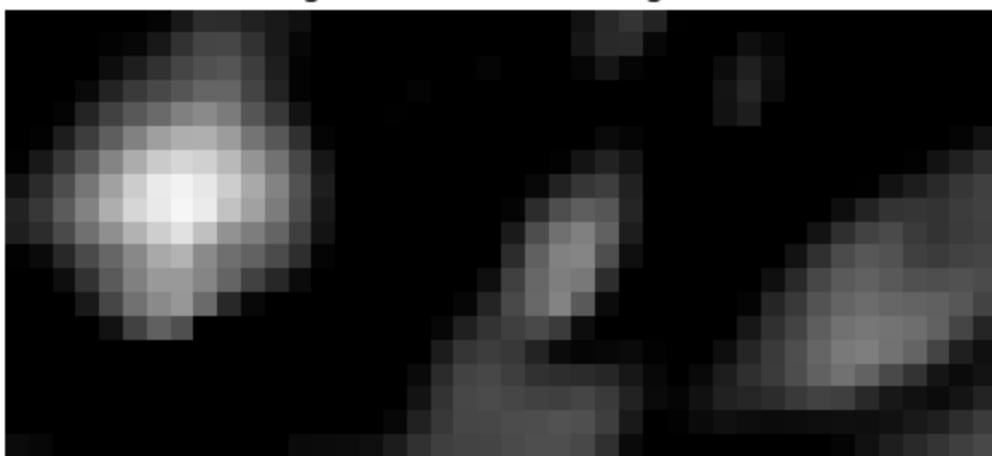


Image 1 - Width: 40, Height: 16

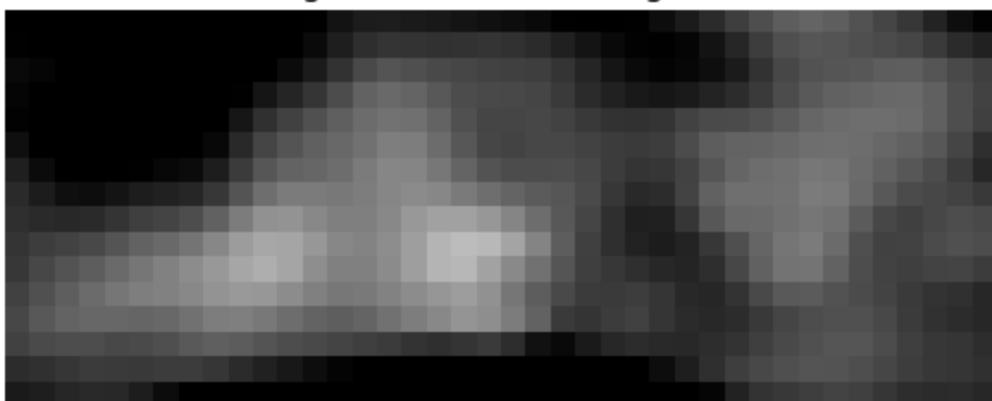


Image 1 - Width: 28, Height: 28

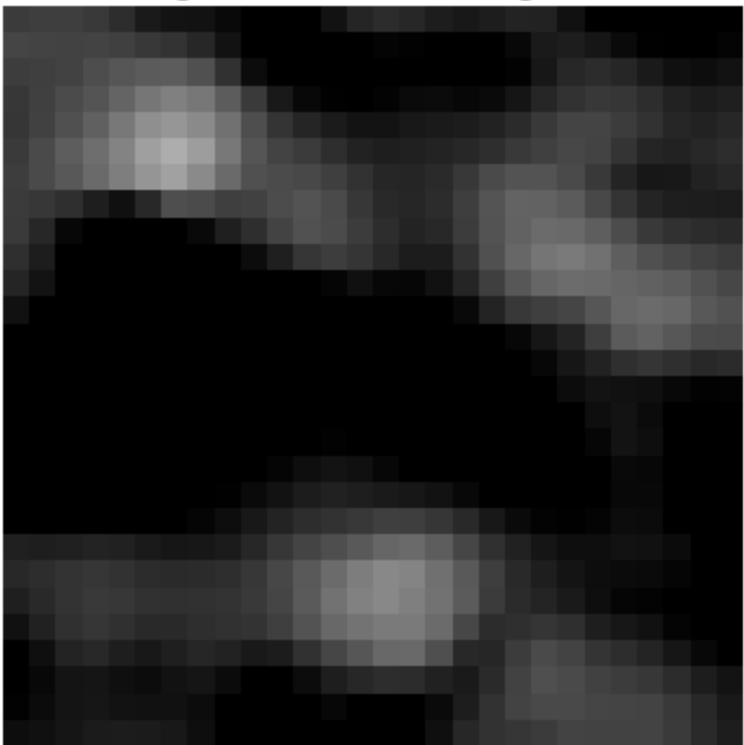


Image 1 - Width: 48, Height: 70



Image 1 - Width: 23, Height: 22

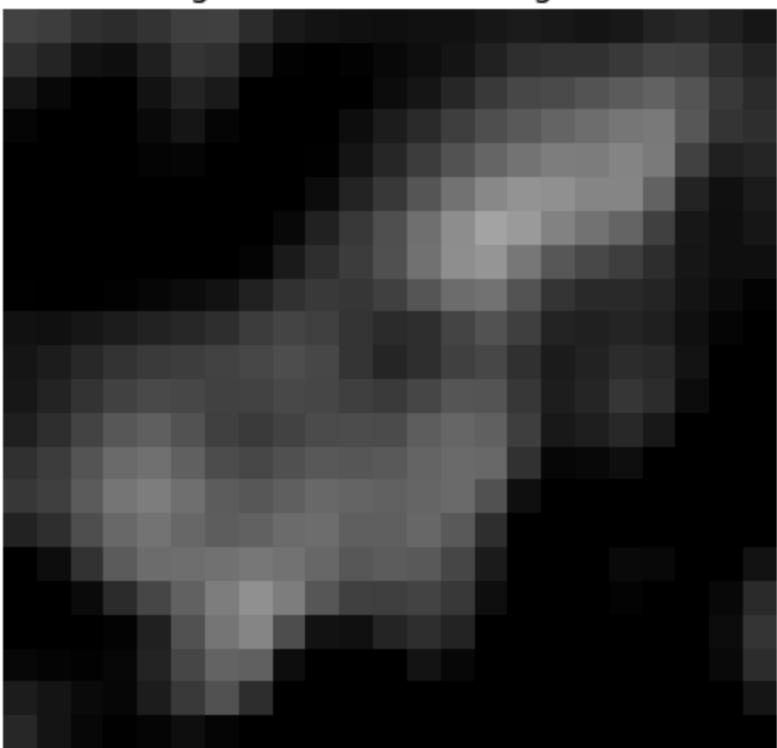


Image 1 - Width: 17, Height: 25

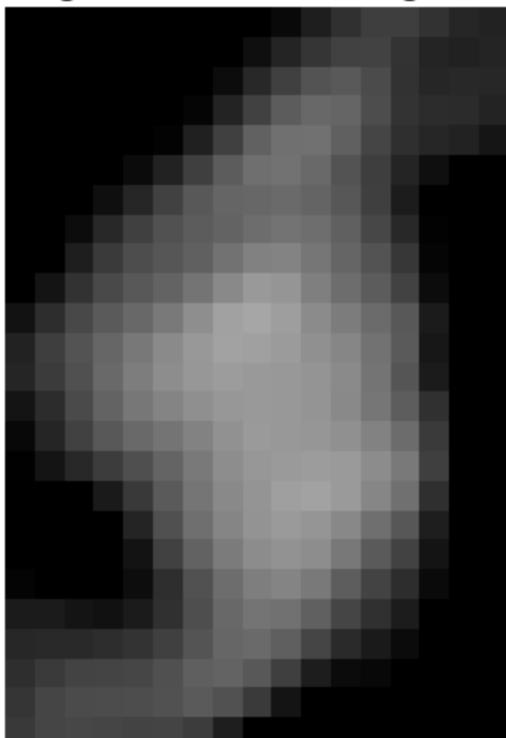


Image 1 - Width: 33, Height: 48



Image 1 - Width: 33, Height: 63

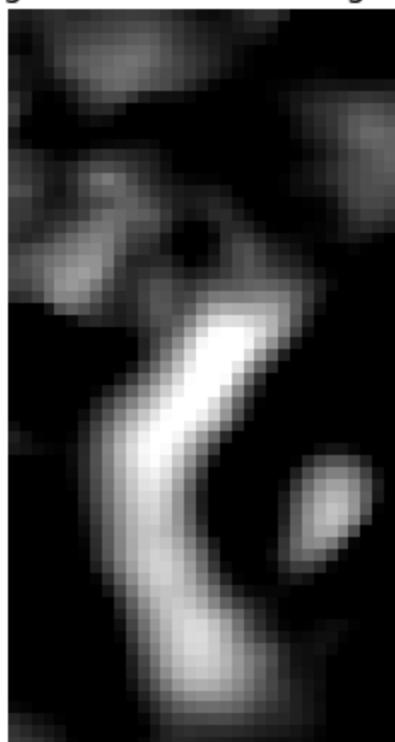


Image 1 - Width: 34, Height: 29

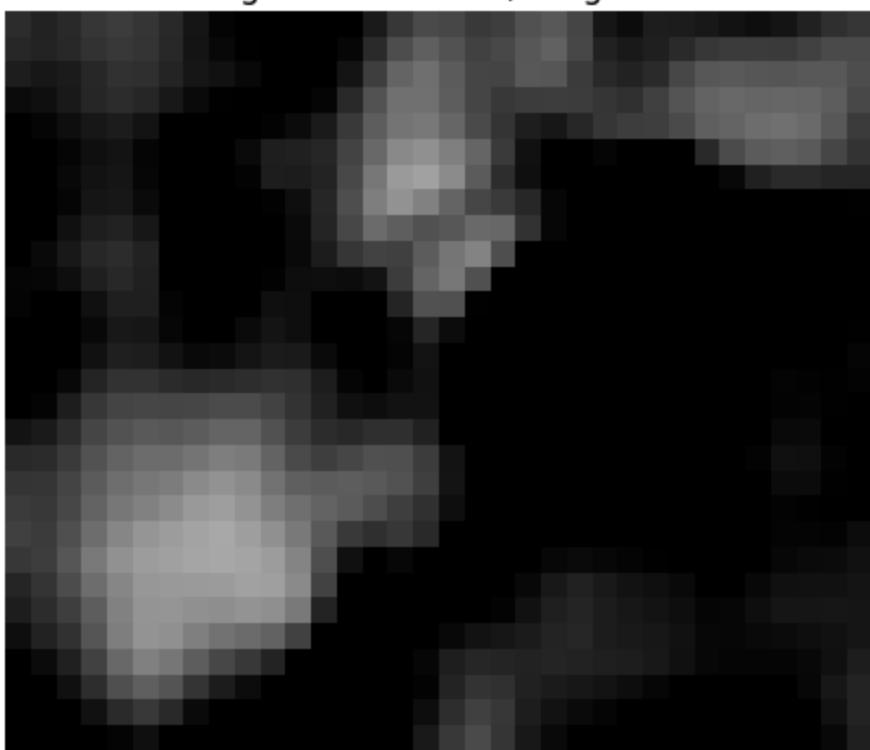


Image 1 - Width: 50, Height: 64



Image 1 - Width: 19, Height: 26

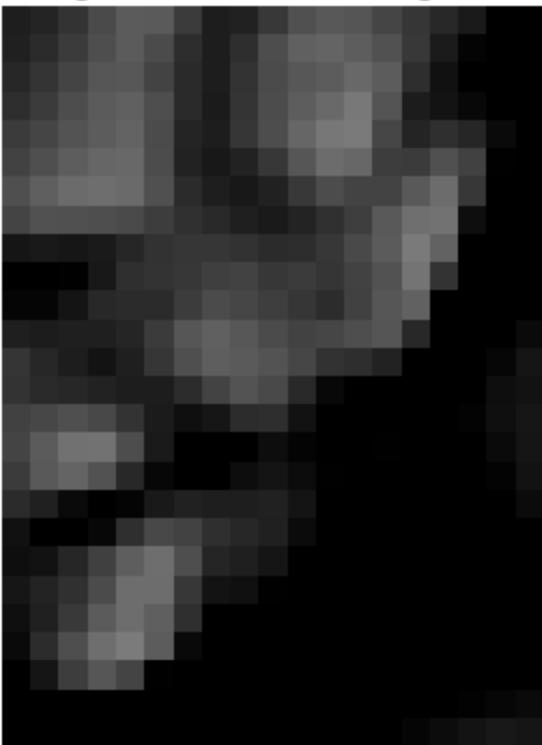


Image 1 - Width: 58, Height: 65

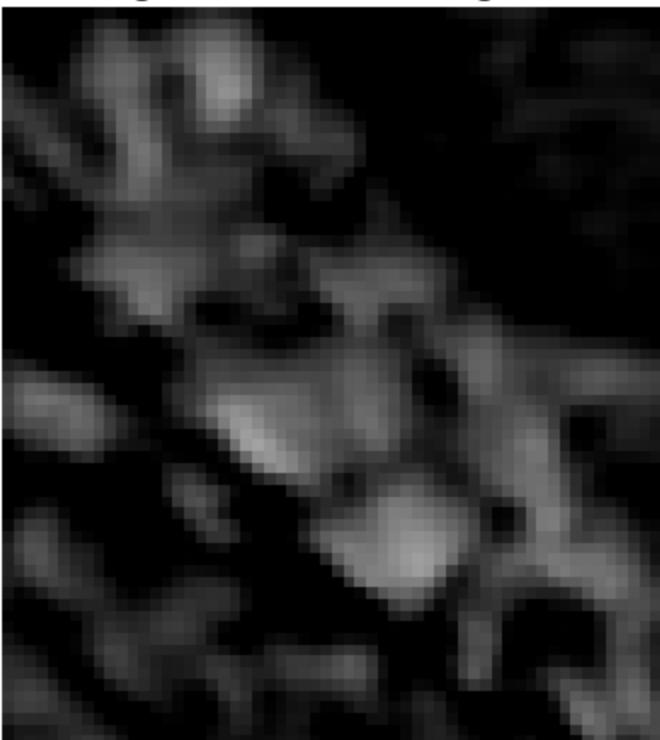


Image 1 - Width: 26, Height: 18

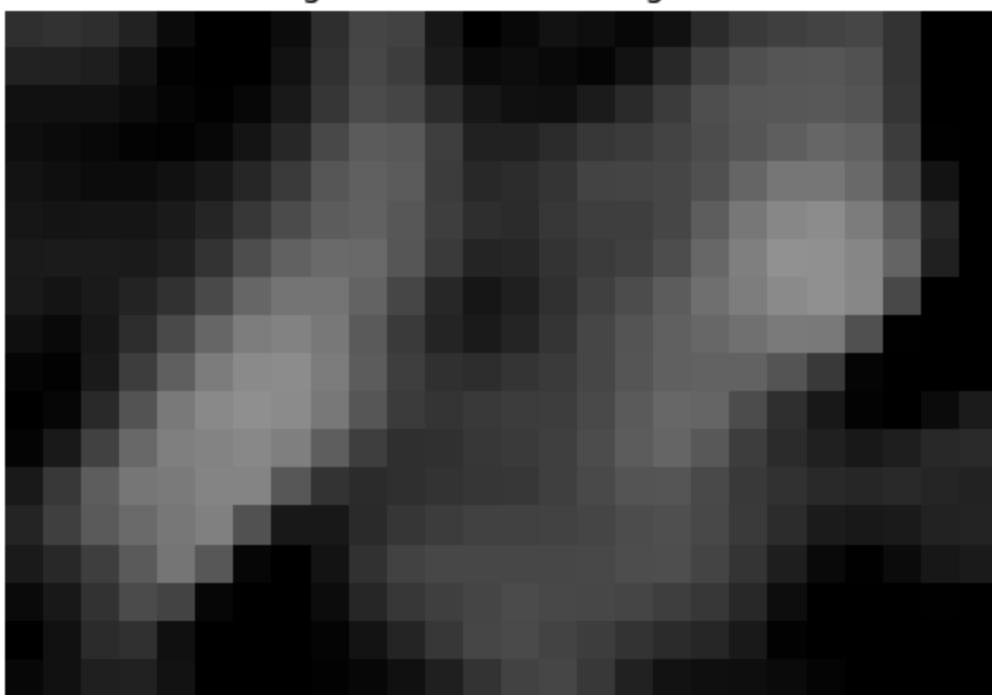


Image 1 - Width: 17, Height: 38

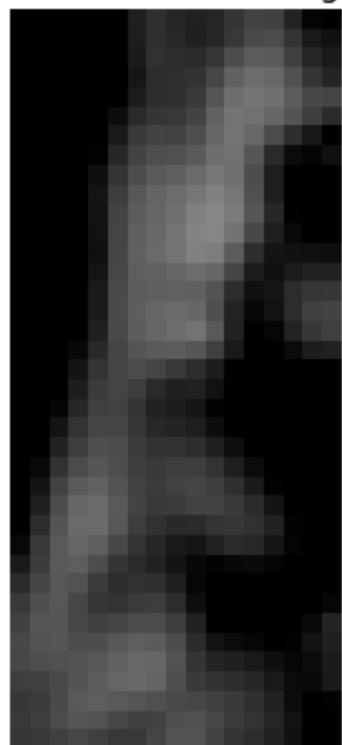


Image 1 - Width: 42, Height: 32

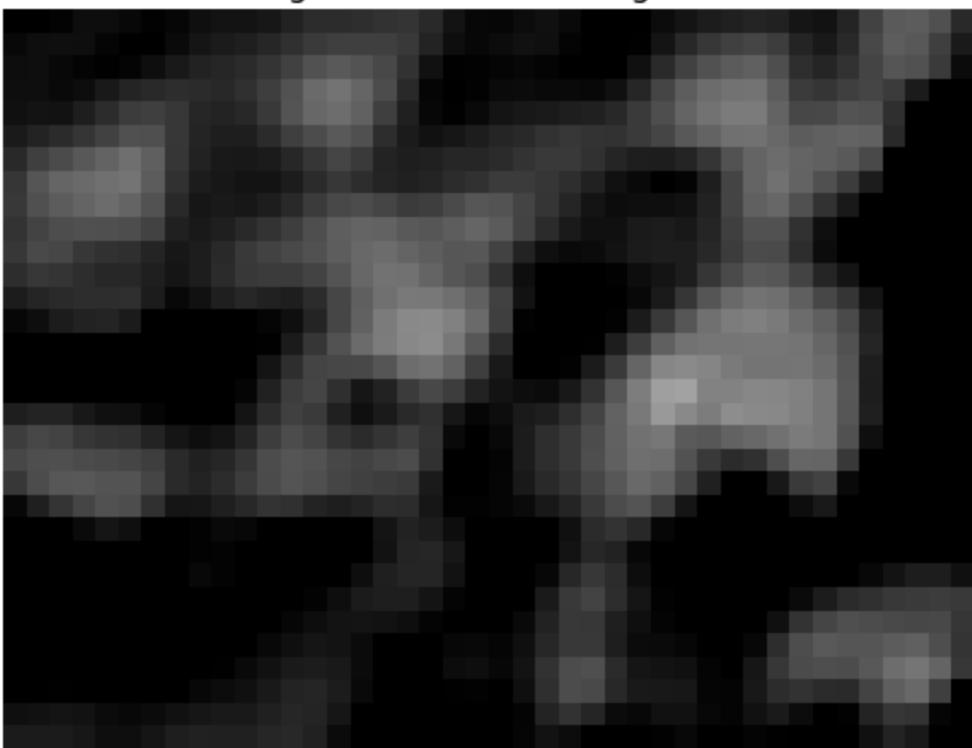


Image 1 - Width: 19, Height: 29

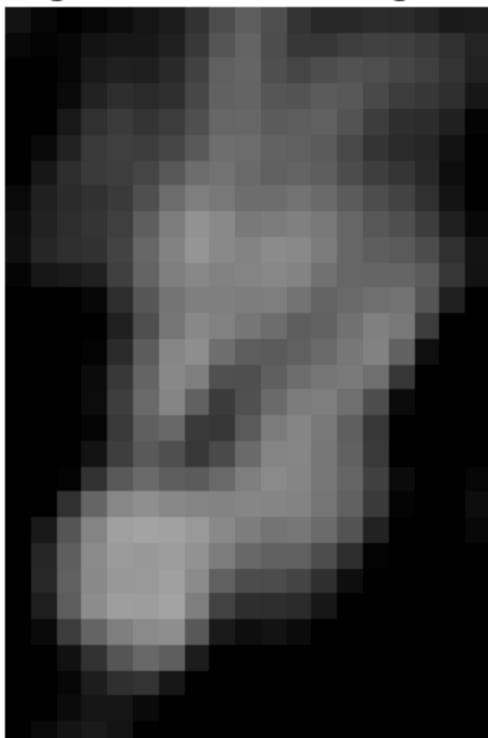


Image 1 - Width: 36, Height: 25

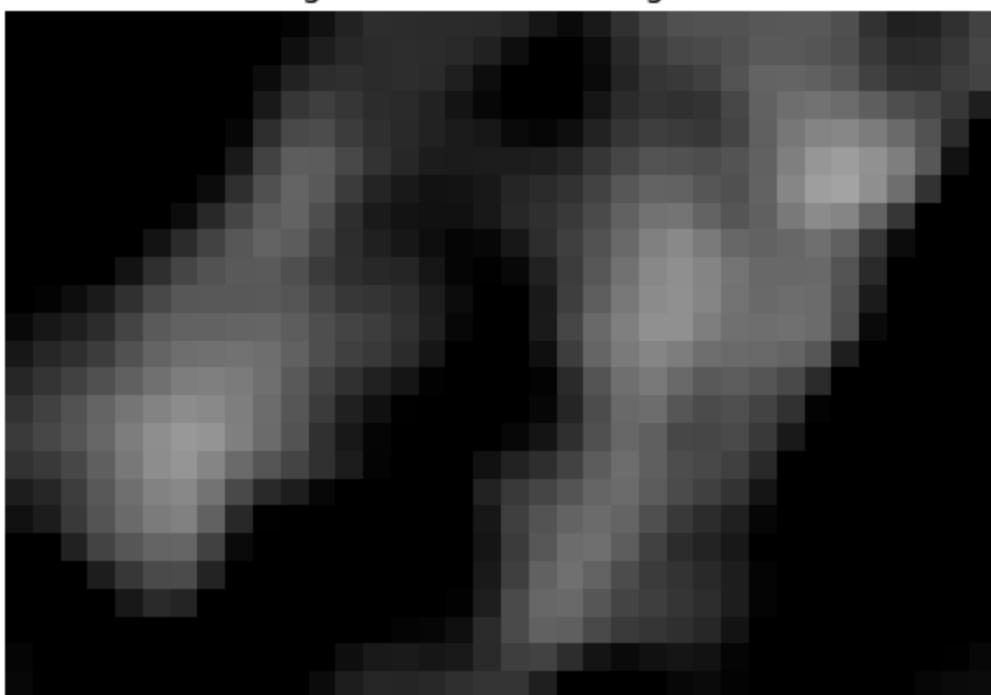


Image 1 - Width: 108, Height: 84

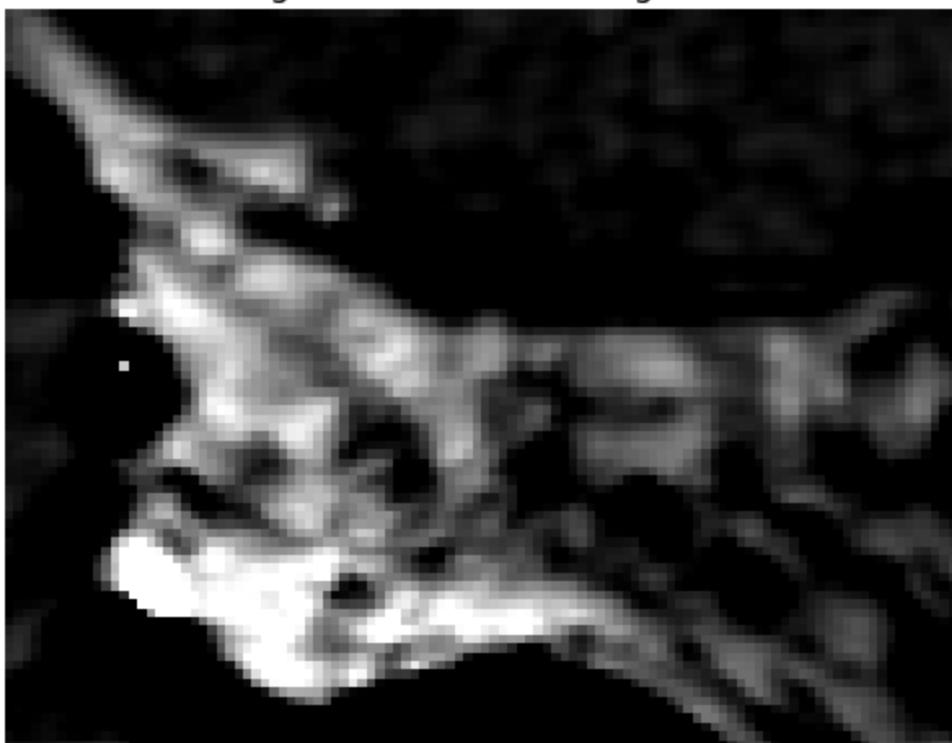


Image 1 - Width: 66, Height: 177

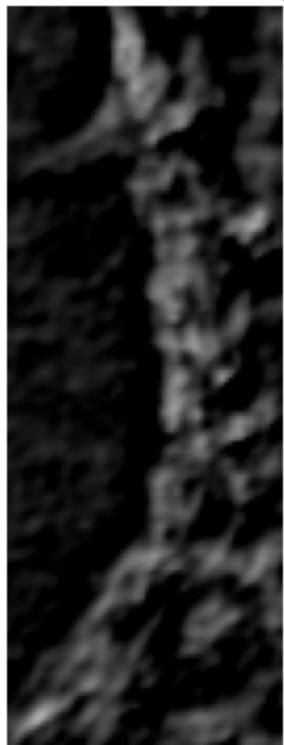


Image 1 - Width: 23, Height: 33

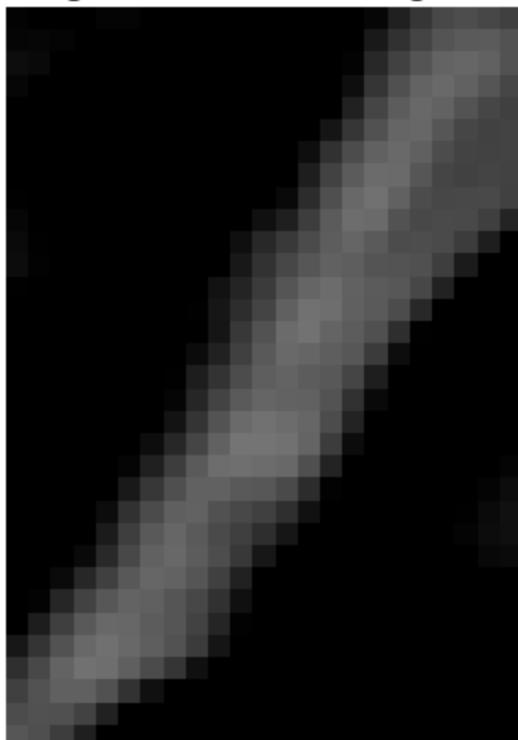


Image 1 - Width: 30, Height: 38

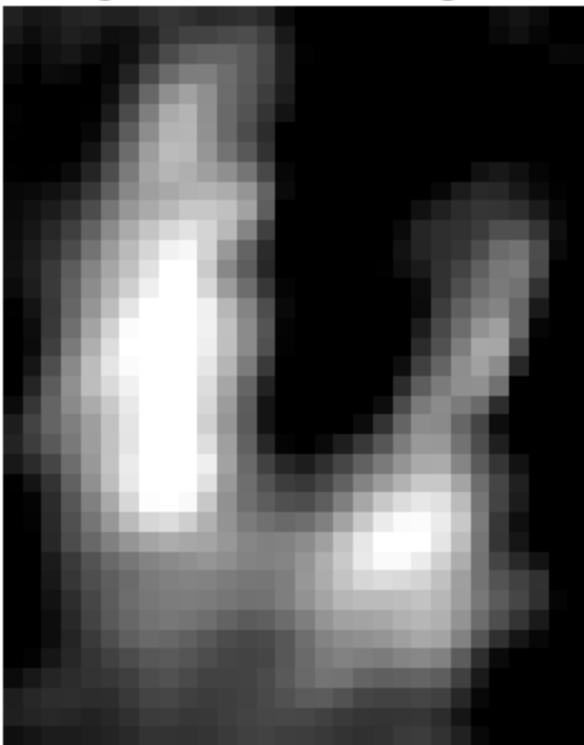


Image 1 - Width: 22, Height: 29

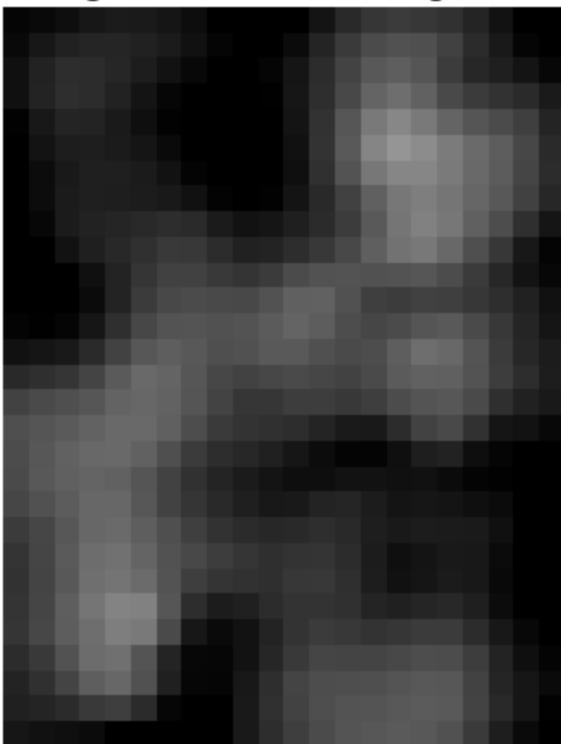


Image 1 - Width: 28, Height: 53

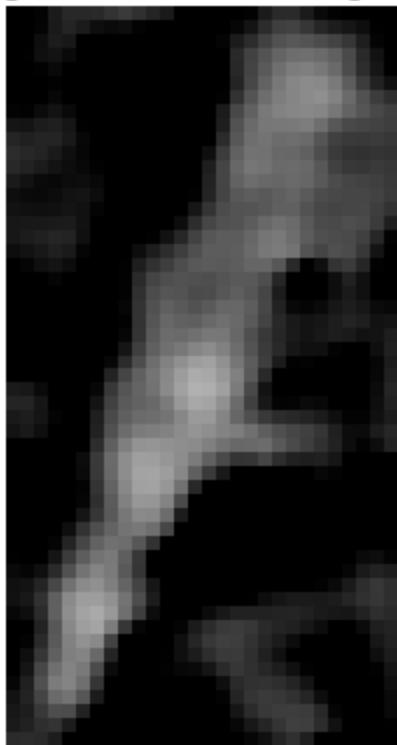


Image 1 - Width: 20, Height: 23

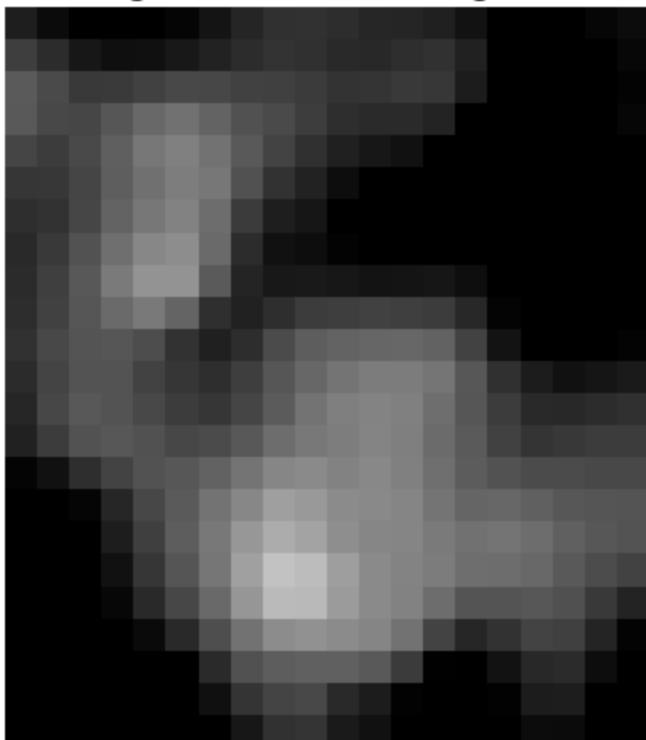


Image 1 - Width: 28, Height: 38

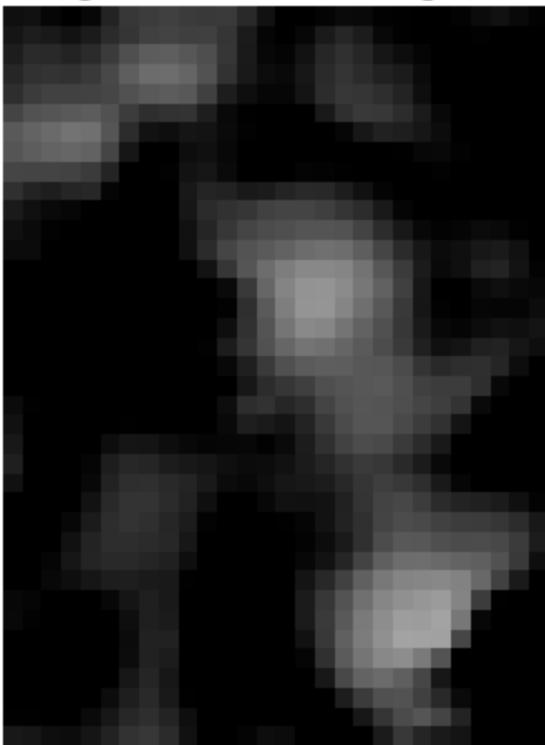


Image 1 - Width: 32, Height: 13

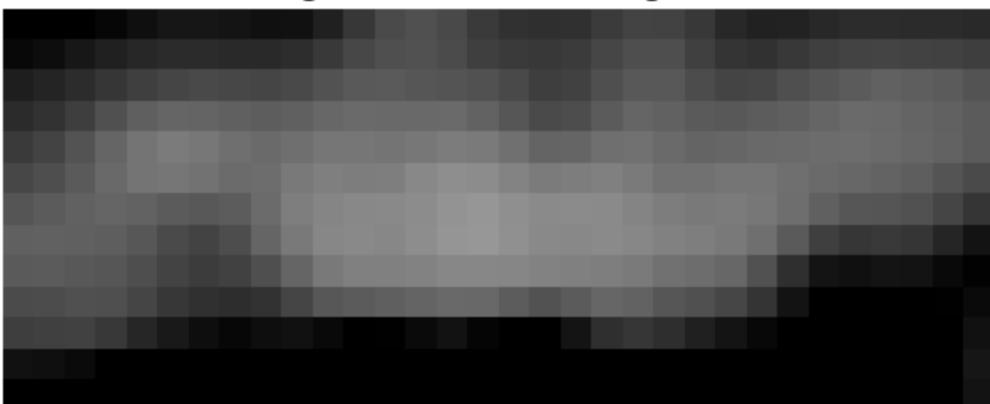


Image 1 - Width: 56, Height: 28

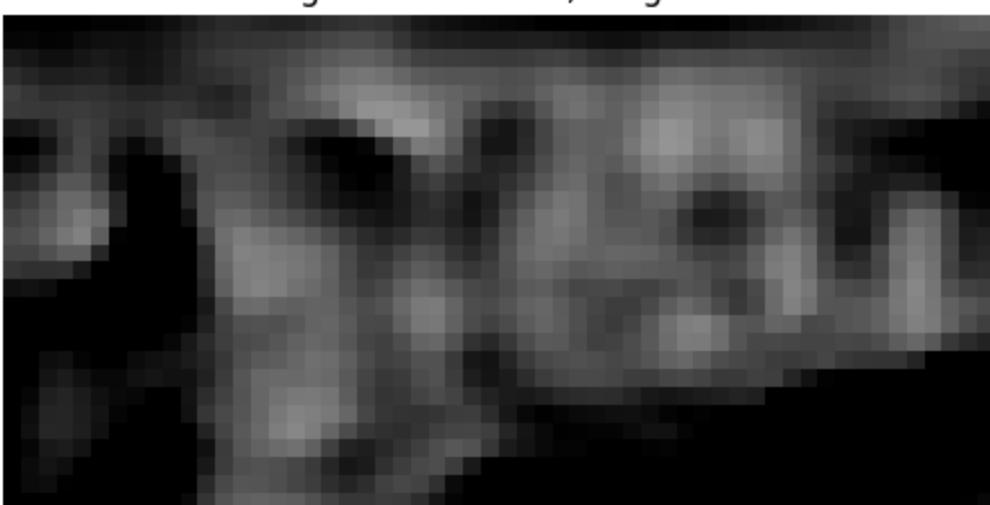


Image 1 - Width: 35, Height: 32

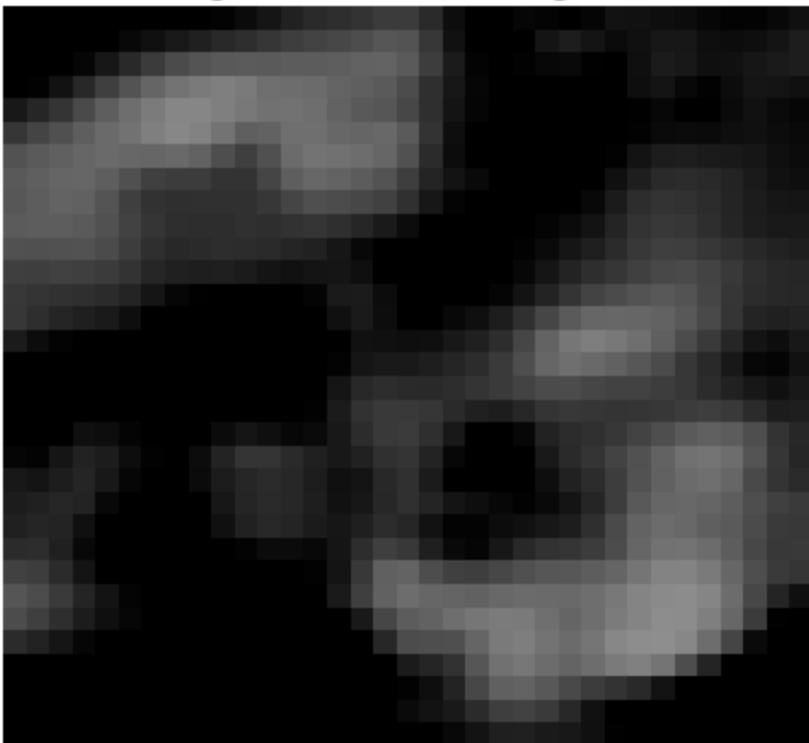


Image 1 - Width: 39, Height: 23

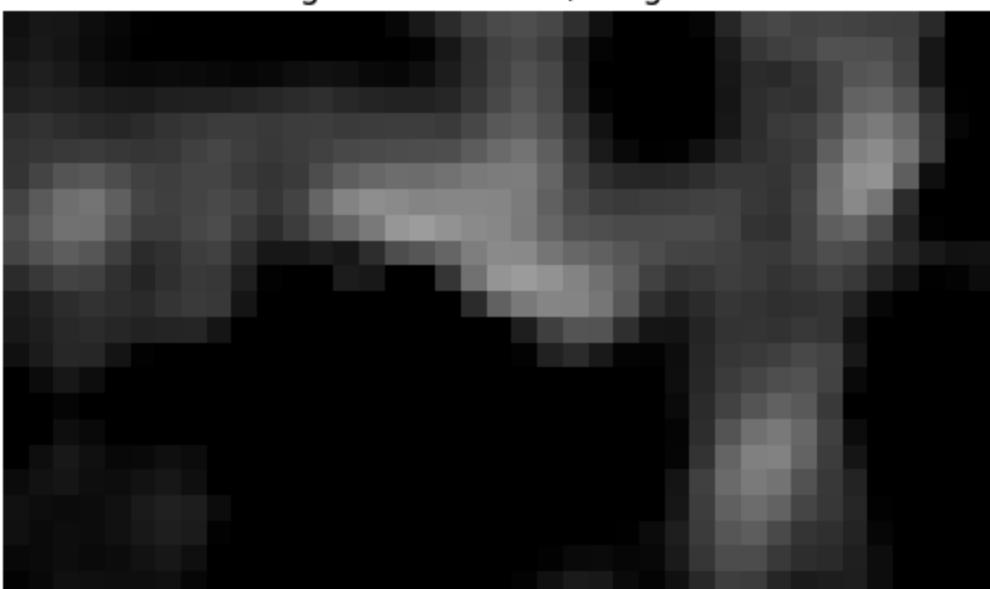


Image 1 - Width: 25, Height: 33

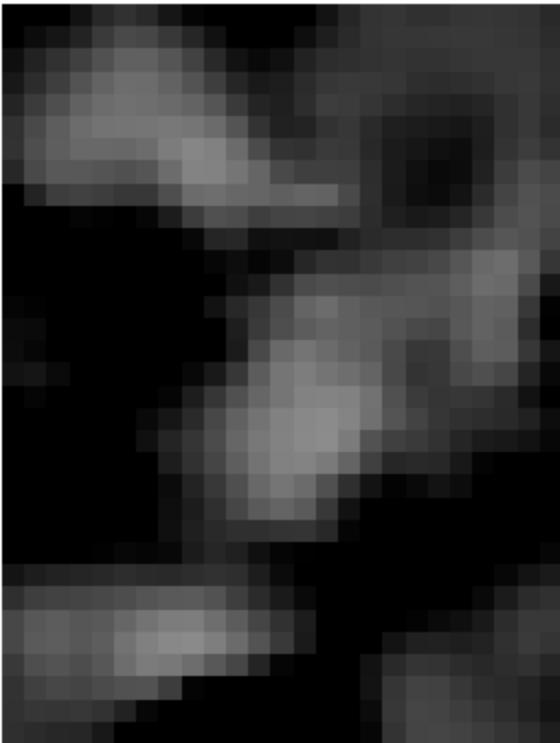


Image 1 - Width: 2592, Height: 25

Image 2 - Width: 28, Height: 59

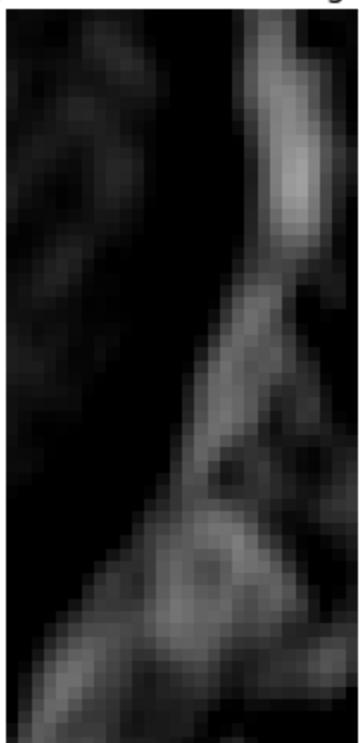


Image 2 - Width: 32, Height: 29

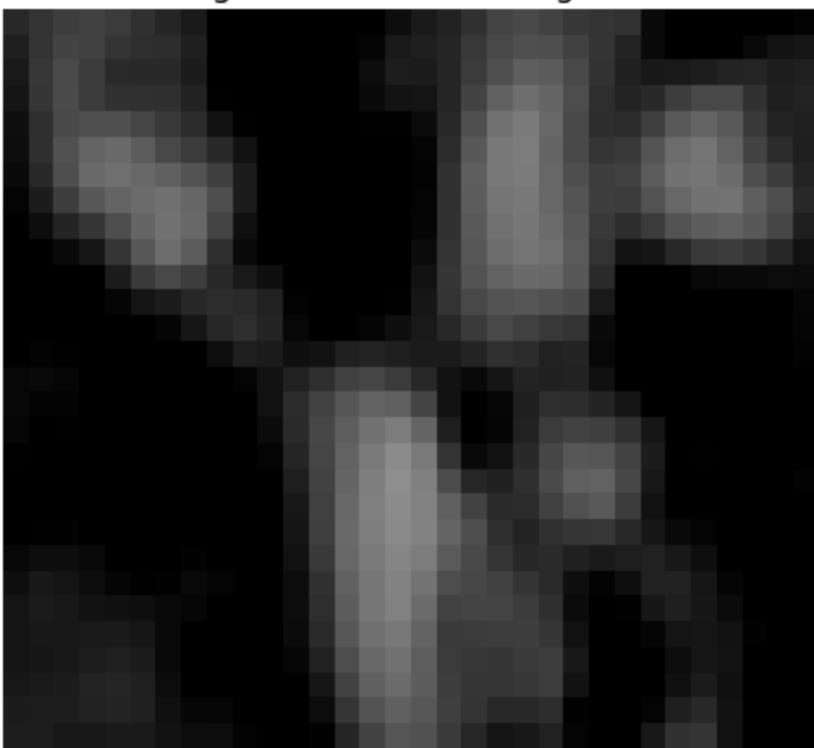


Image 2 - Width: 32, Height: 75

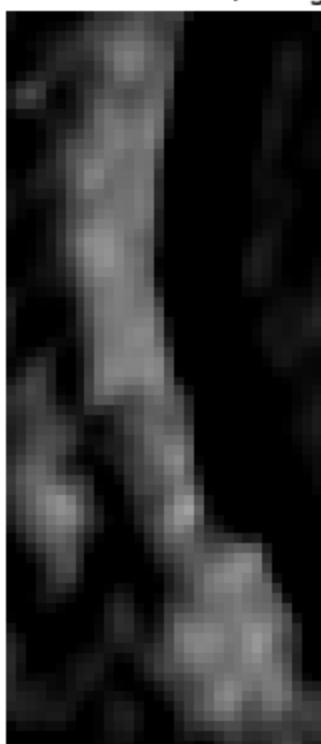


Image 2 - Width: 25, Height: 25

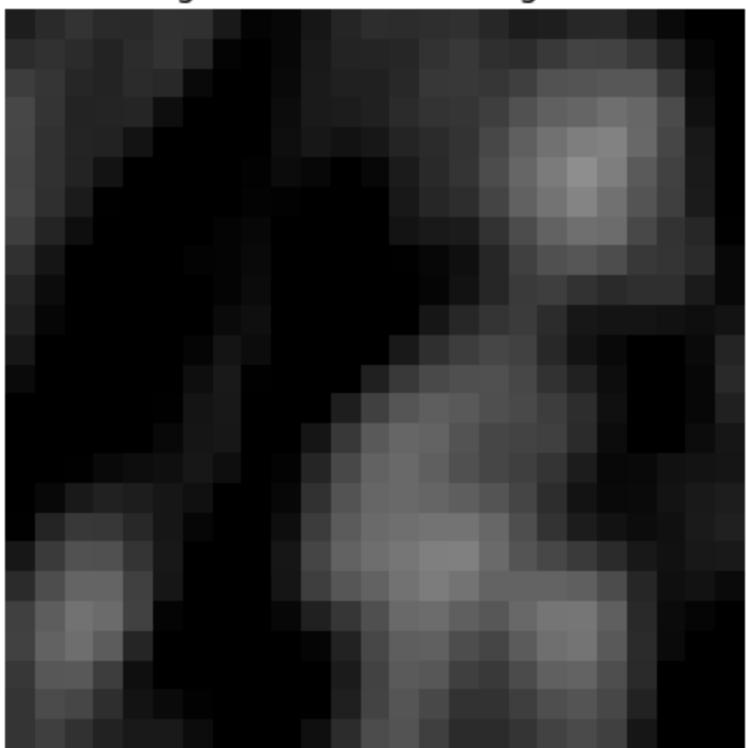


Image 2 - Width: 22, Height: 31

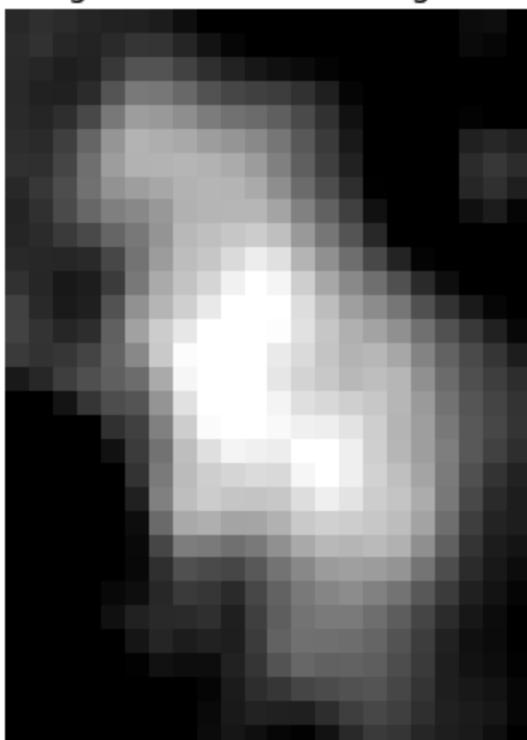


Image 2 - Width: 50, Height: 63

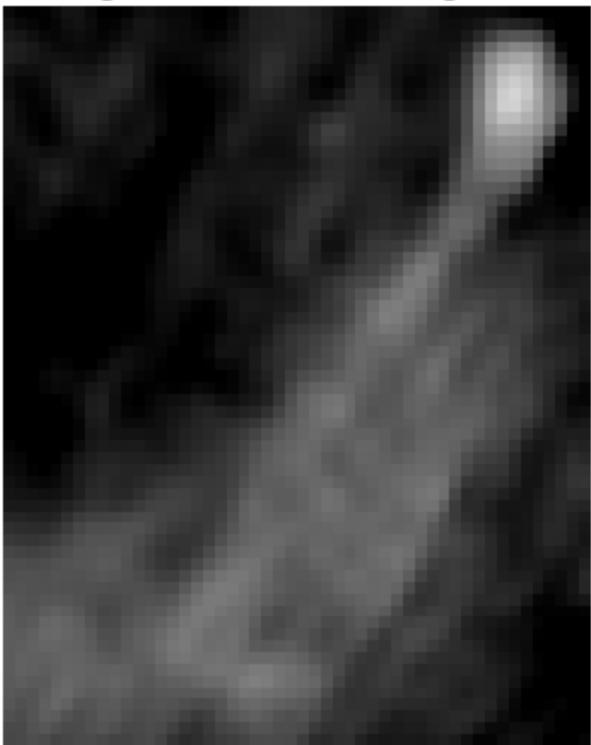


Image 2 - Width: 20, Height: 28

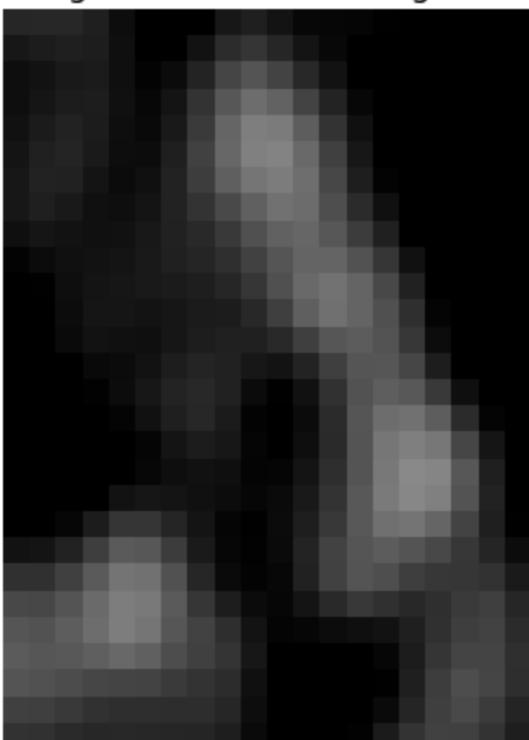


Image 2 - Width: 62, Height: 61



Image 2 - Width: 24, Height: 30

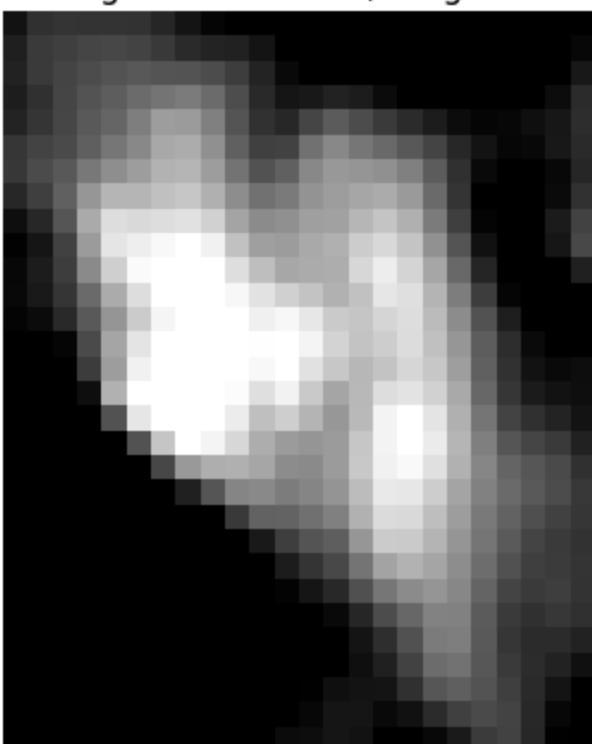


Image 2 - Width: 26, Height: 26

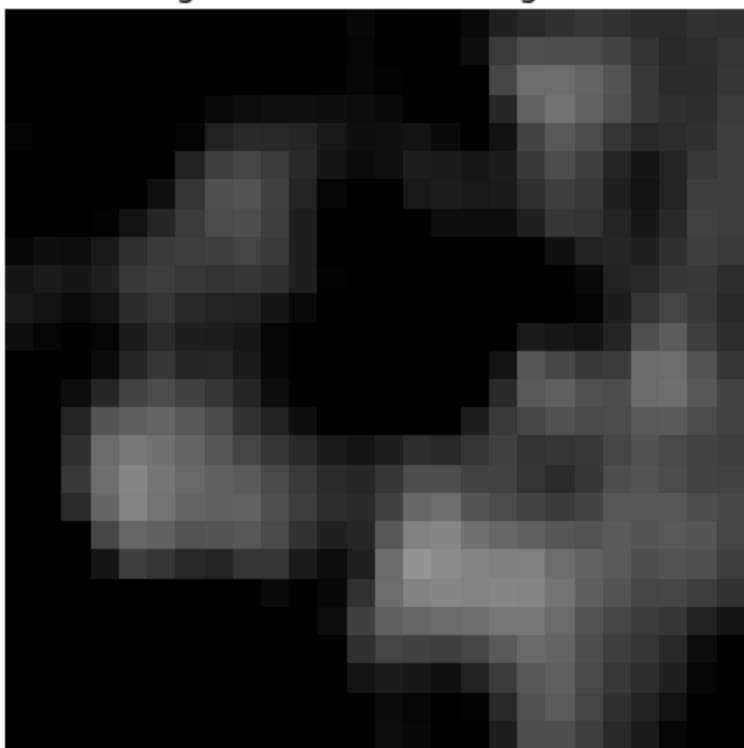


Image 2 - Width: 27, Height: 16

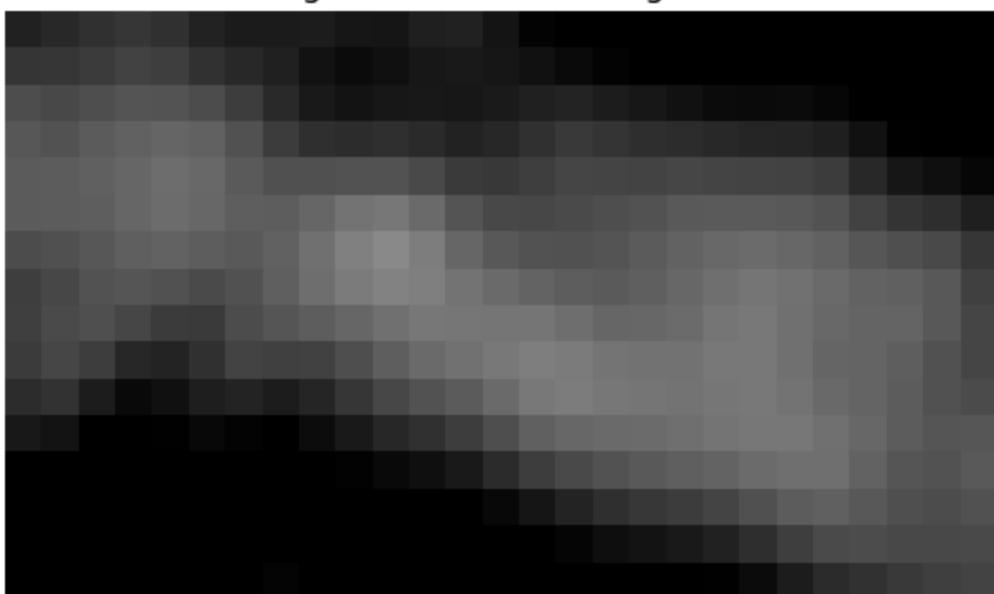


Image 2 - Width: 31, Height: 42

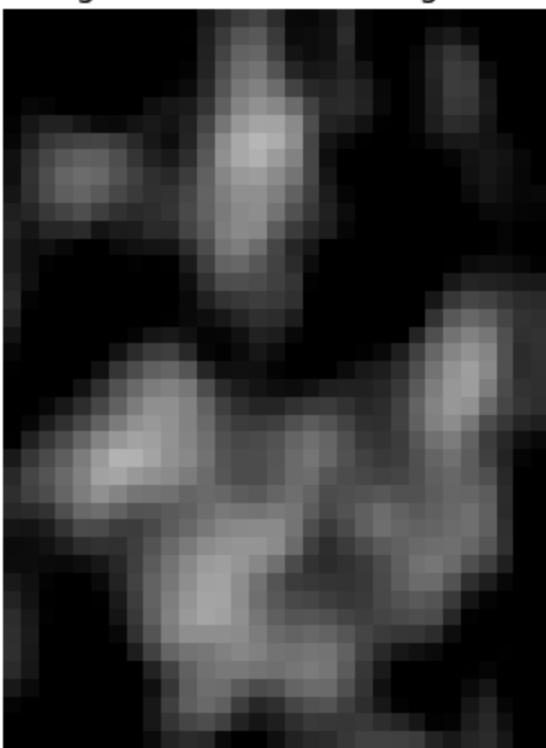


Image 2 - Width: 68, Height: 100



Image 2 - Width: 125, Height: 167

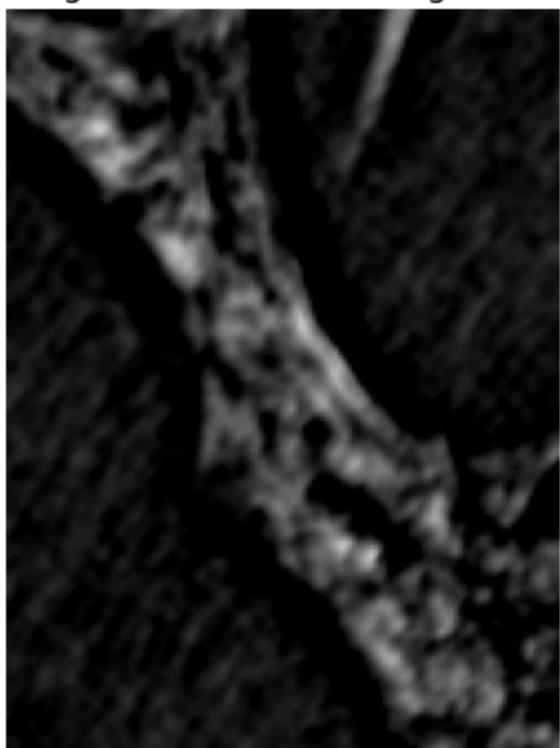


Image 2 - Width: 18, Height: 48

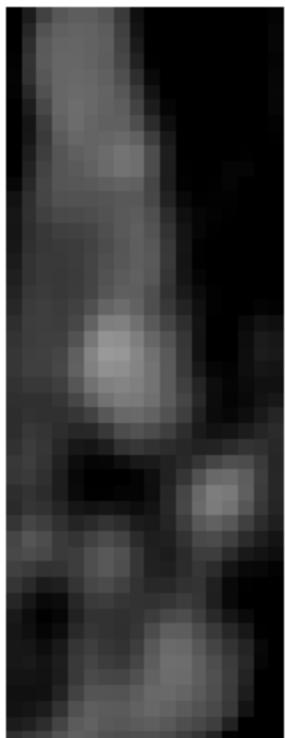


Image 2 - Width: 44, Height: 36

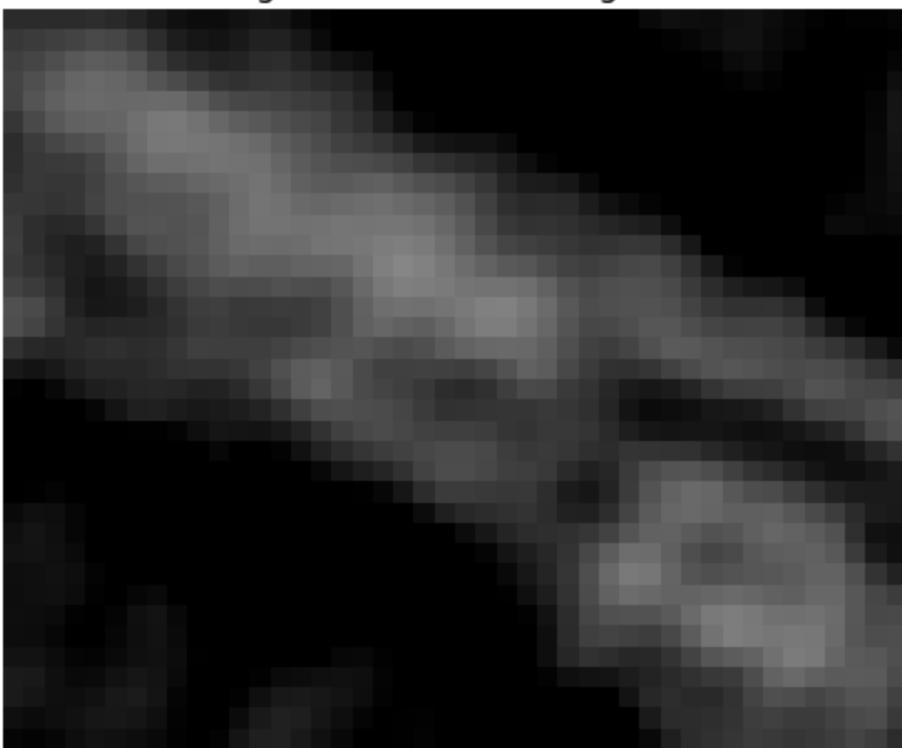


Image 2 - Width: 20, Height: 45

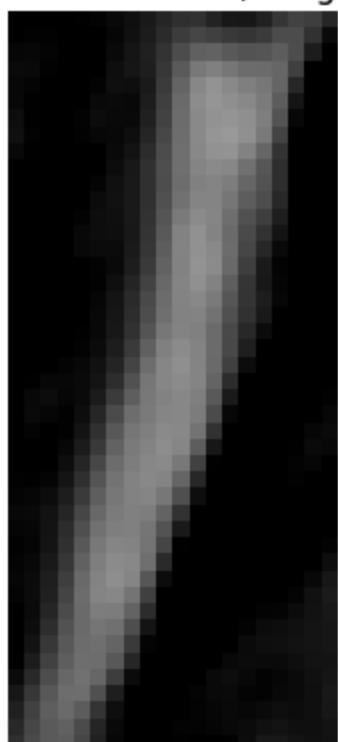


Image 2 - Width: 70, Height: 126

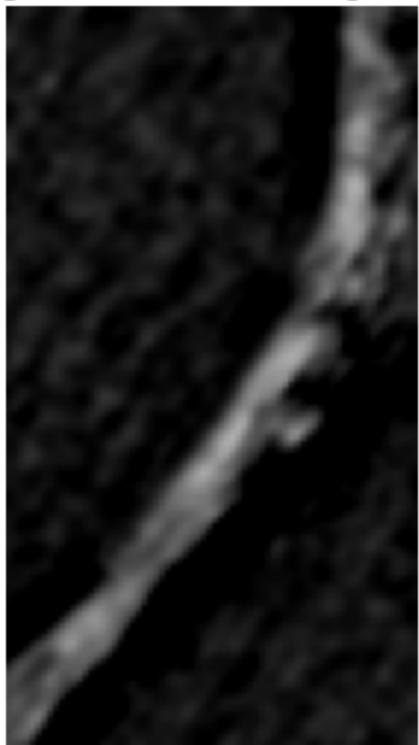


Image 2 - Width: 30, Height: 31



Image 2 - Width: 49, Height: 116



Image 2 - Width: 17, Height: 33

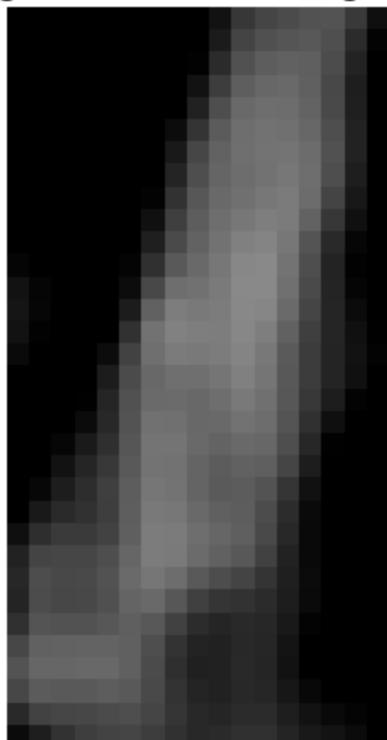


Image 2 - Width: 16, Height: 26

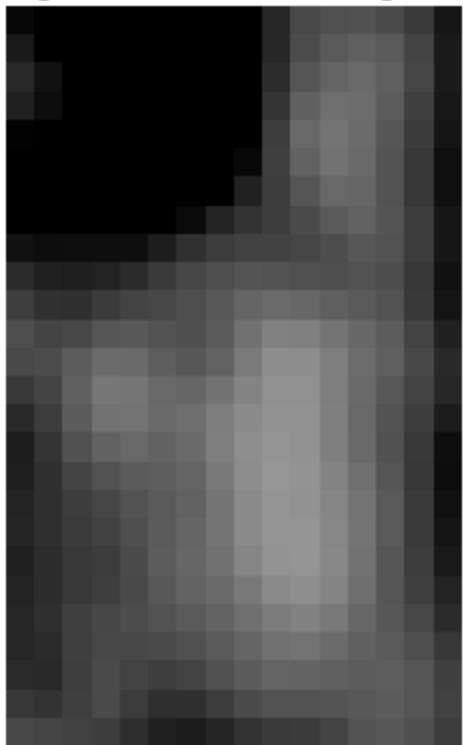


Image 2 - Width: 31, Height: 16

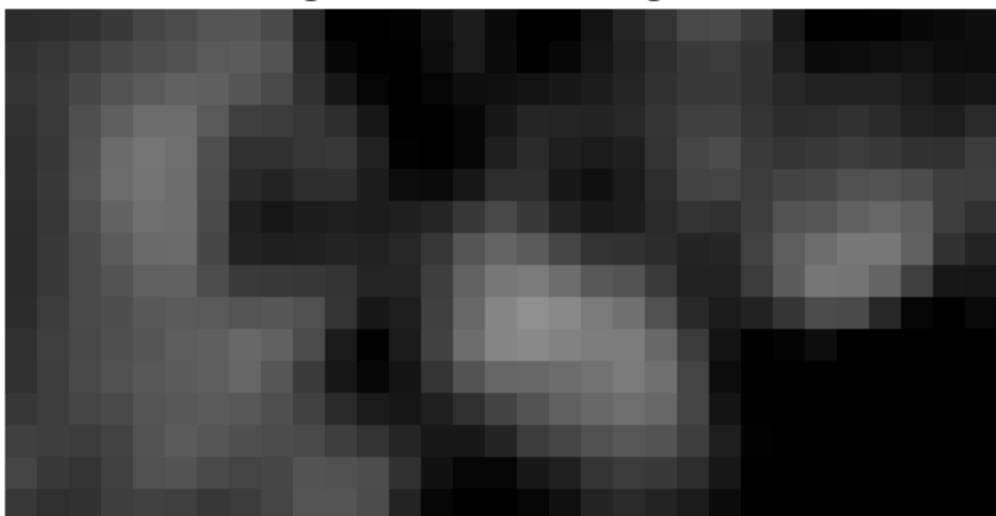


Image 2 - Width: 146, Height: 140

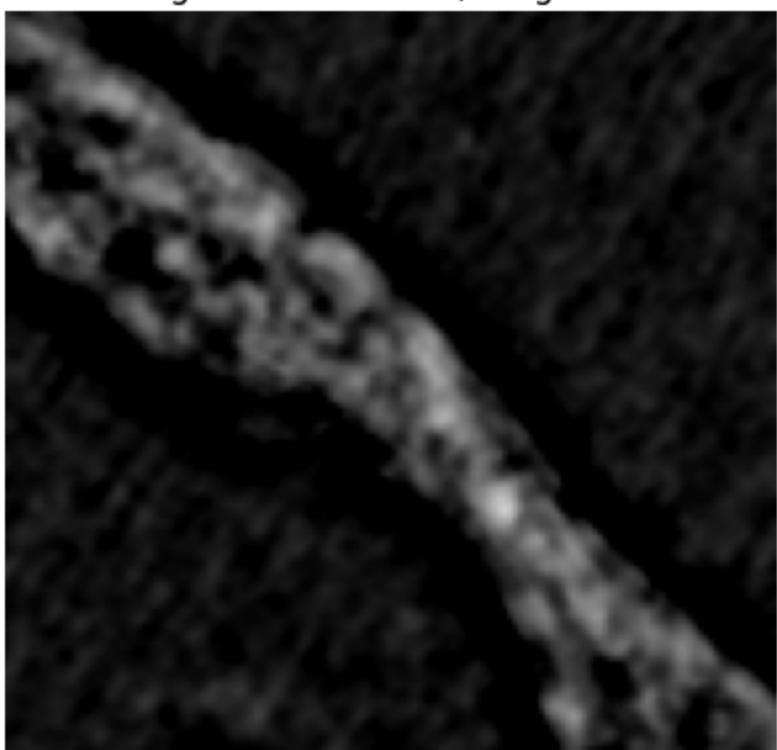


Image 2 - Width: 15, Height: 45

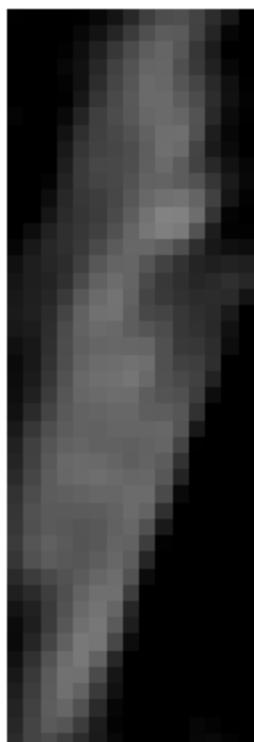


Image 2 - Width: 51, Height: 77

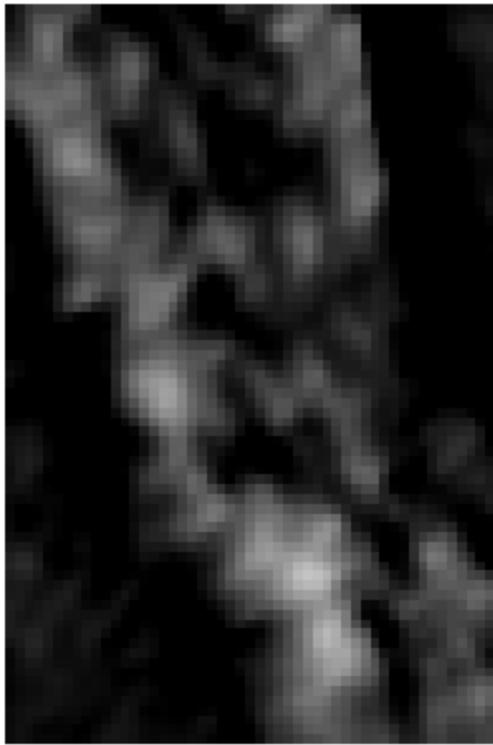


Image 2 - Width: 59, Height: 61

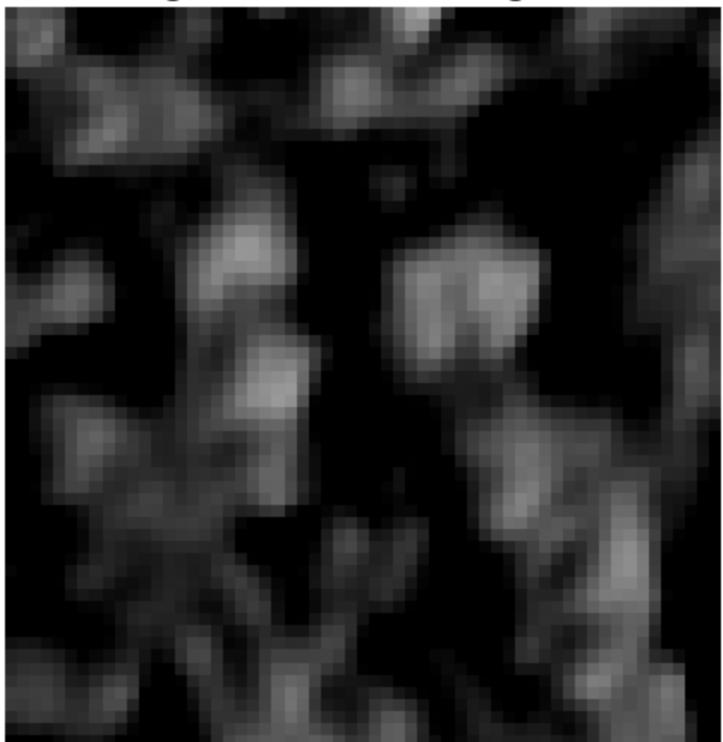


Image 2 - Width: 32, Height: 27

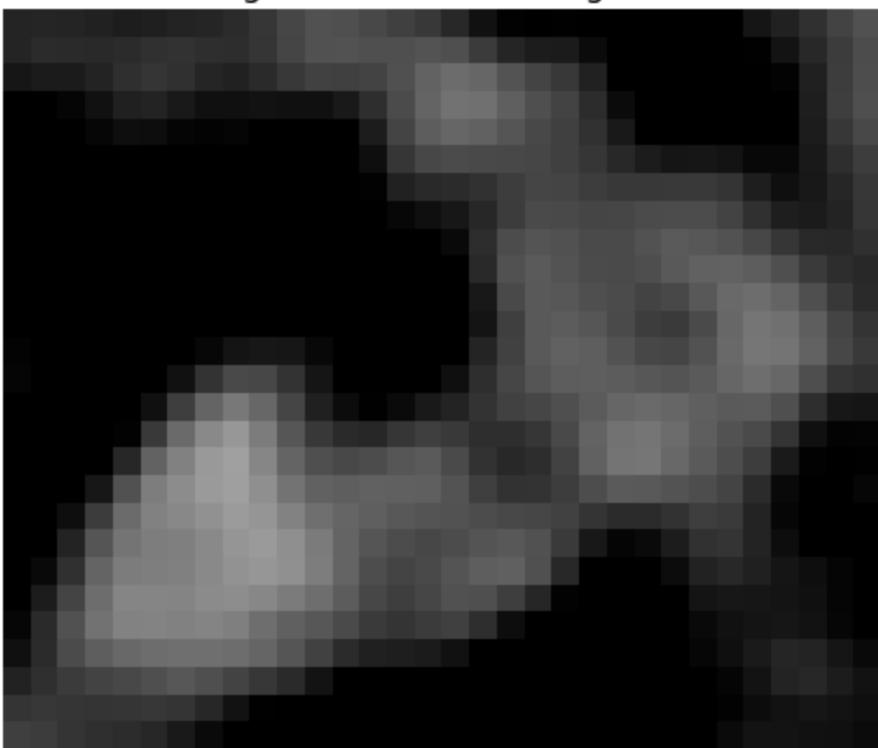


Image 2 - Width: 40, Height: 39

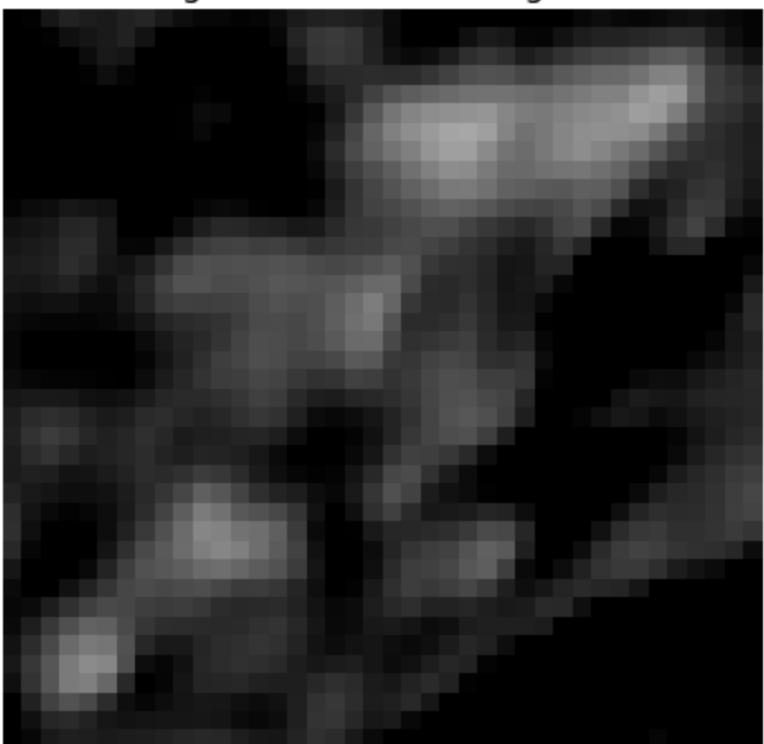


Image 2 - Width: 40, Height: 24

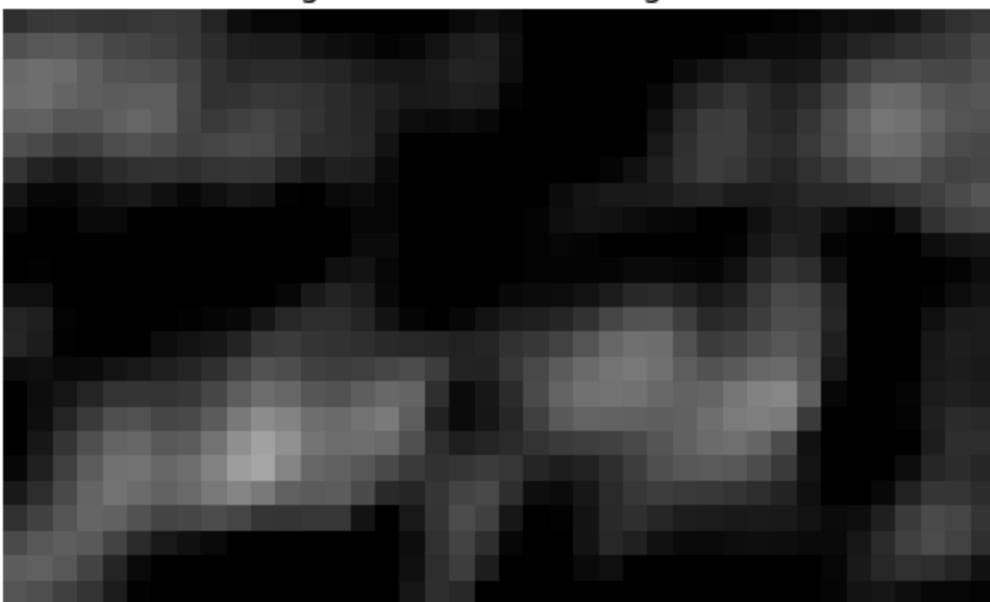


Image 2 - Width: 43, Height: 15

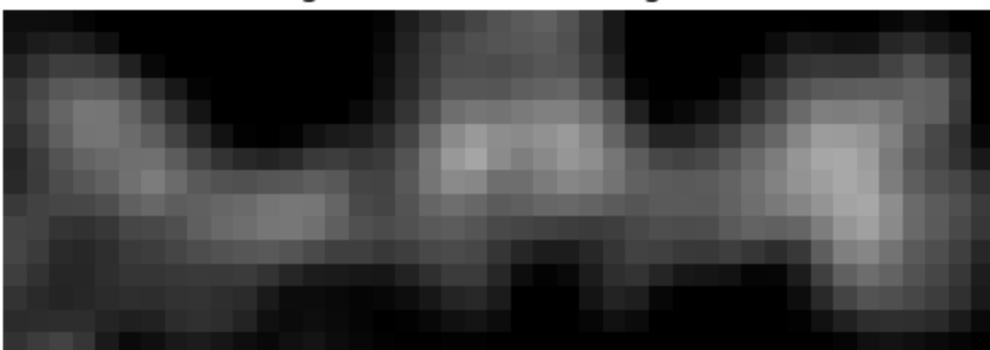


Image 2 - Width: 40, Height: 39

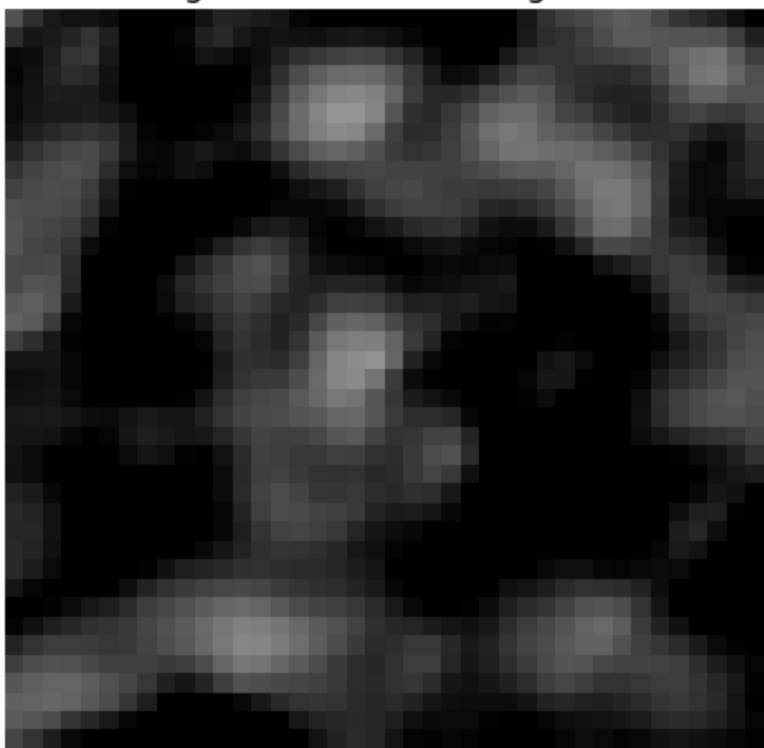


Image 2 - Width: 37, Height: 22

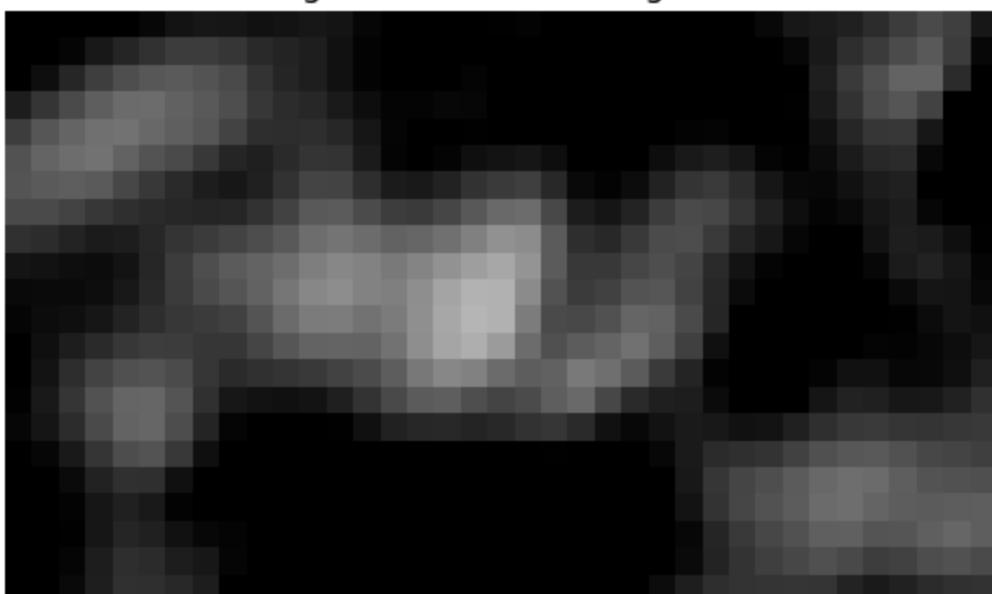


Image 2 - Width: 34, Height: 15

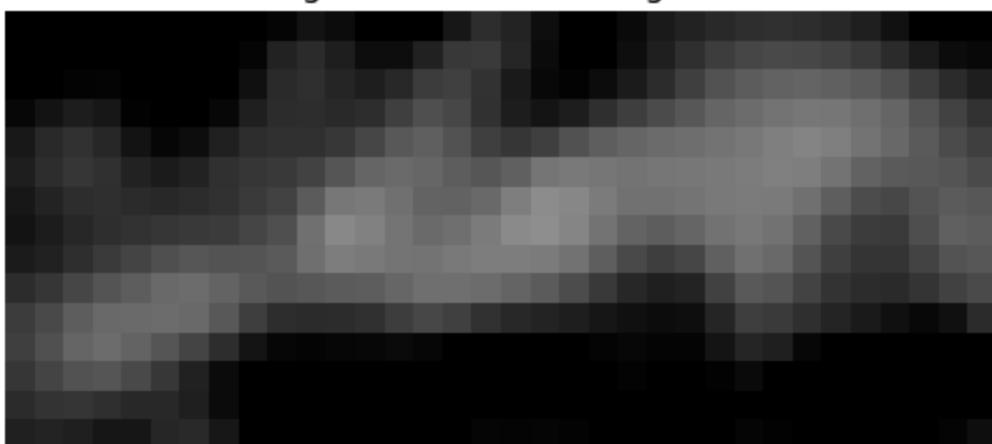


Image 2 - Width: 34, Height: 15

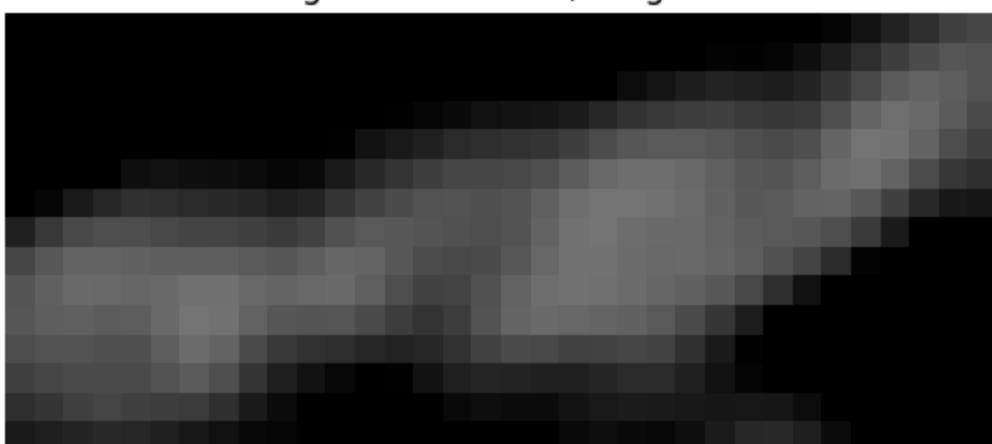


Image 2 - Width: 18, Height: 36

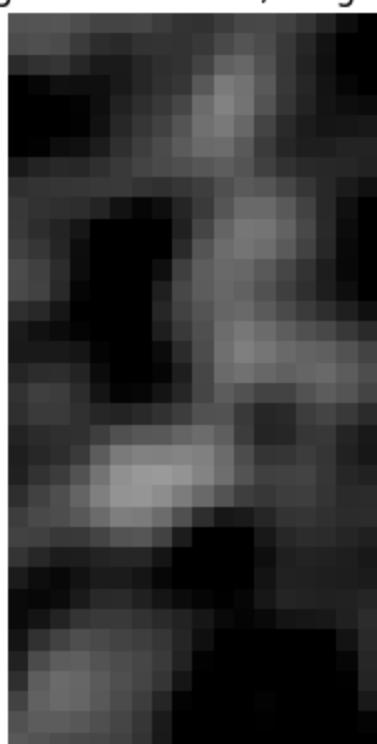


Image 2 - Width: 48, Height: 21

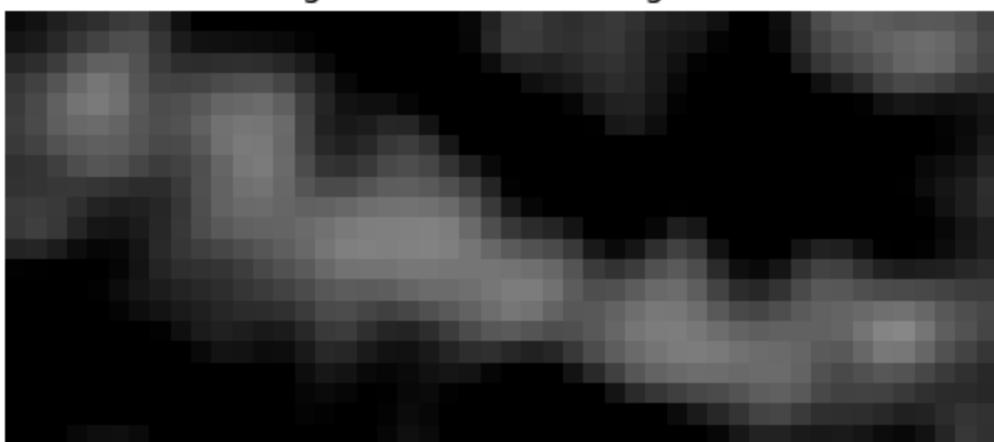


Image 2 - Width: 21, Height: 22

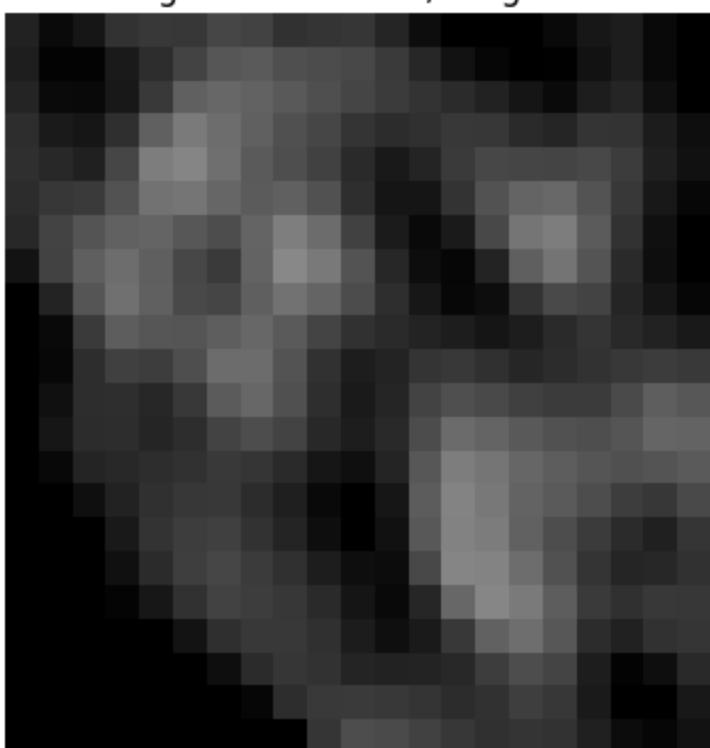


Image 2 - Width: 35, Height: 45

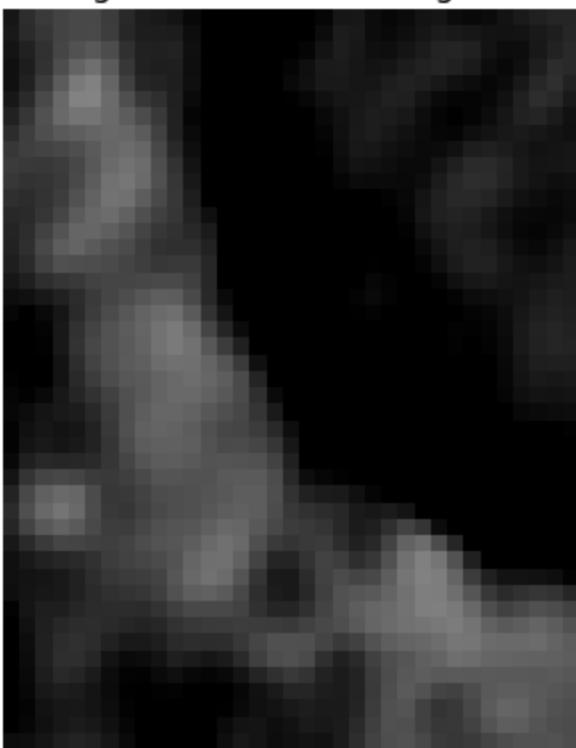


Image 2 - Width: 83, Height: 54

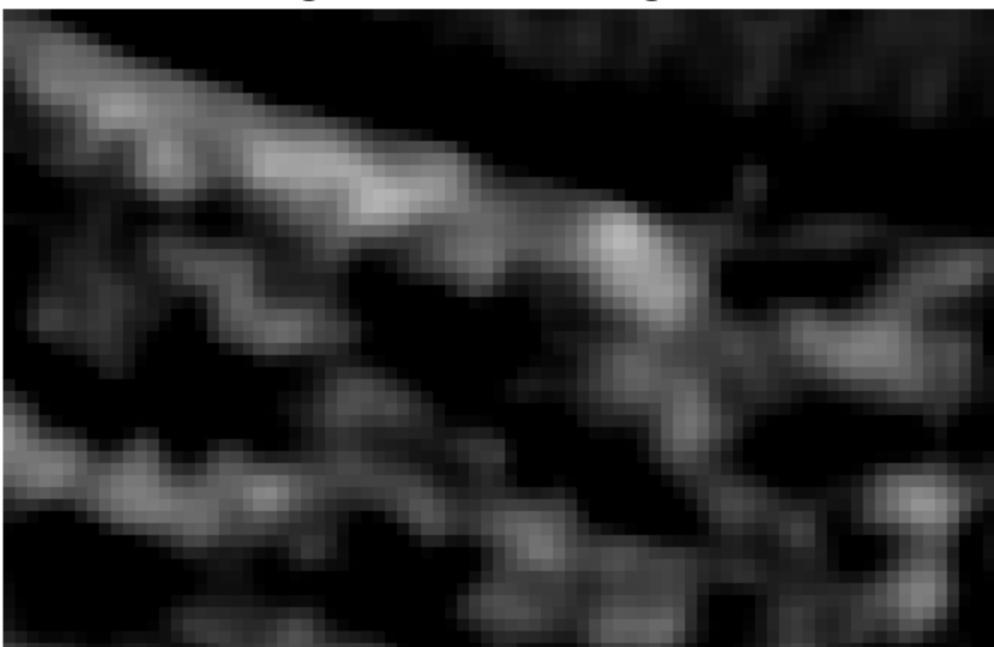


Image 2 - Width: 29, Height: 20

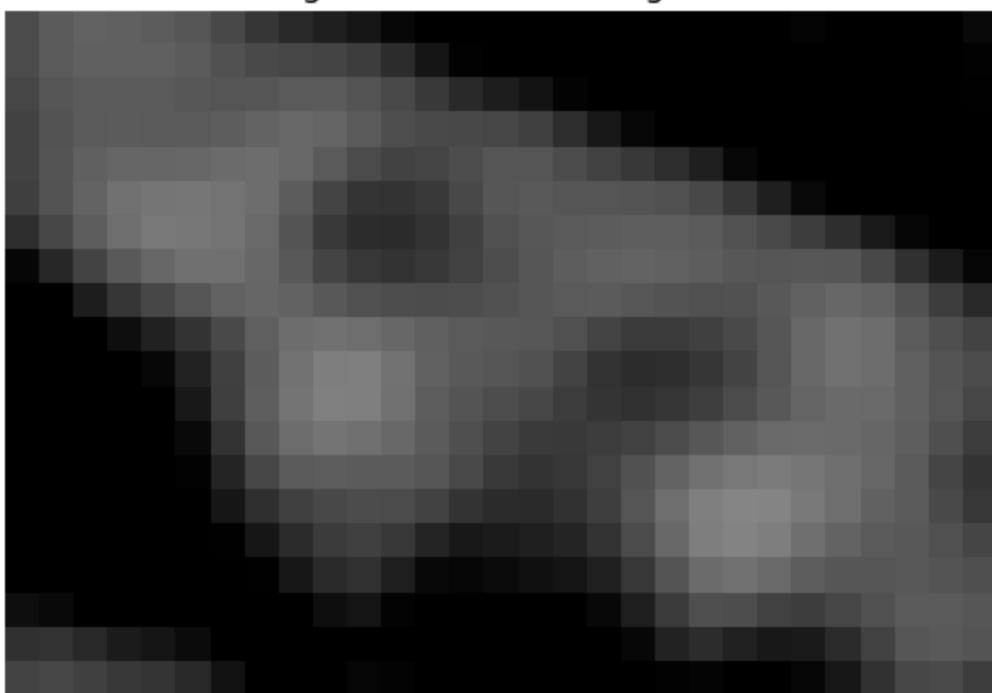


Image 2 - Width: 31, Height: 17

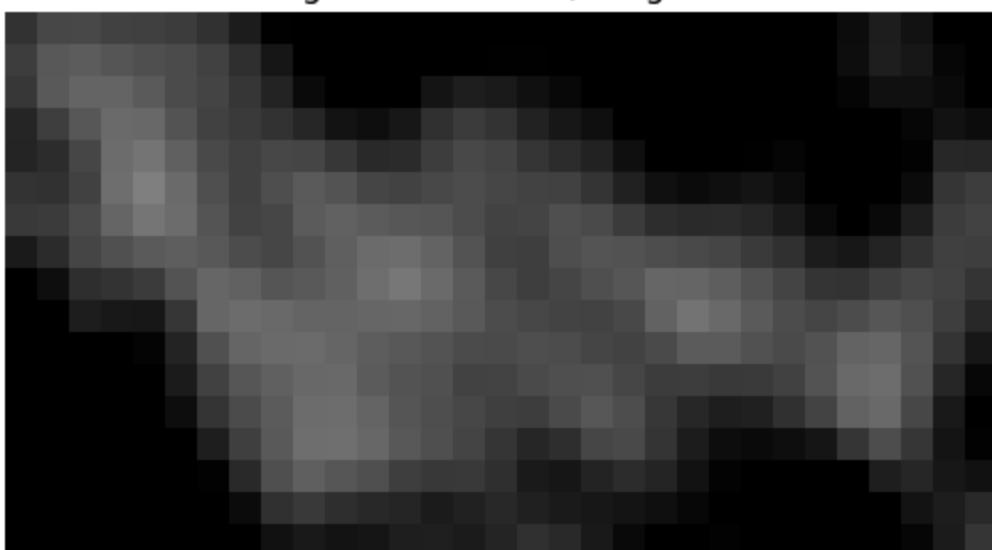


Image 2 - Width: 29, Height: 26

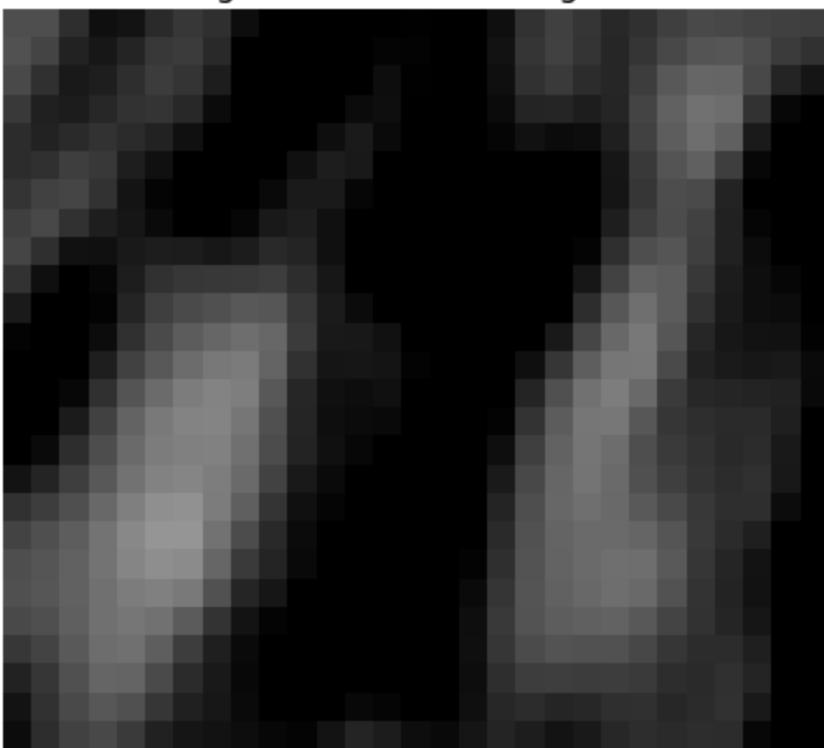


Image 2 - Width: 34, Height: 36

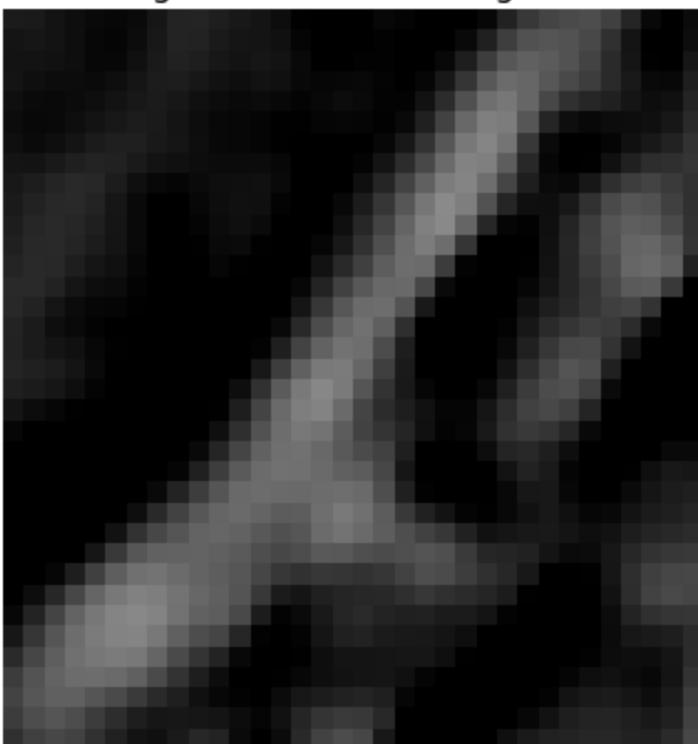


Image 2 - Width: 31, Height: 23

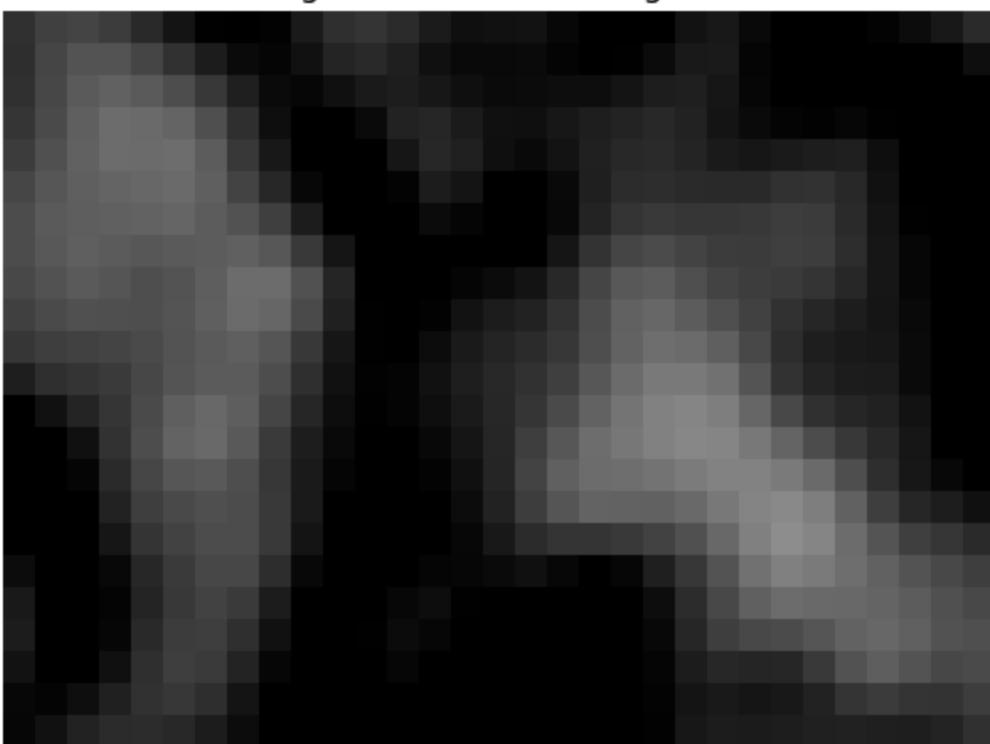


Image 2 - Width: 32, Height: 41

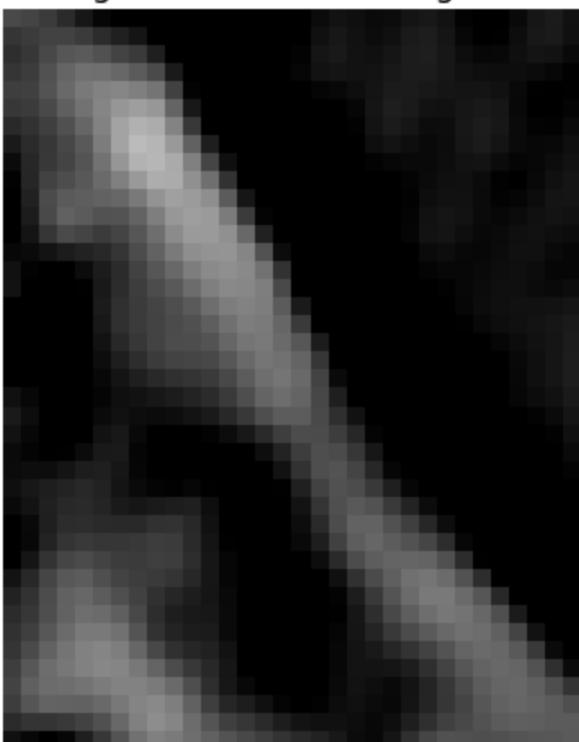


Image 2 - Width: 33, Height: 30

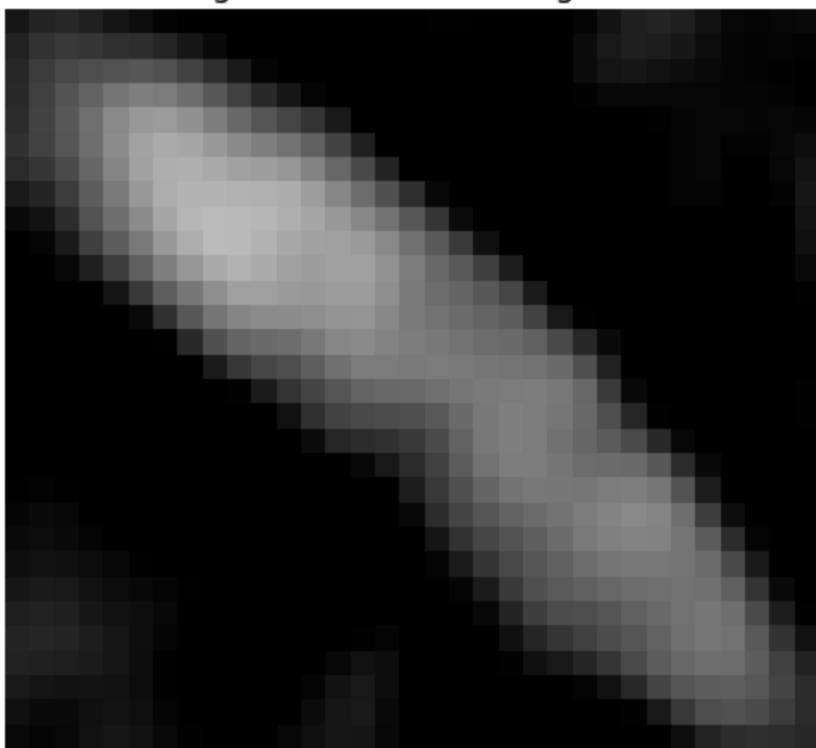


Image 2 - Width: 35, Height: 30

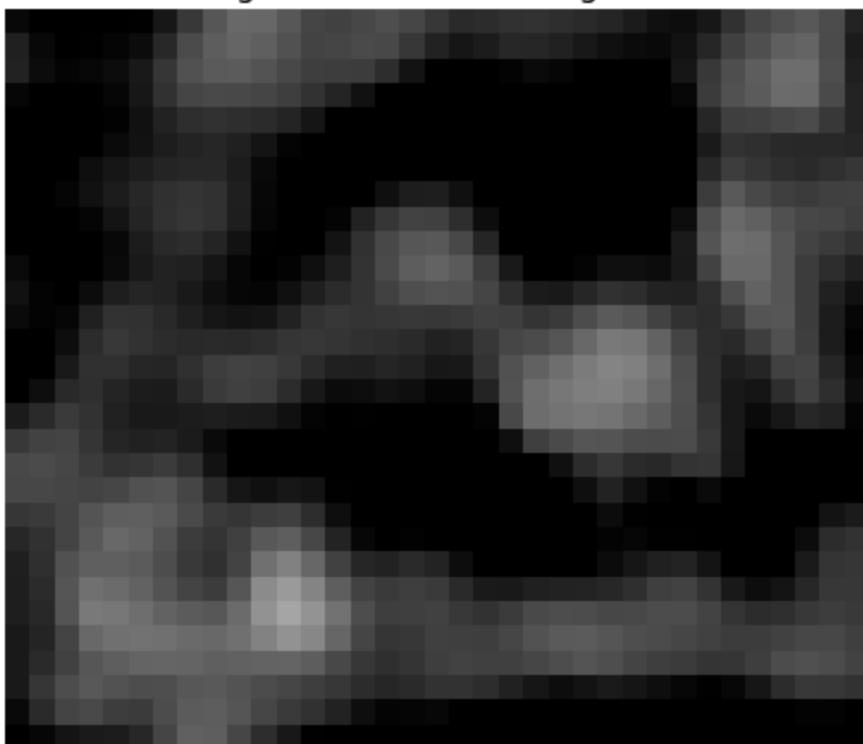


Image 2 - Width: 96, Height: 74

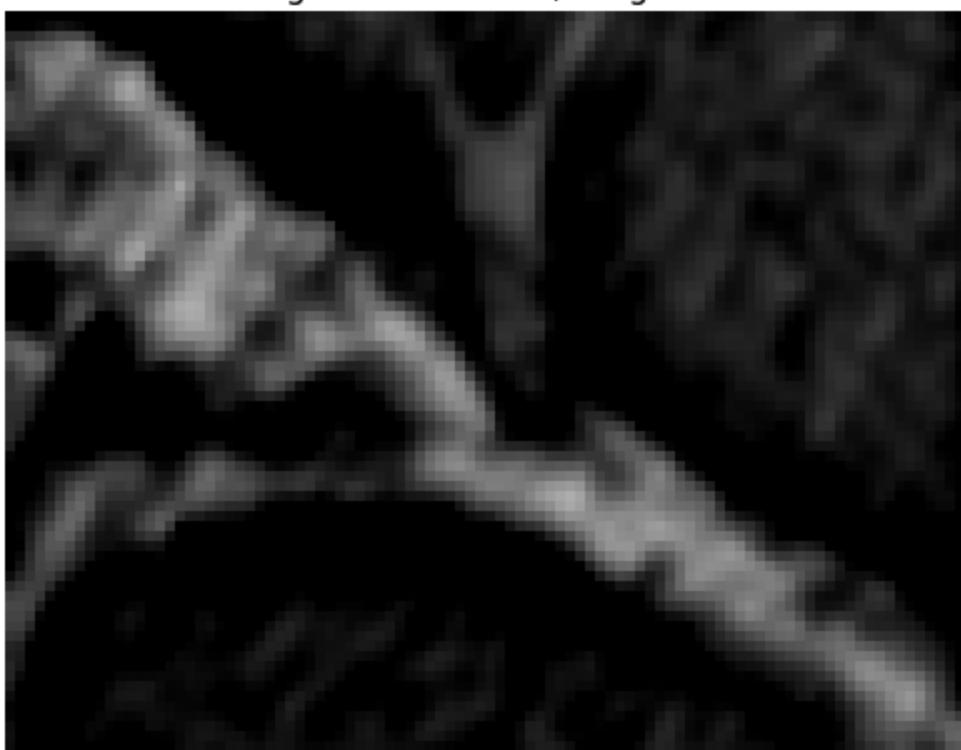


Image 2 - Width: 23, Height: 43

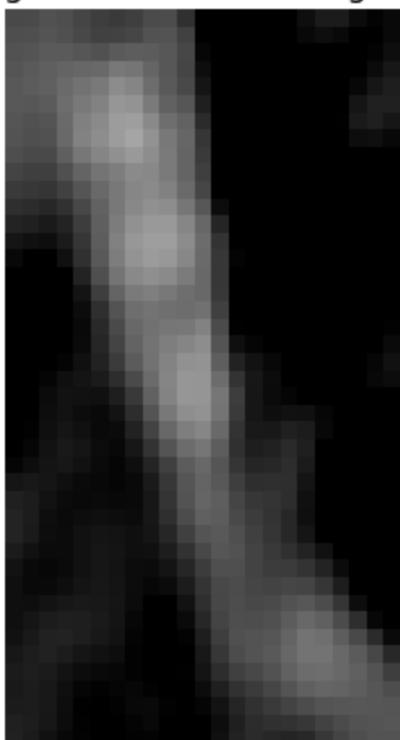


Image 2 - Width: 21, Height: 25

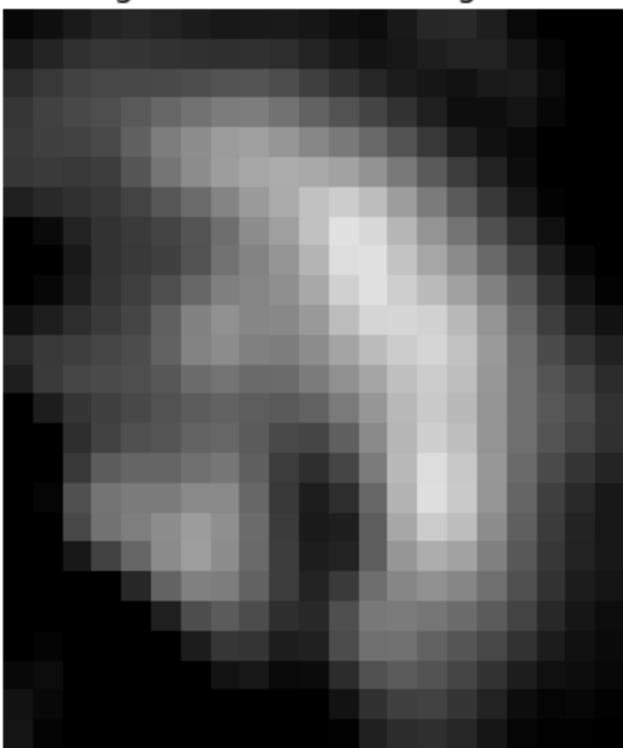


Image 2 - Width: 85, Height: 71

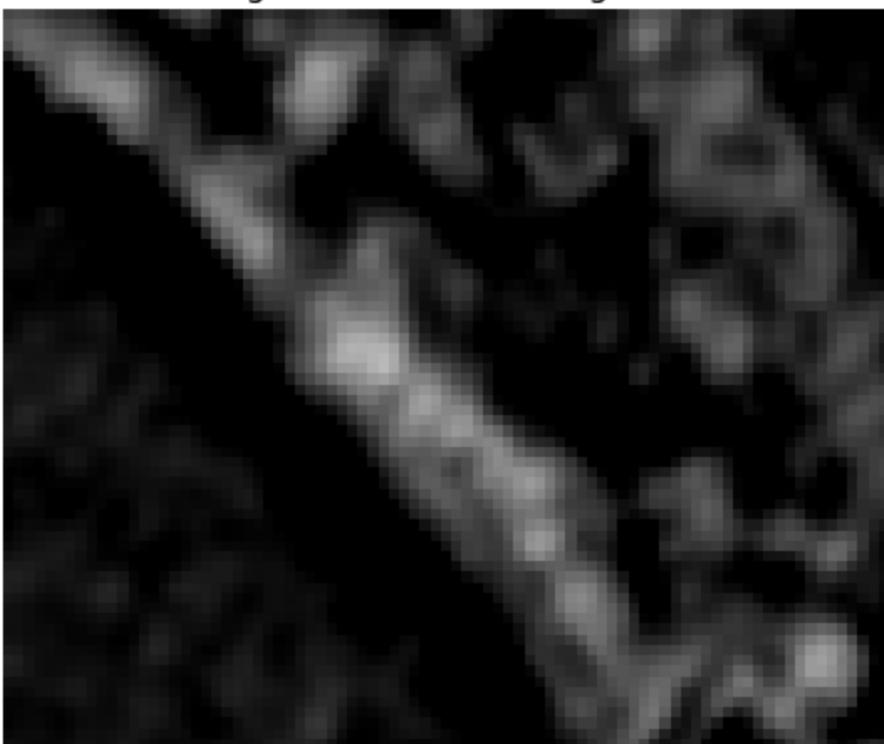


Image 2 - Width: 20, Height: 34

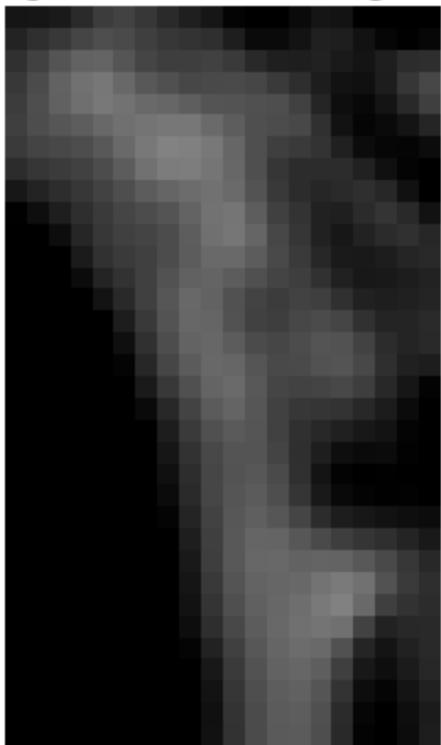


Image 2 - Width: 51, Height: 52

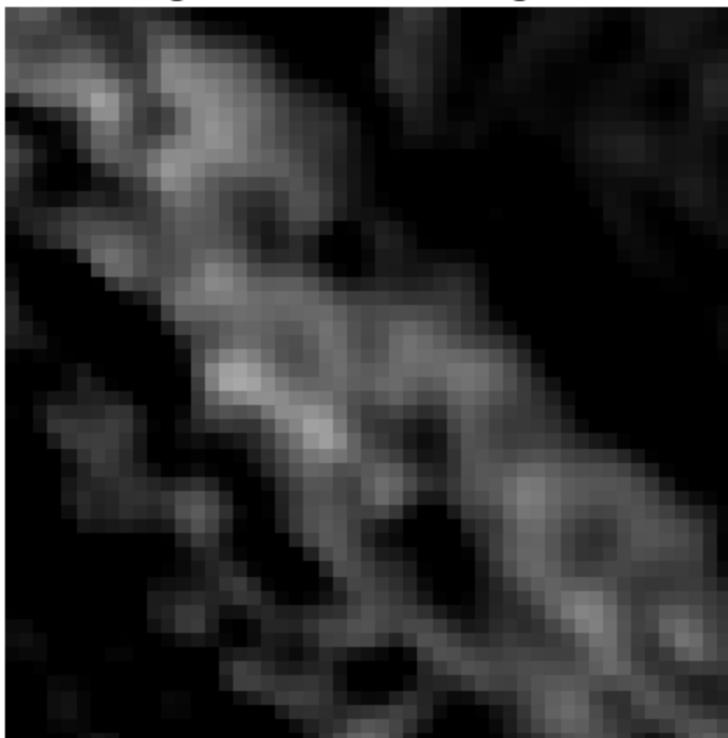


Image 2 - Width: 25, Height: 28

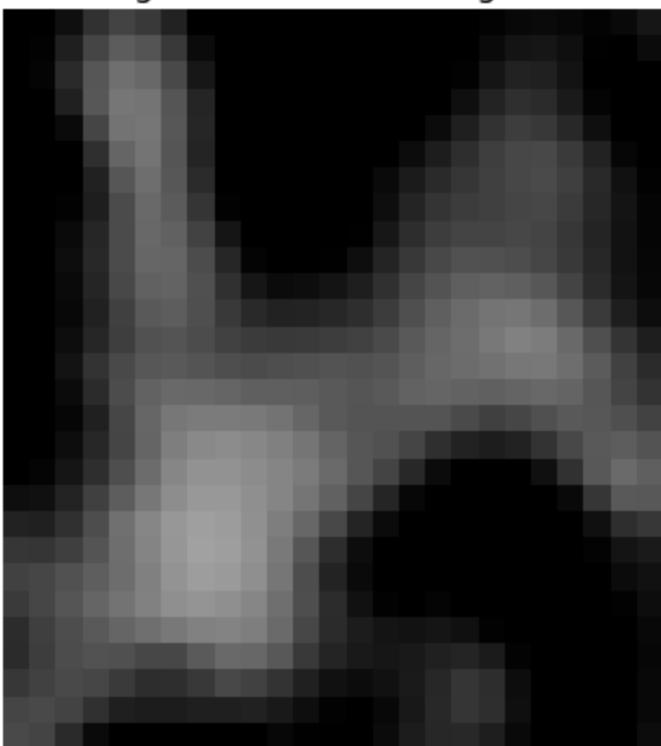


Image 2 - Width: 51, Height: 38

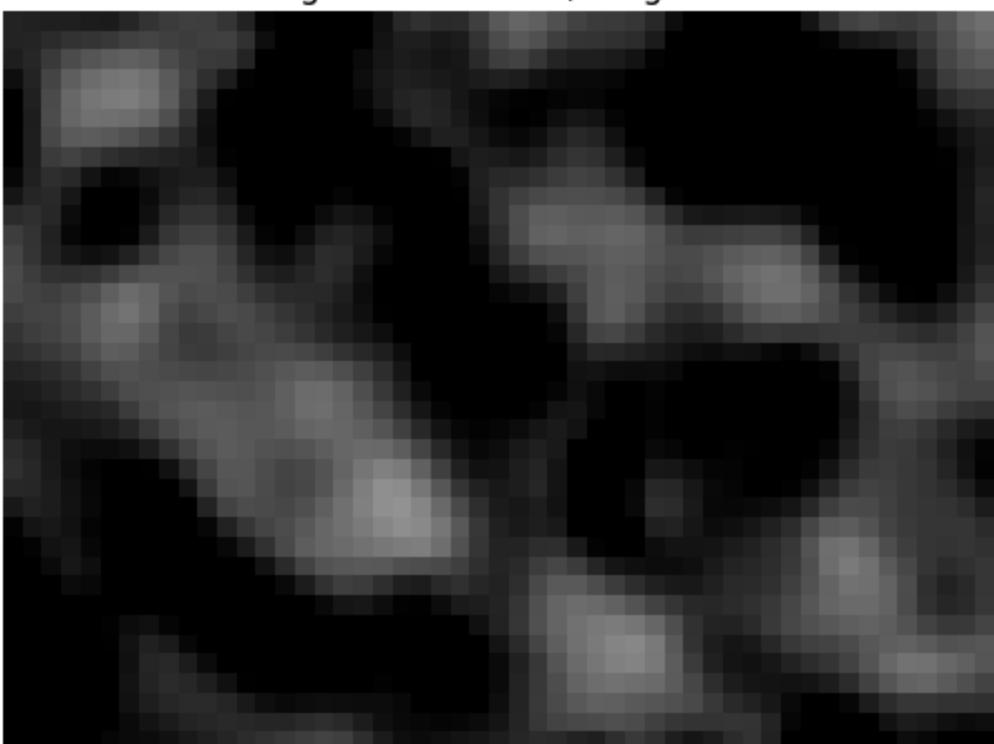


Image 2 - Width: 34, Height: 27

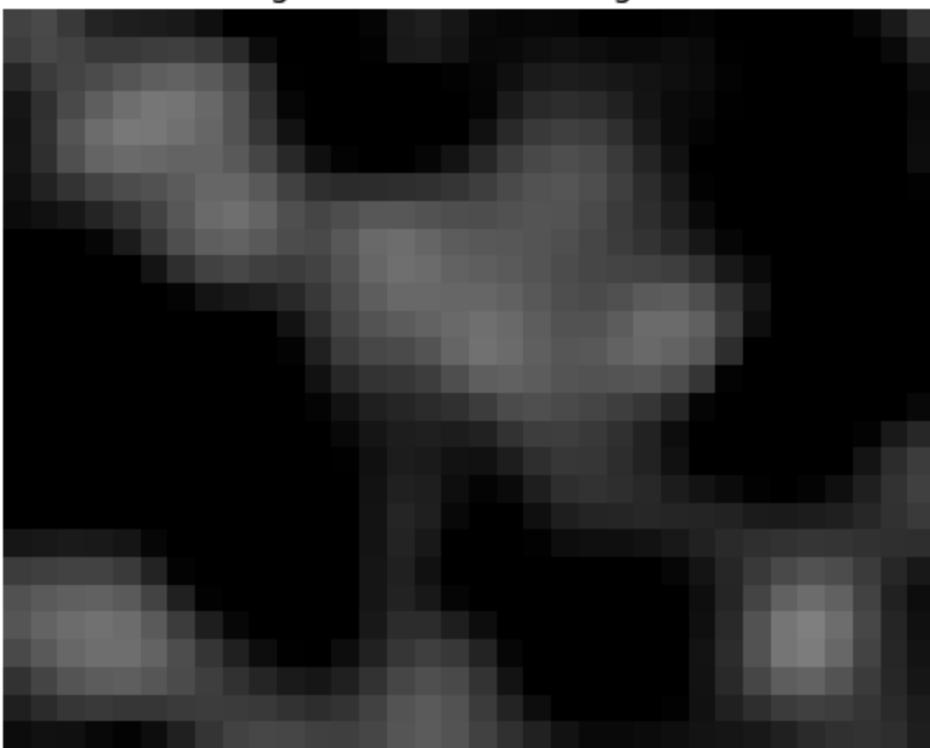


Image 2 - Width: 25, Height: 15

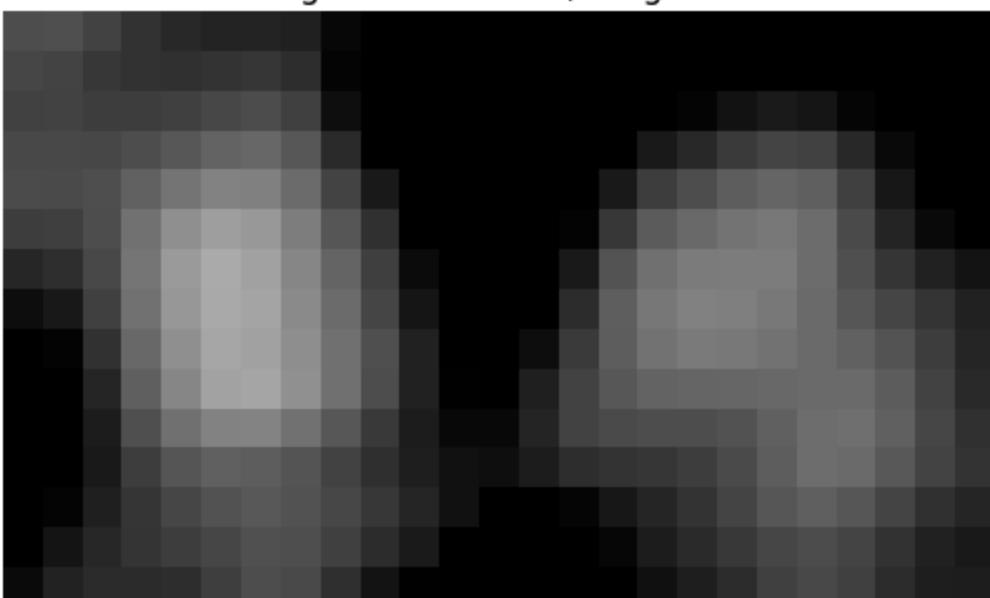


Image 2 - Width: 19, Height: 33

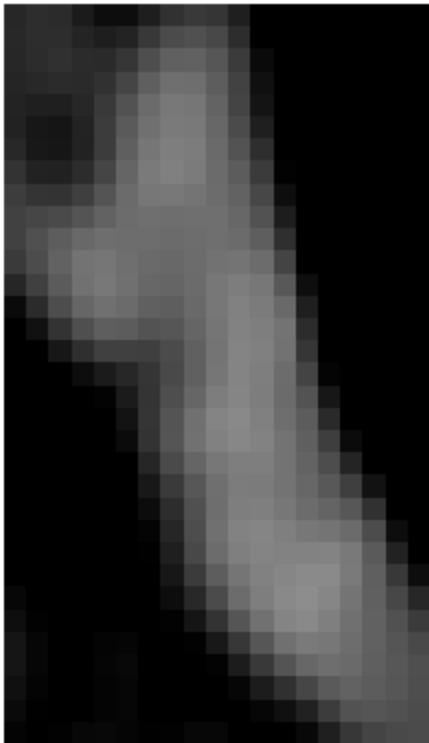


Image 2 - Width: 31, Height: 47

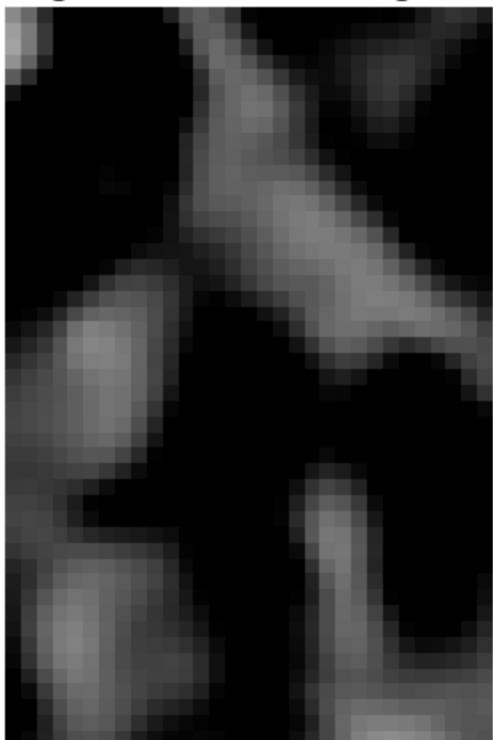


Image 2 - Width: 186, Height: 87

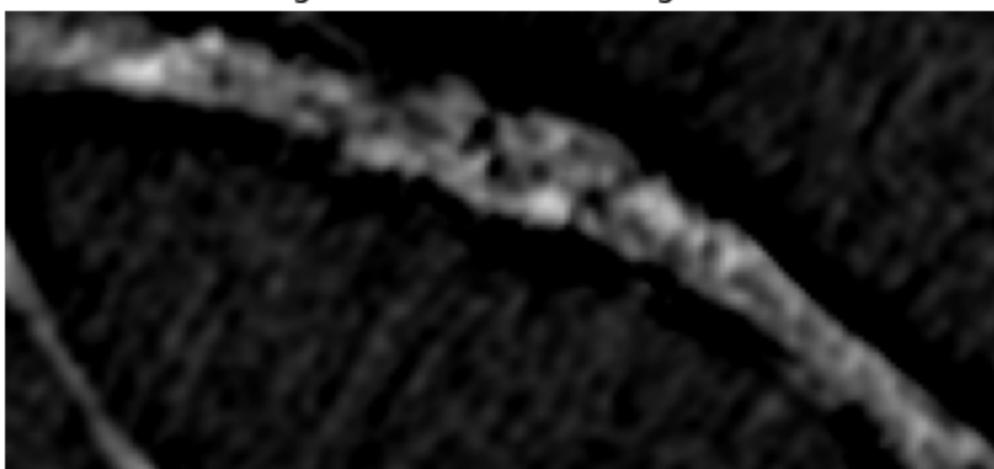


Image 2 - Width: 41, Height: 44



Image 2 - Width: 59, Height: 102

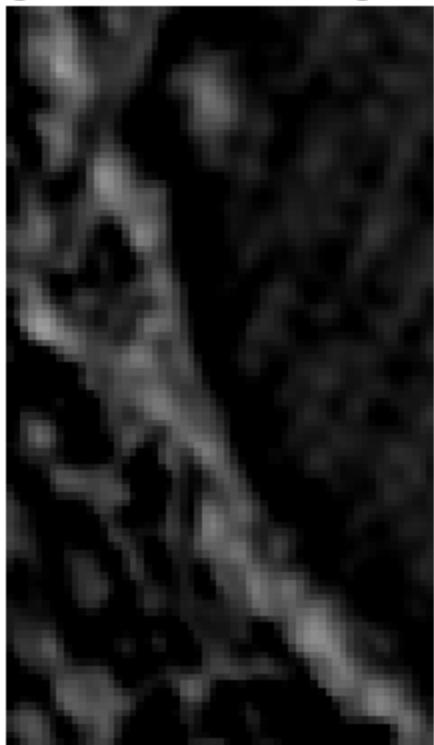


Image 2 - Width: 28, Height: 63

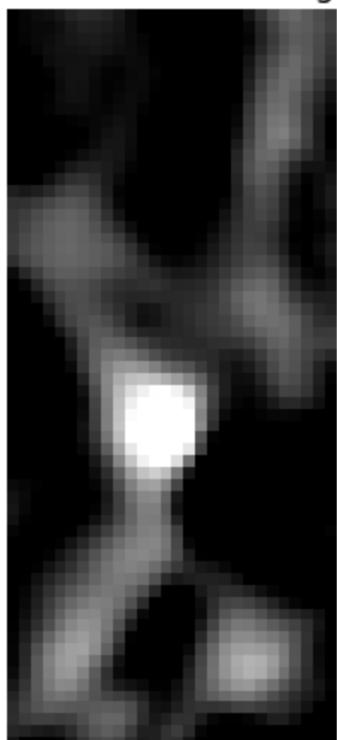


Image 2 - Width: 17, Height: 36

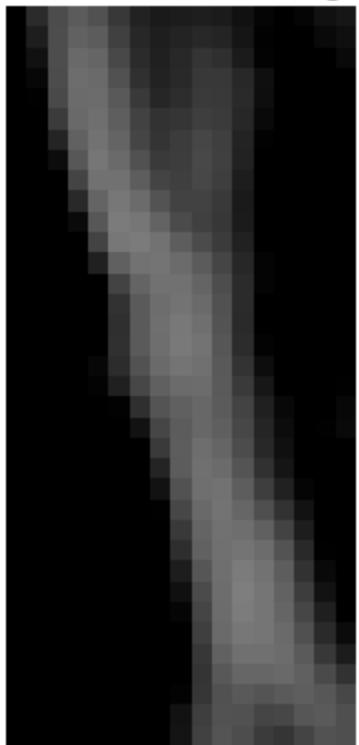


Image 2 - Width: 24, Height: 43

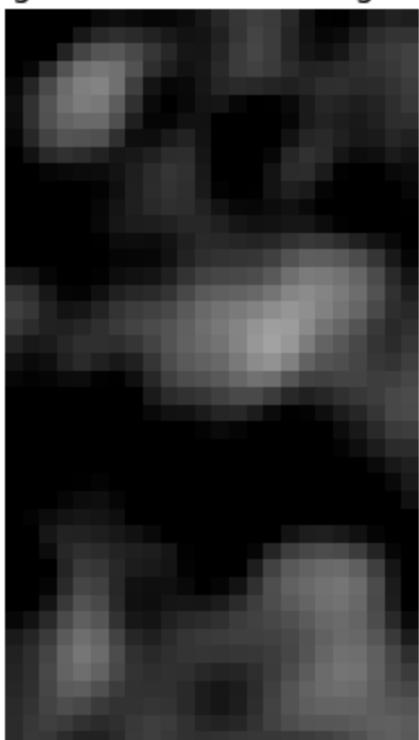


Image 2 - Width: 70, Height: 59

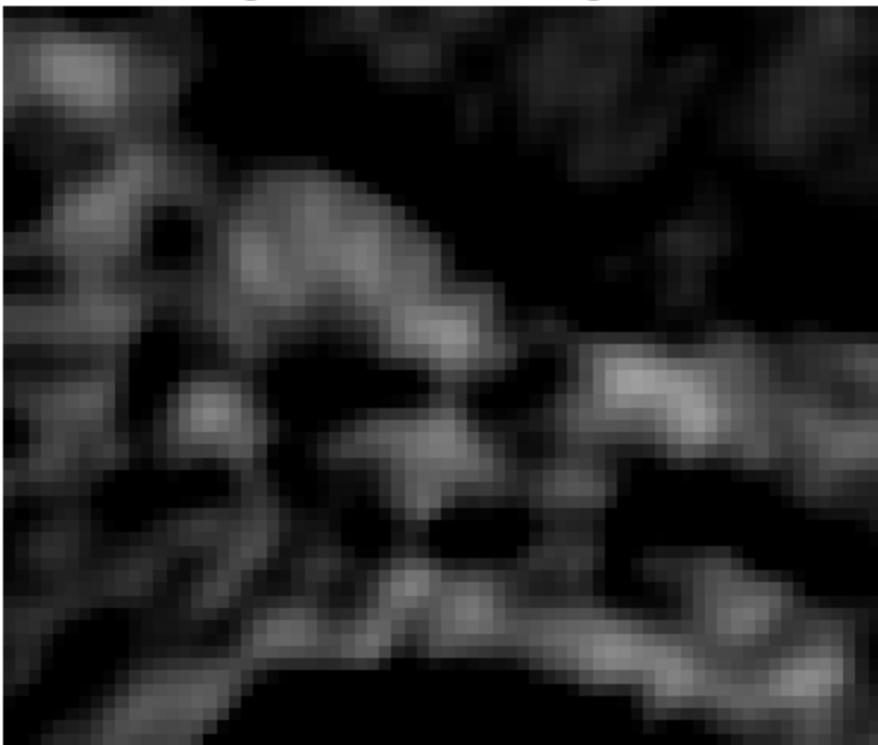


Image 2 - Width: 42, Height: 64

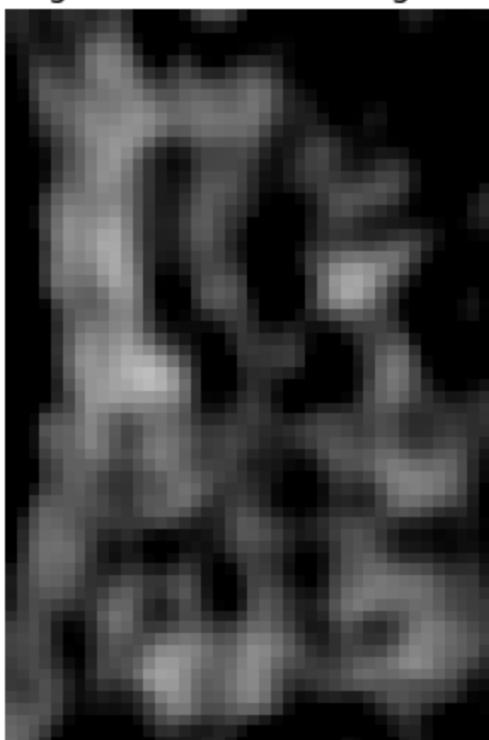


Image 2 - Width: 32, Height: 40

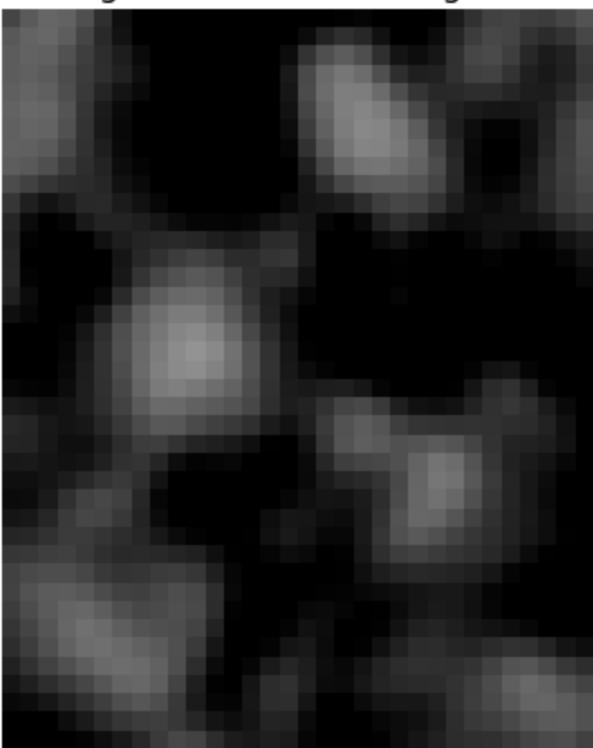


Image 2 - Width: 20, Height: 26

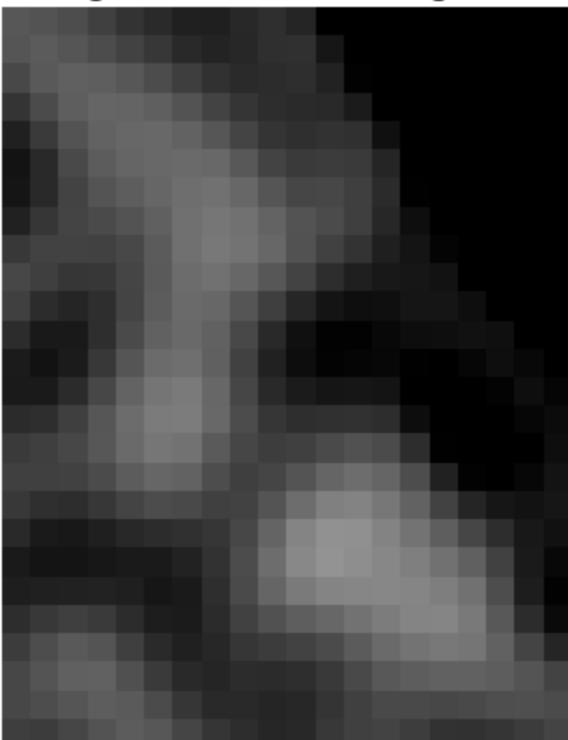


Image 2 - Width: 30, Height: 35

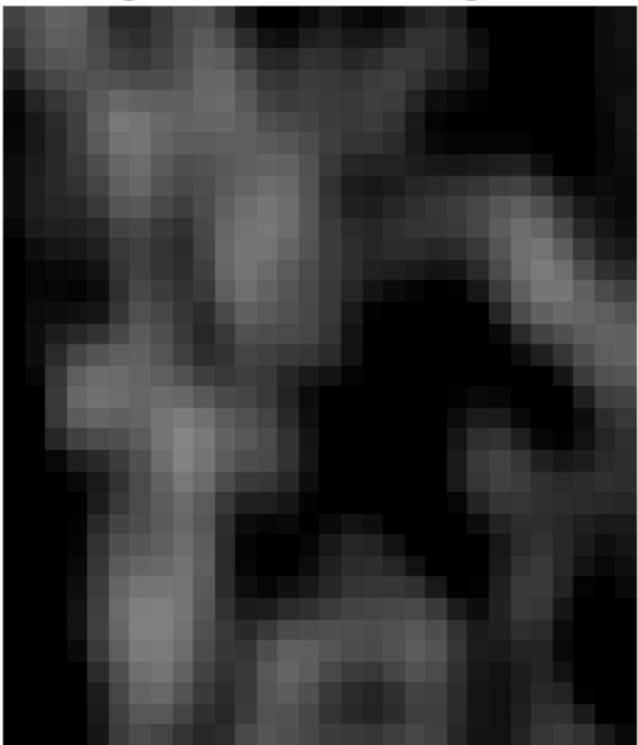


Image 2 - Width: 16, Height: 31

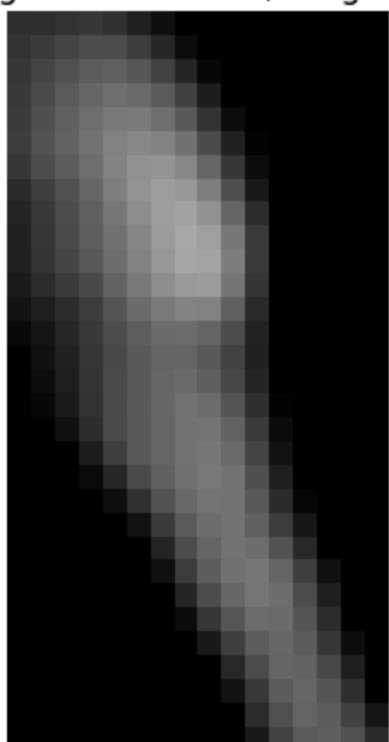


Image 2 - Width: 32, Height: 17

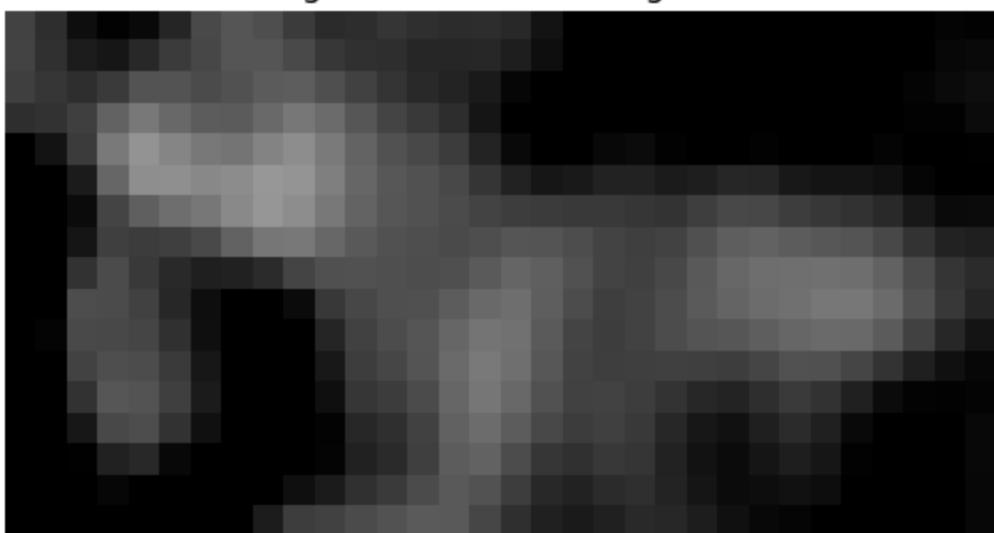


Image 2 - Width: 29, Height: 41

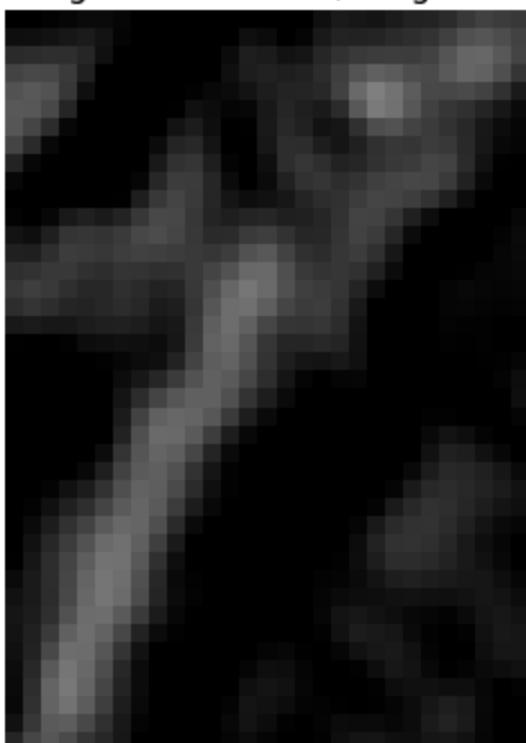


Image 2 - Width: 35, Height: 58

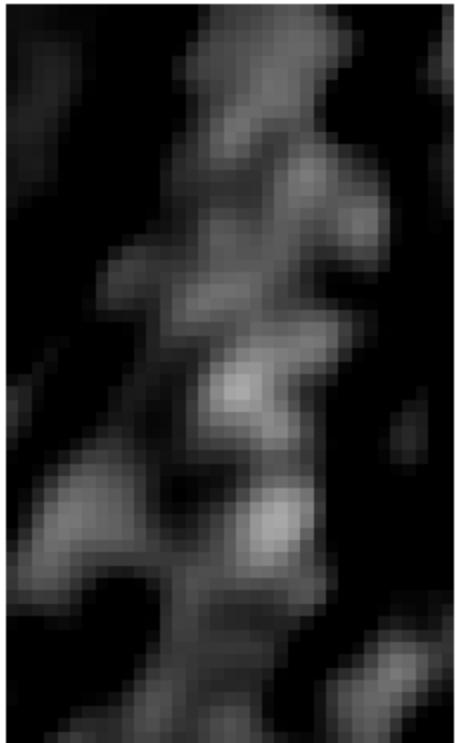


Image 2 - Width: 158, Height: 209

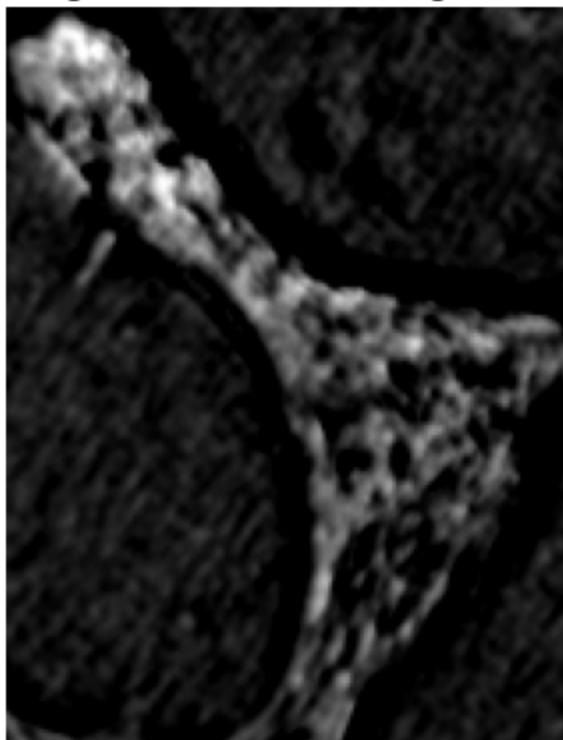


Image 2 - Width: 37, Height: 44

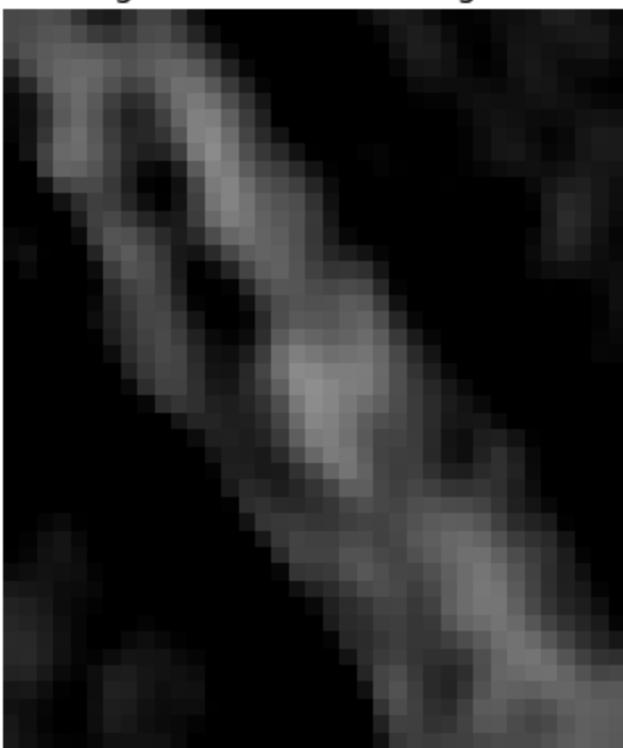


Image 2 - Width: 29, Height: 28

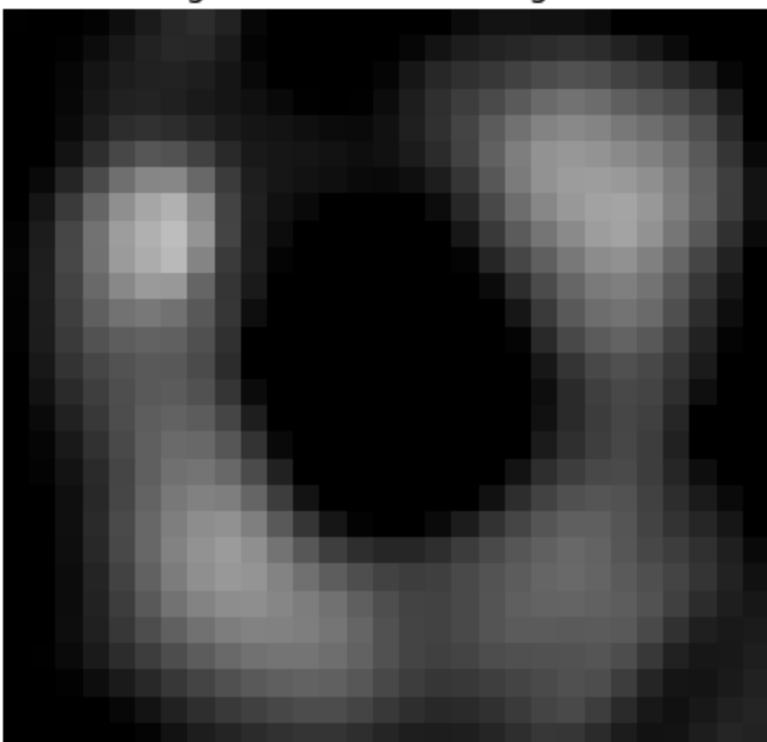


Image 2 - Width: 30, Height: 27

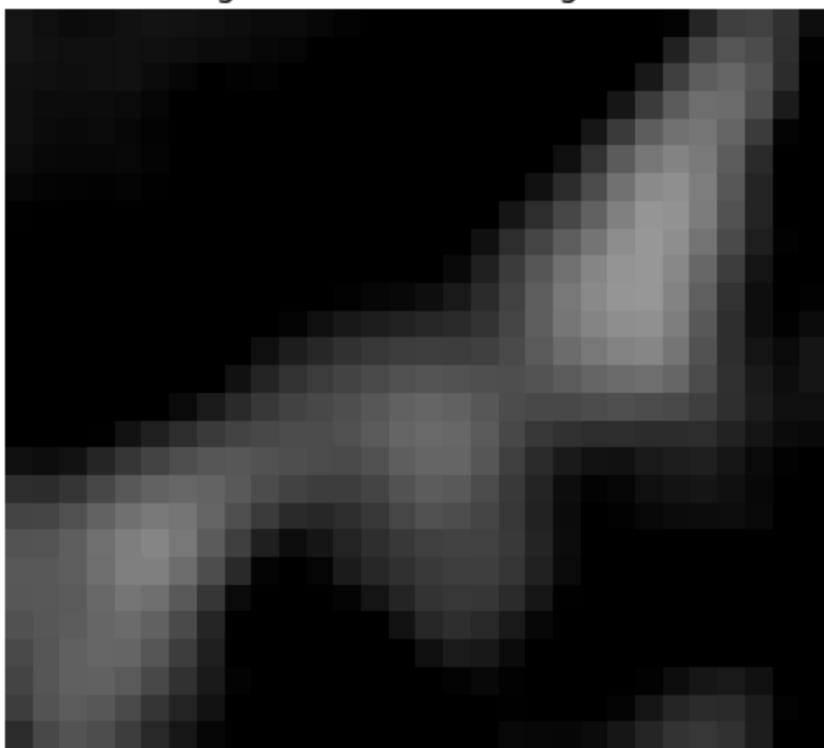


Image 2 - Width: 25, Height: 24

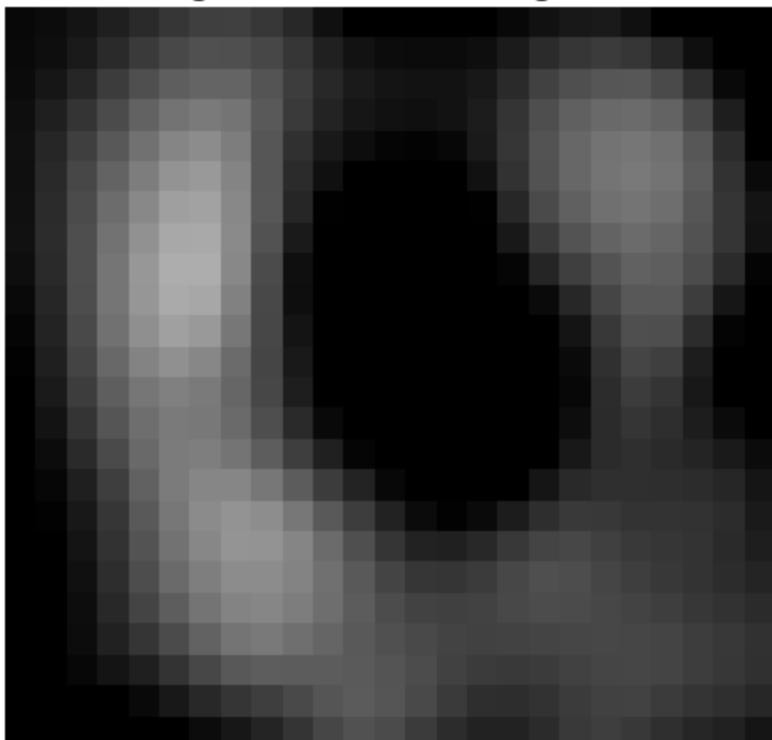


Image 2 - Width: 21, Height: 34

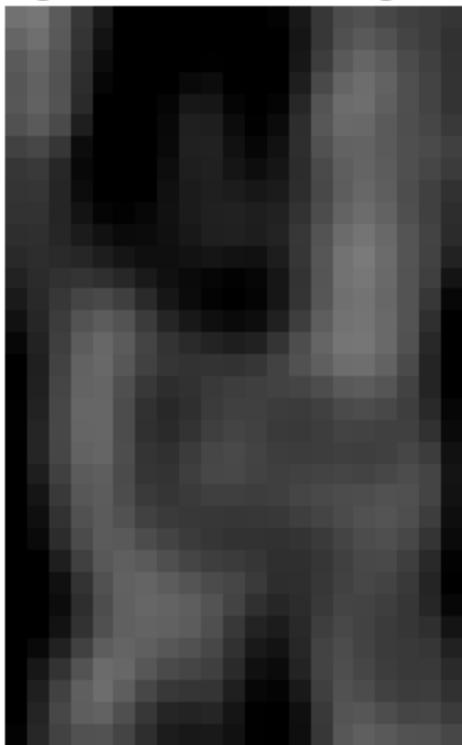


Image 2 - Width: 44, Height: 72

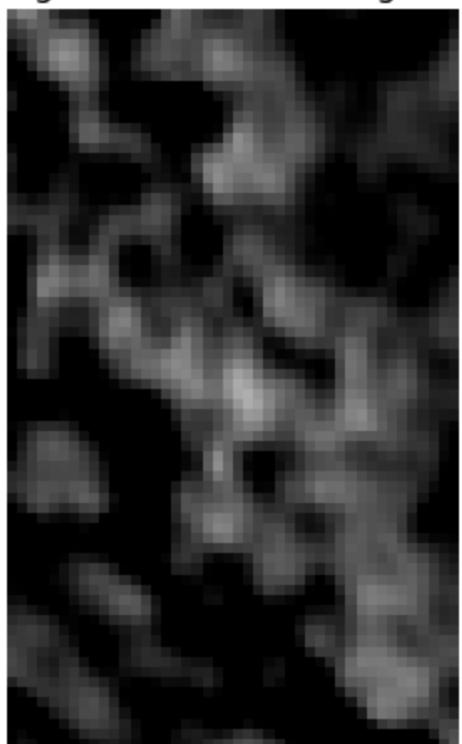


Image 2 - Width: 18, Height: 30

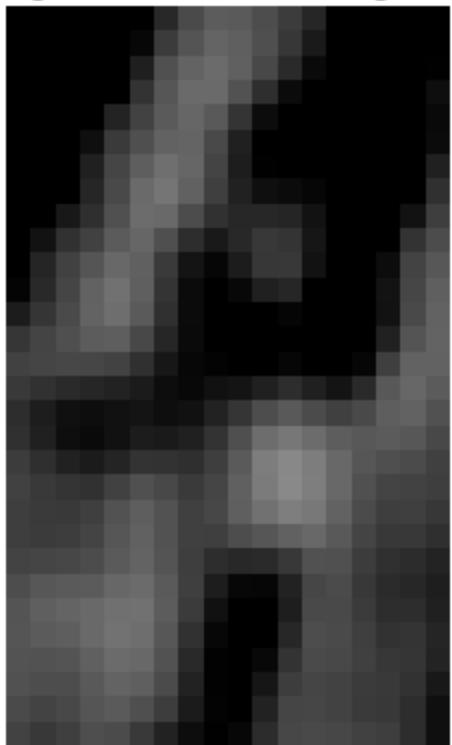


Image 2 - Width: 45, Height: 34

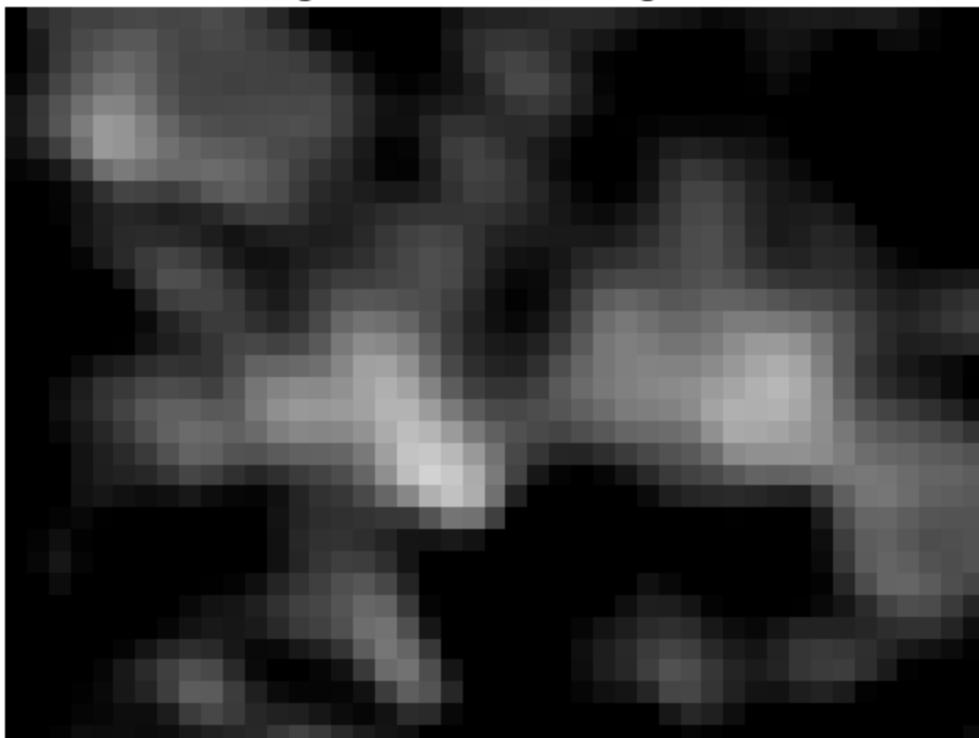


Image 2 - Width: 81, Height: 139

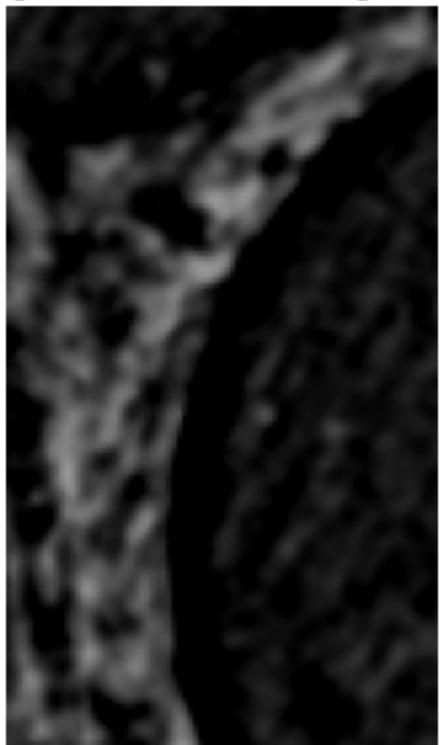


Image 2 - Width: 41, Height: 37

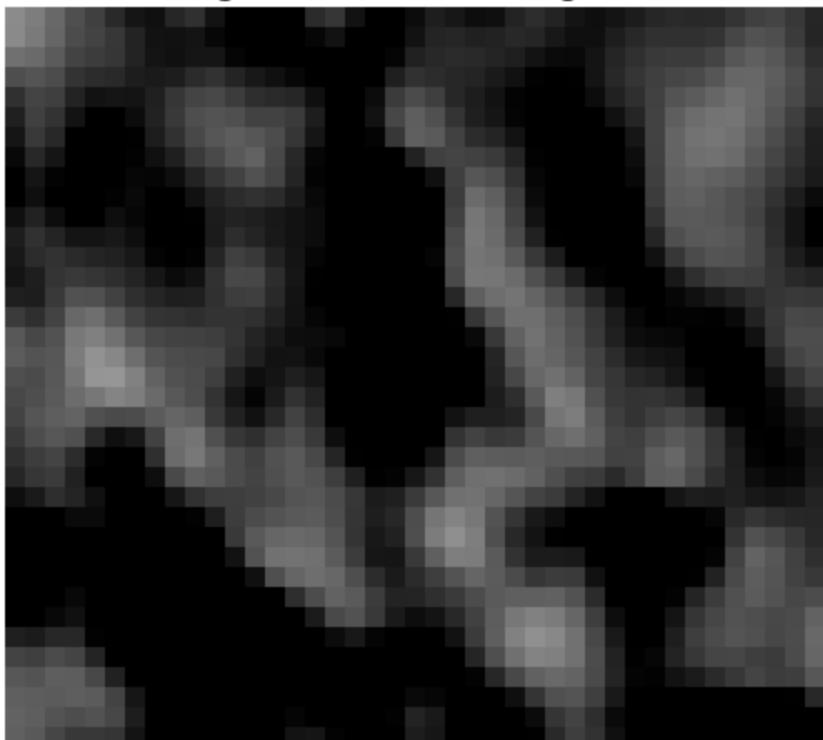


Image 2 - Width: 29, Height: 24

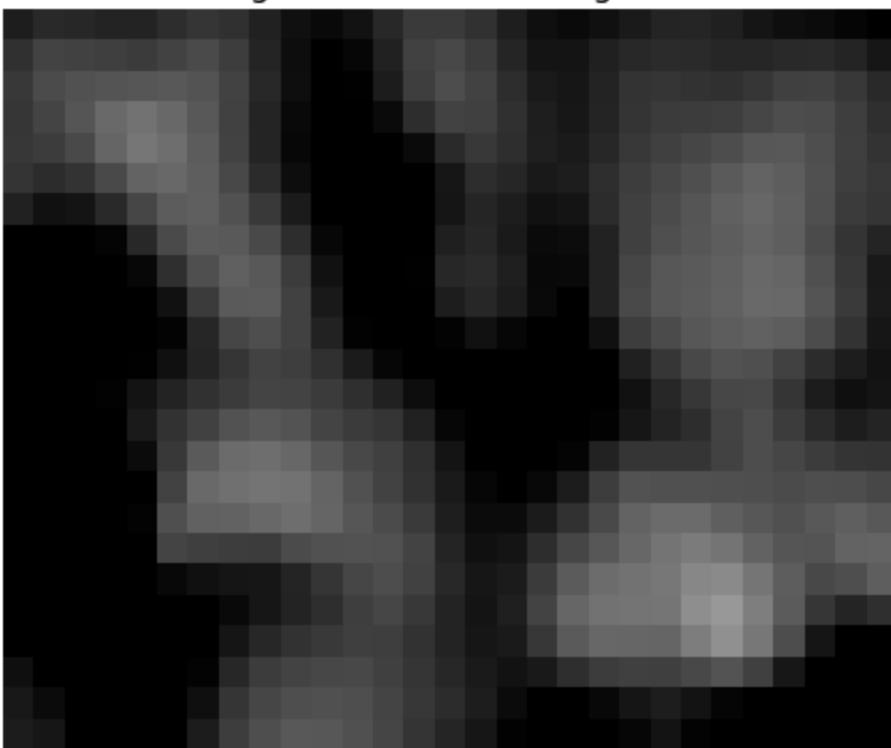


Image 2 - Width: 41, Height: 57

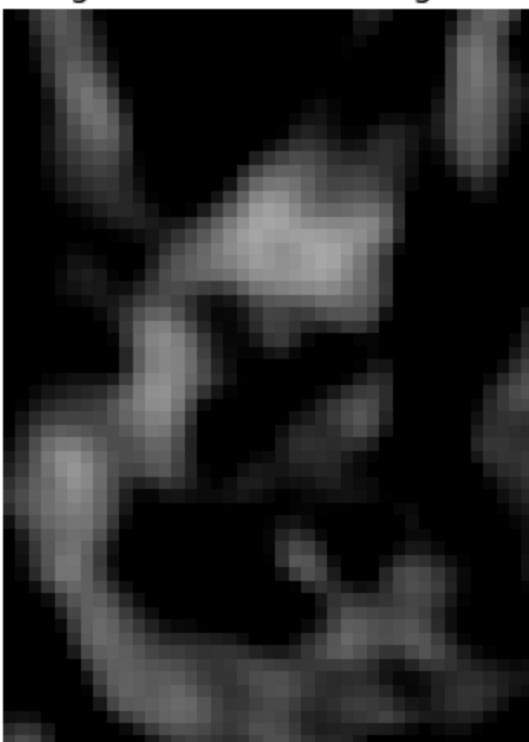


Image 2 - Width: 252, Height: 149

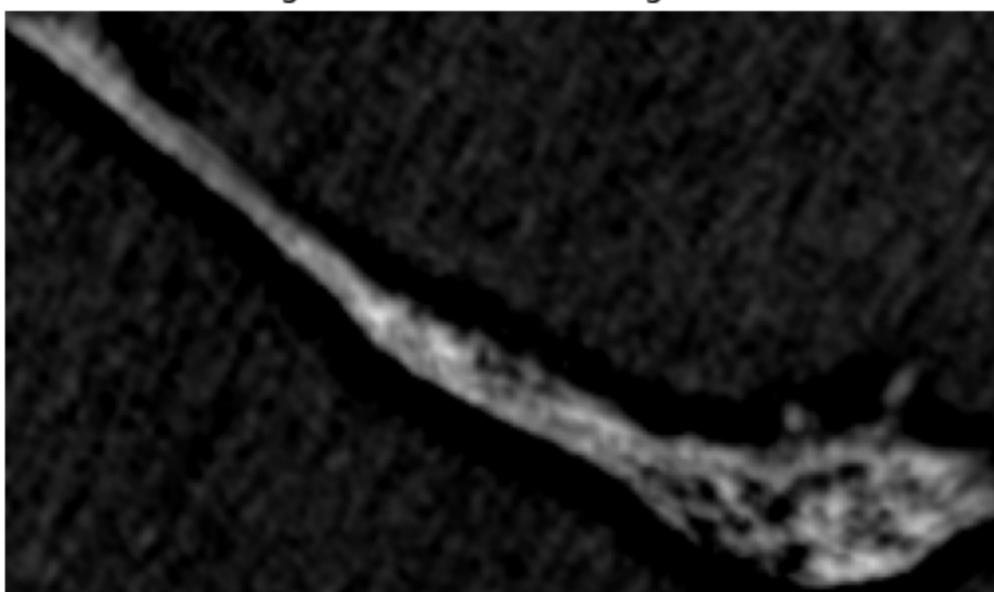


Image 2 - Width: 37, Height: 61

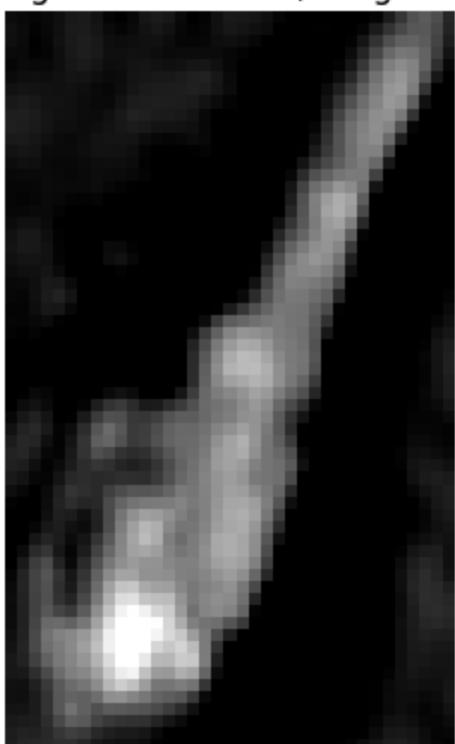


Image 2 - Width: 16, Height: 42

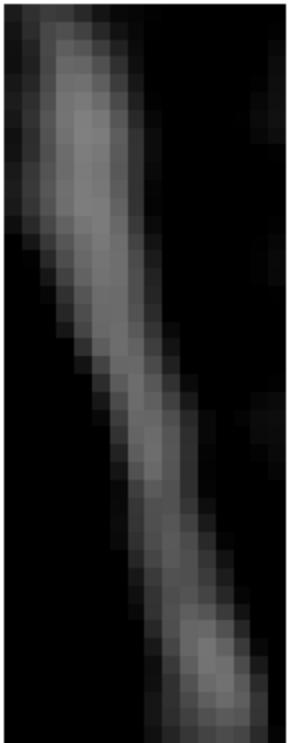


Image 2 - Width: 26, Height: 59

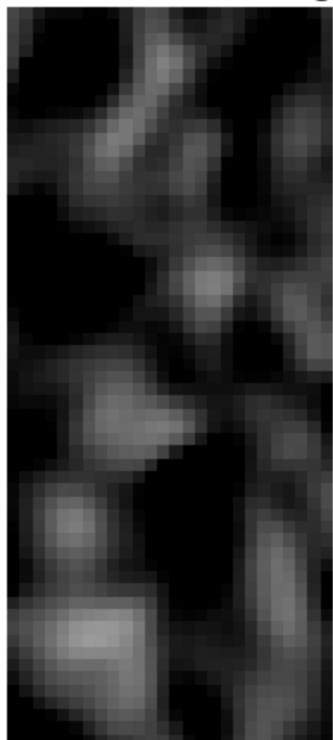


Image 2 - Width: 32, Height: 29

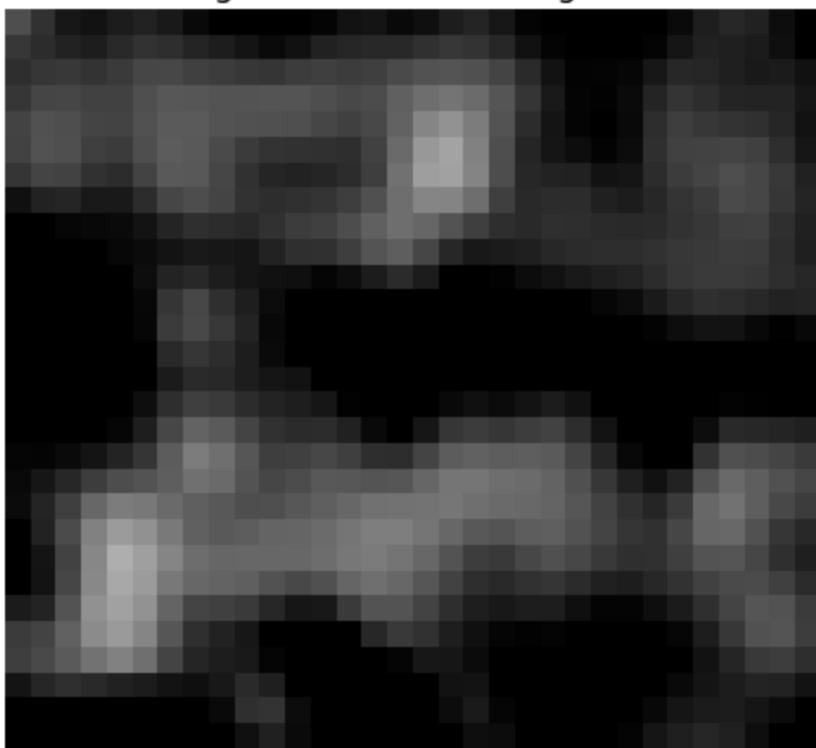


Image 2 - Width: 17, Height: 42

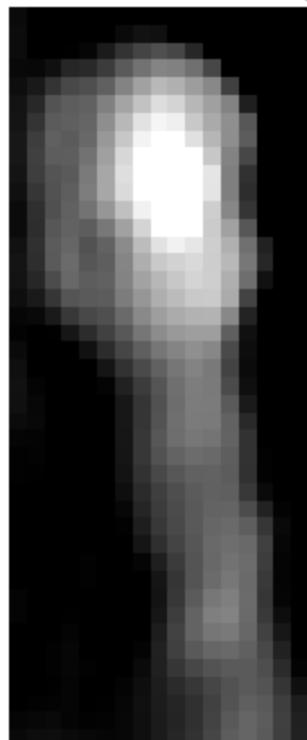


Image 2 - Width: 29, Height: 51

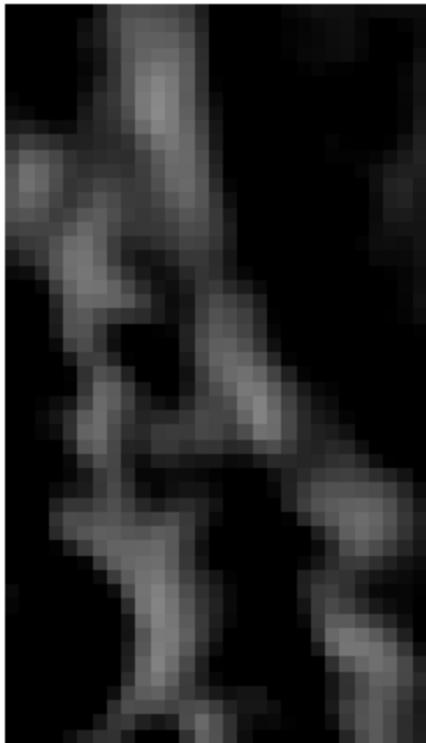


Image 2 - Width: 37, Height: 32

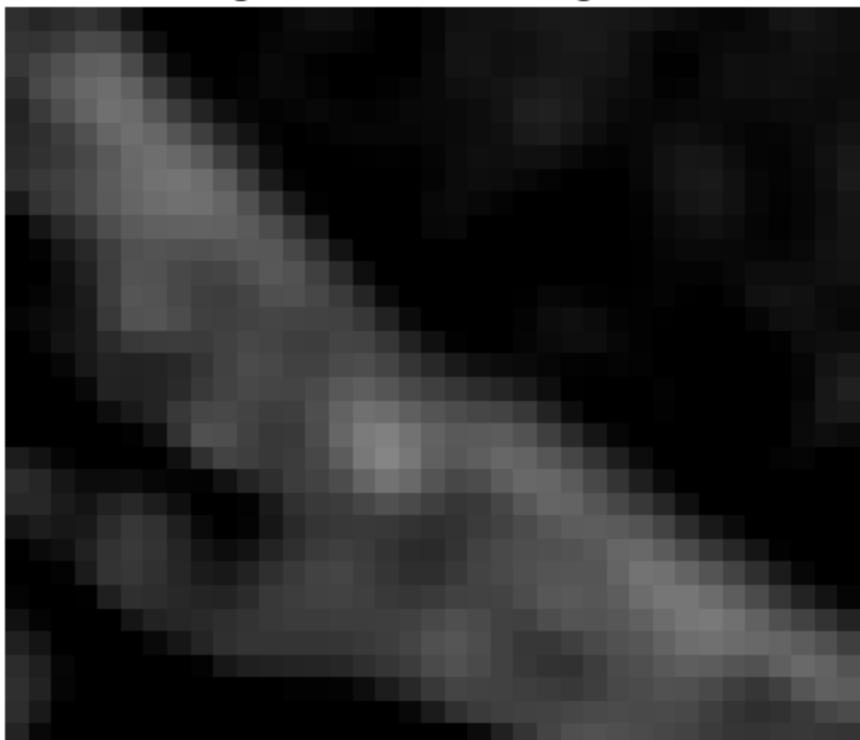


Image 2 - Width: 15, Height: 47

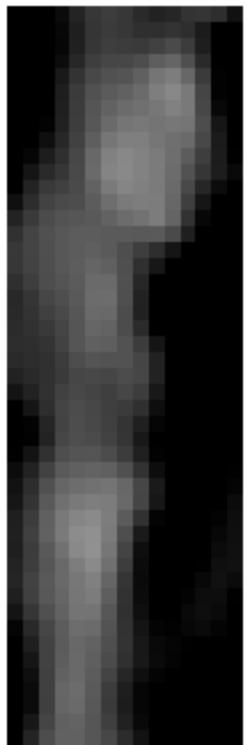


Image 2 - Width: 22, Height: 41

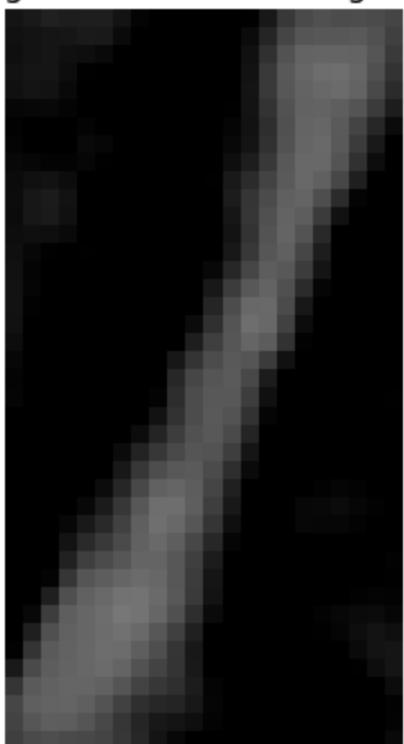


Image 2 - Width: 44, Height: 43

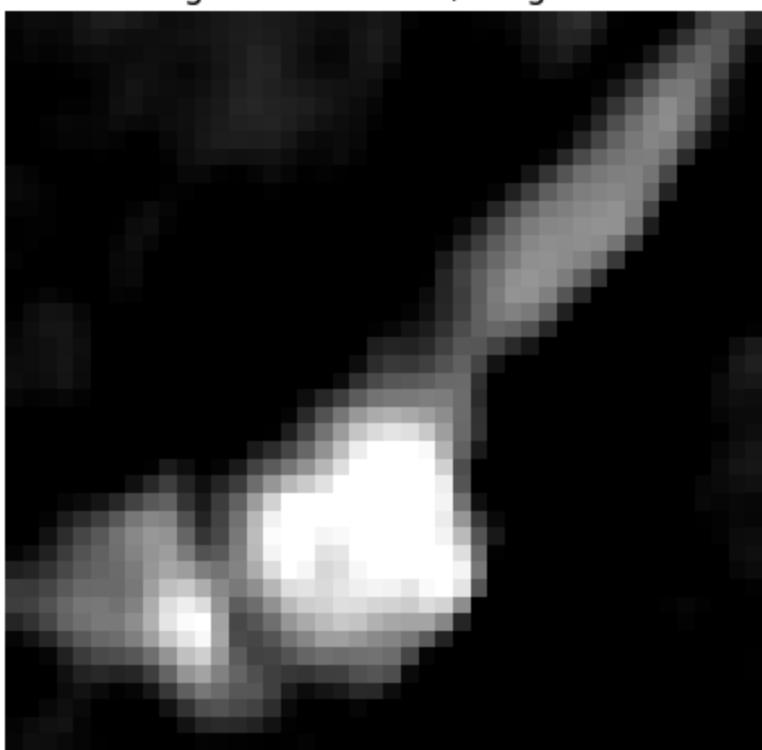


Image 2 - Width: 17, Height: 32

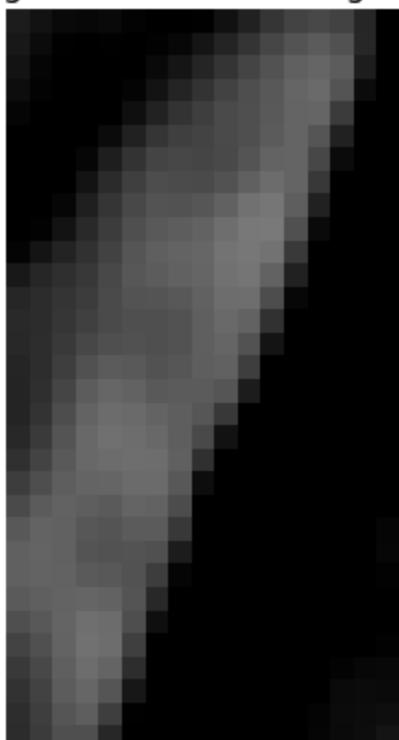


Image 2 - Width: 71, Height: 145

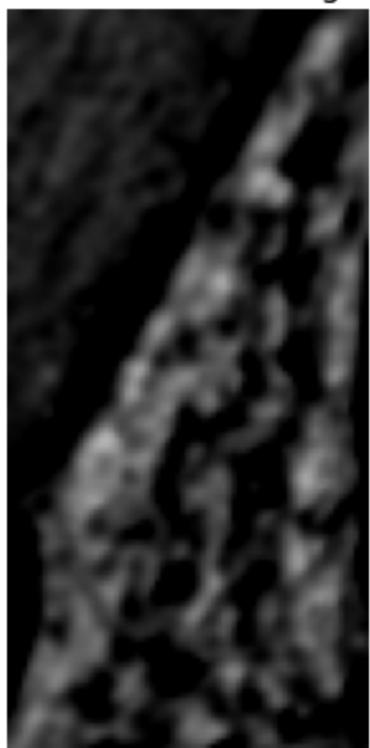


Image 2 - Width: 26, Height: 108

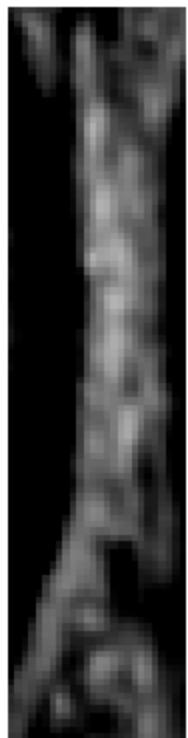


Image 2 - Width: 24, Height: 46

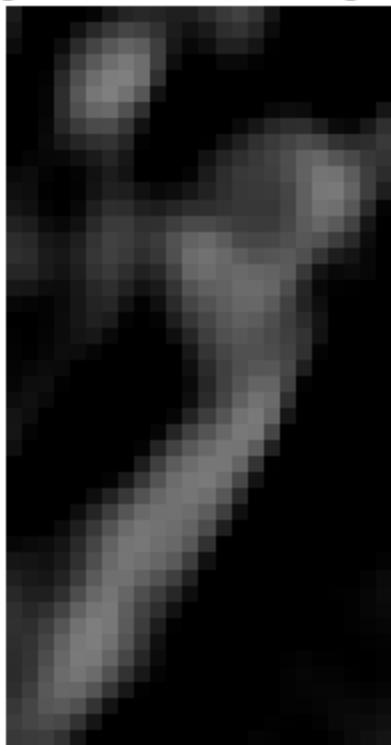


Image 2 - Width: 32, Height: 29

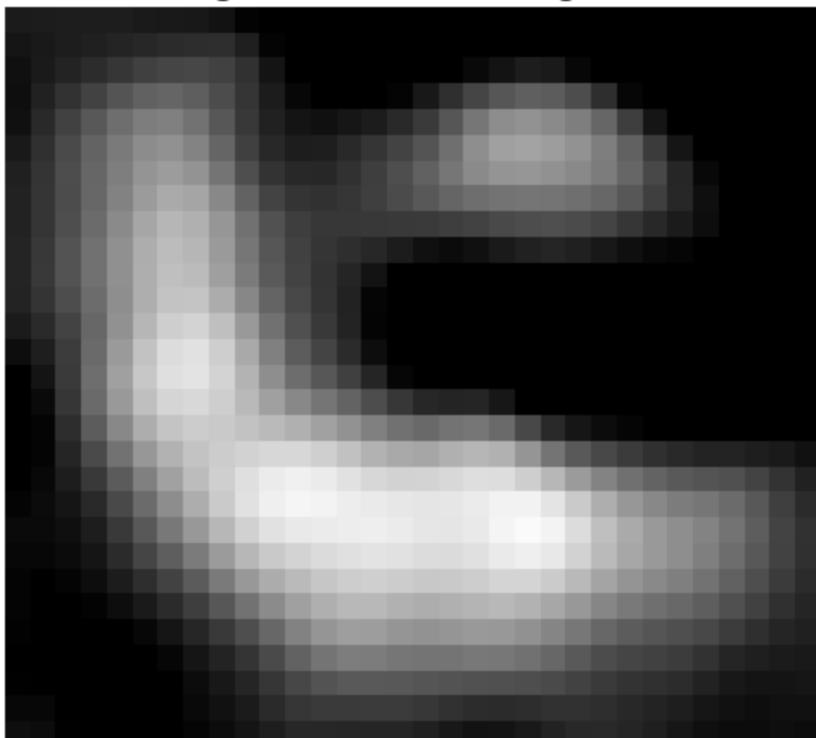


Image 2 - Width: 23, Height: 28

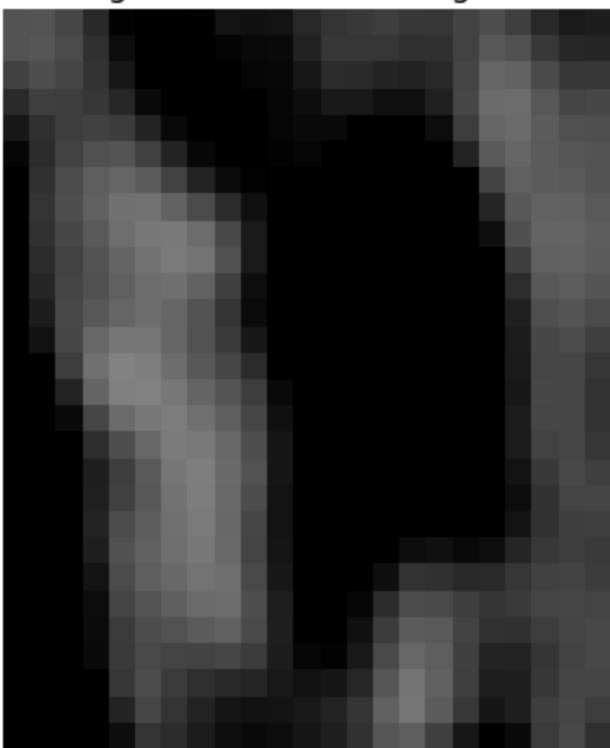


Image 2 - Width: 27, Height: 26

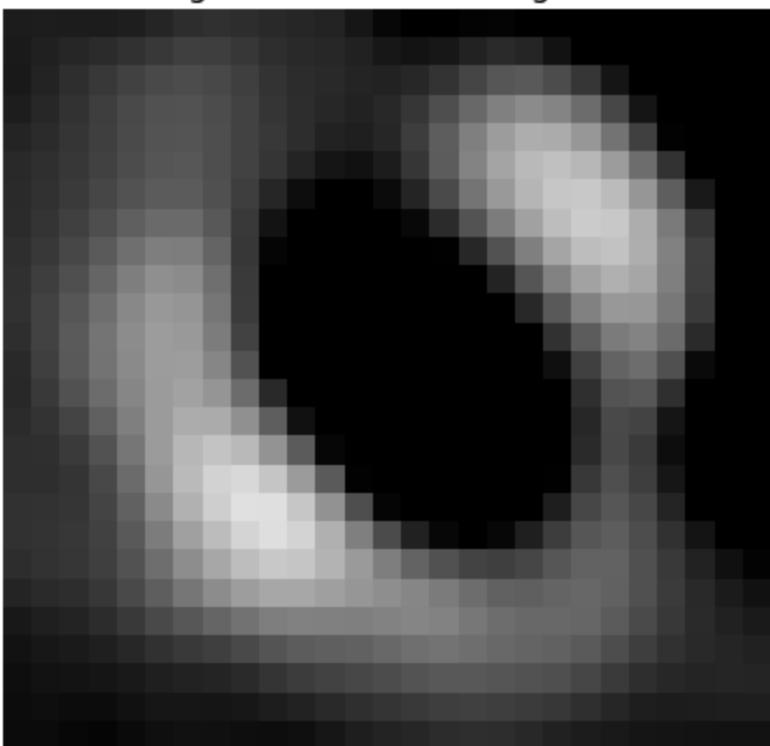


Image 2 - Width: 58, Height: 128

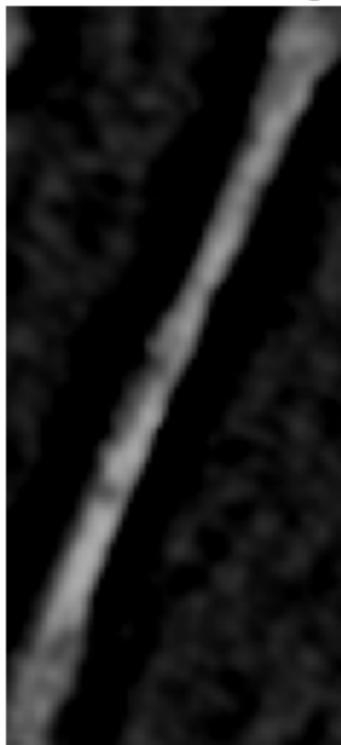


Image 2 - Width: 41, Height: 28

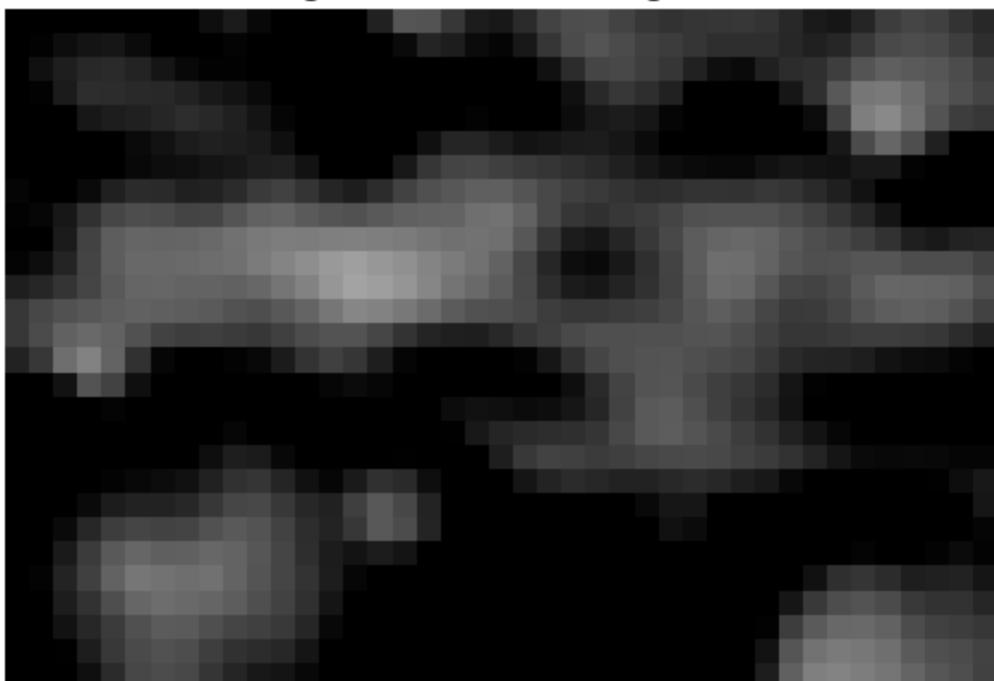


Image 2 - Width: 26, Height: 39

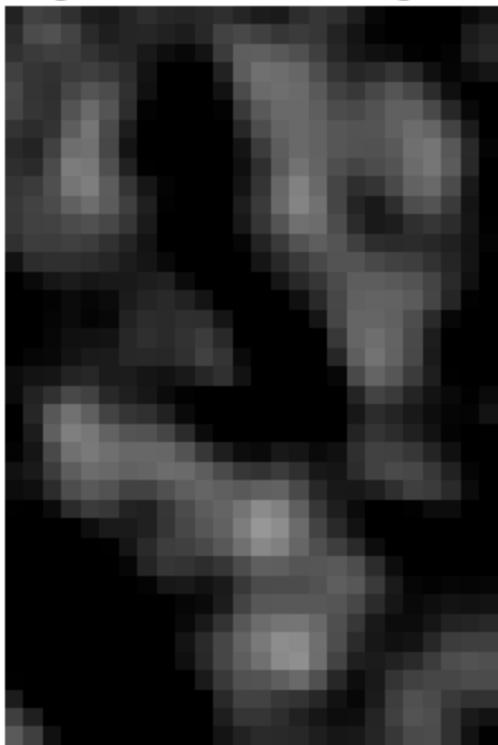


Image 2 - Width: 28, Height: 86

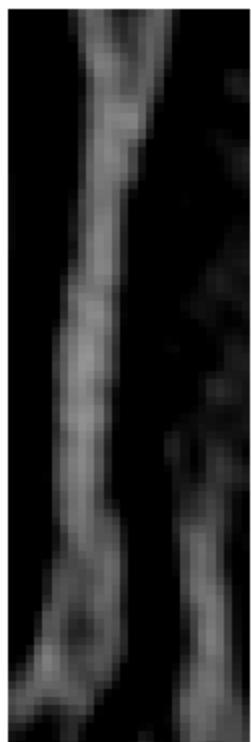


Image 2 - Width: 42, Height: 18

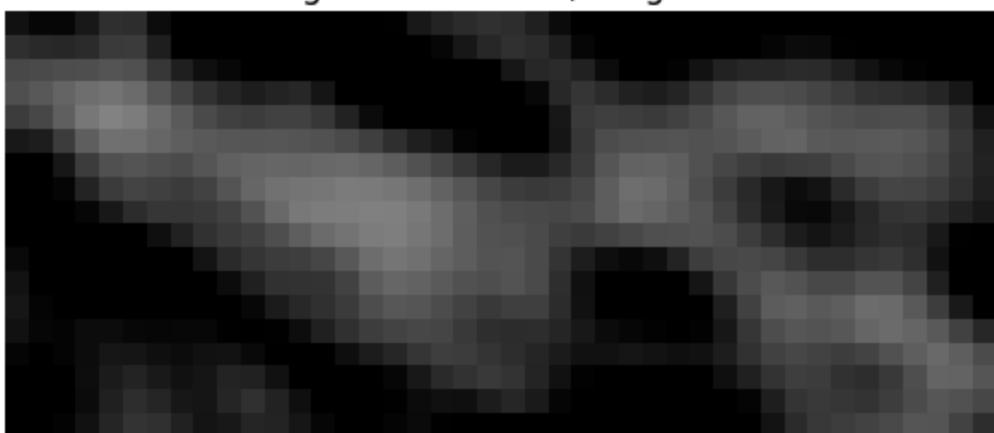


Image 2 - Width: 22, Height: 35

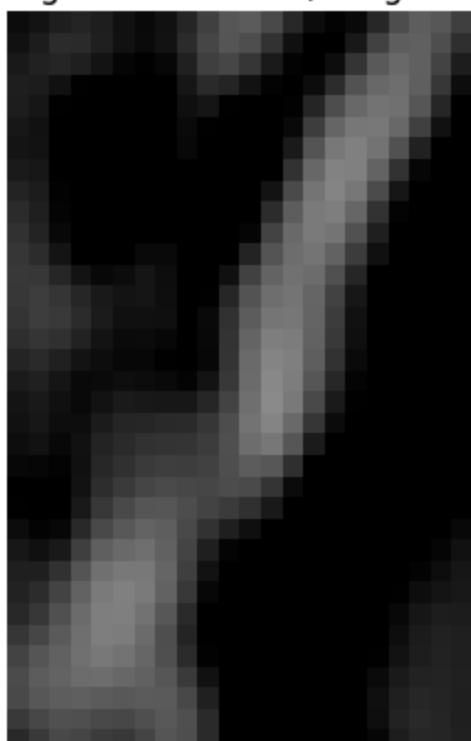


Image 2 - Width: 44, Height: 37

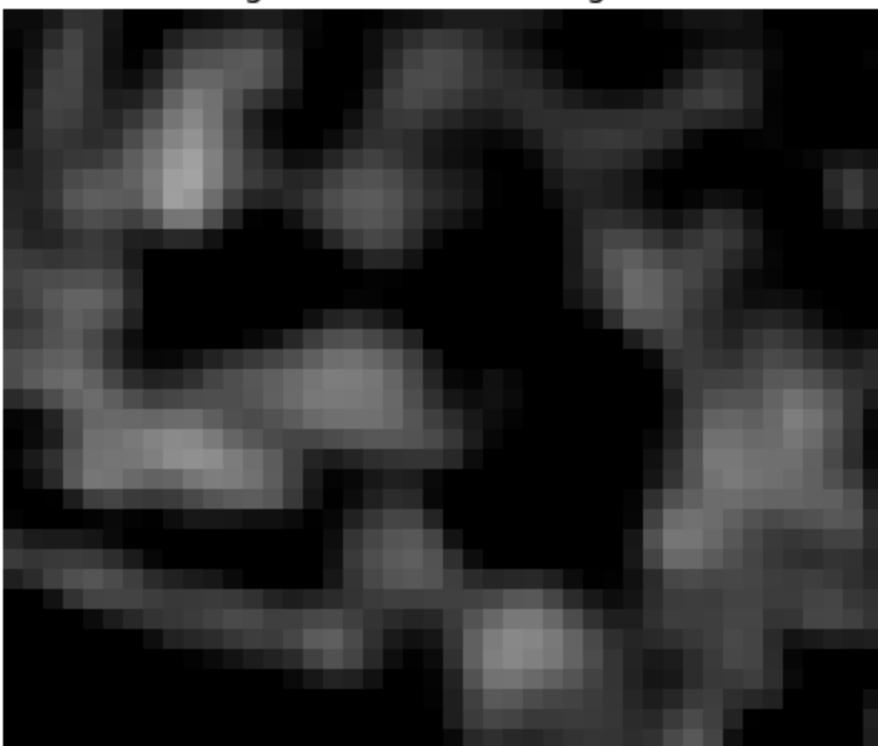


Image 2 - Width: 30, Height: 39

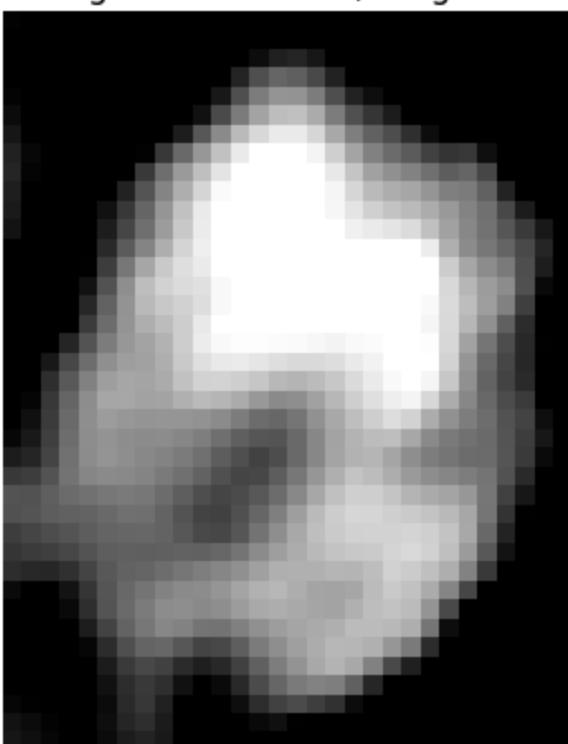


Image 2 - Width: 23, Height: 22

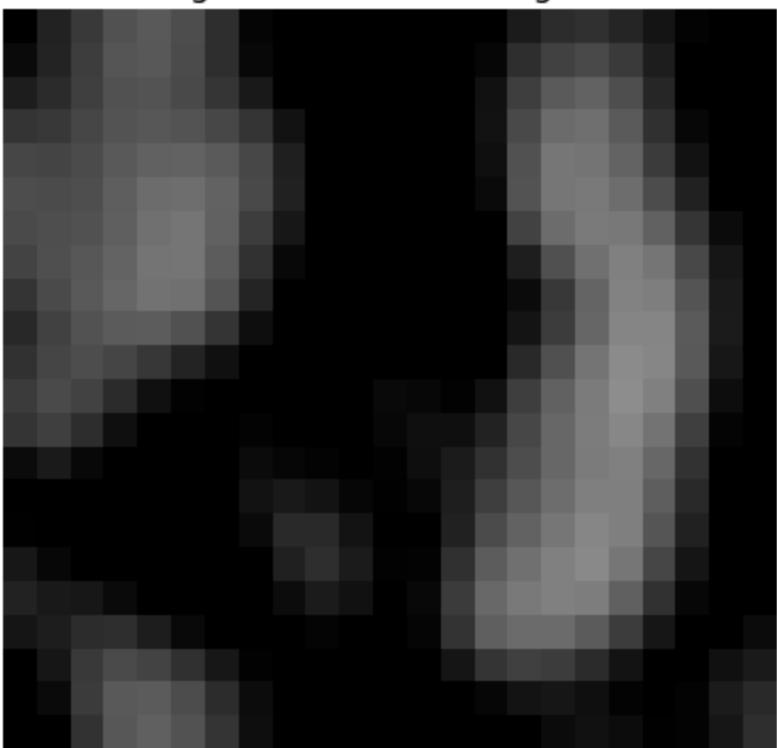


Image 2 - Width: 39, Height: 27

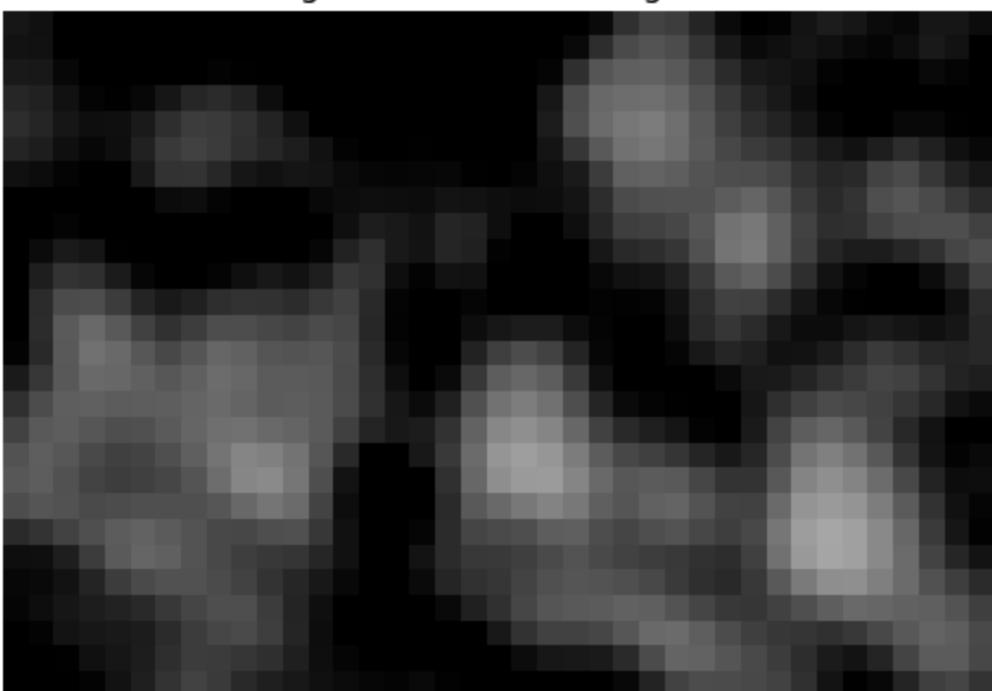


Image 2 - Width: 38, Height: 43

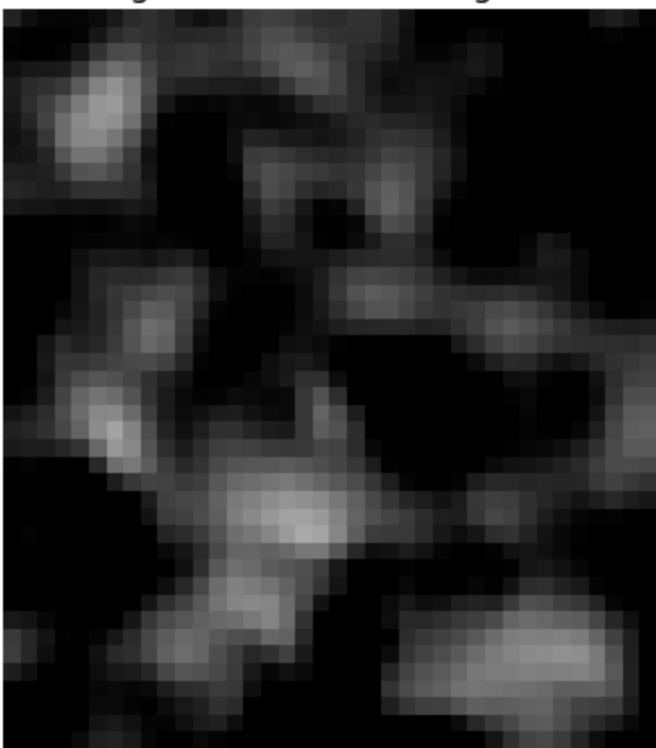


Image 2 - Width: 18, Height: 31

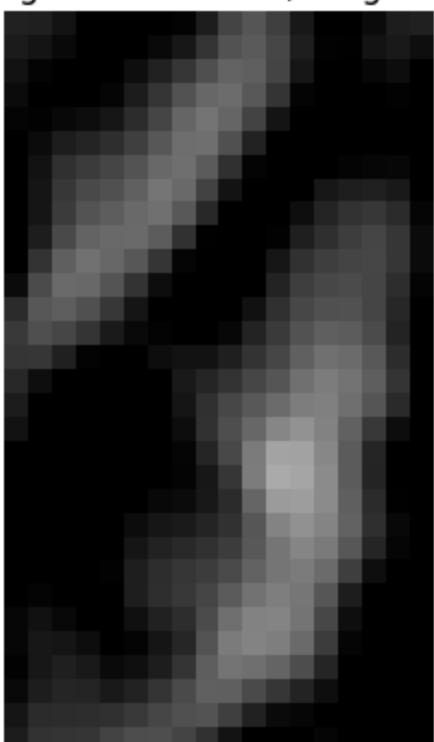


Image 2 - Width: 78, Height: 46

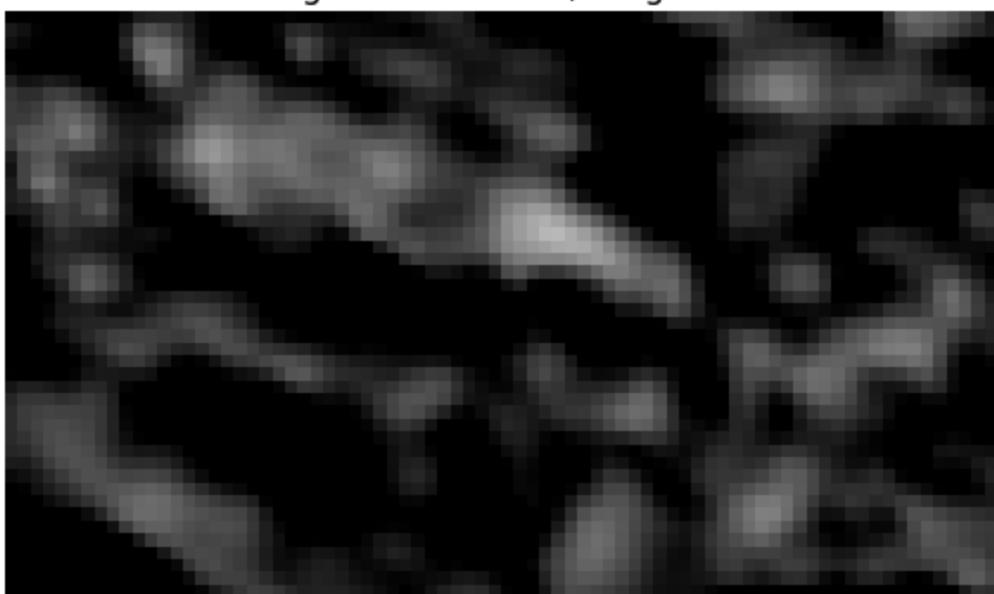


Image 2 - Width: 48, Height: 28

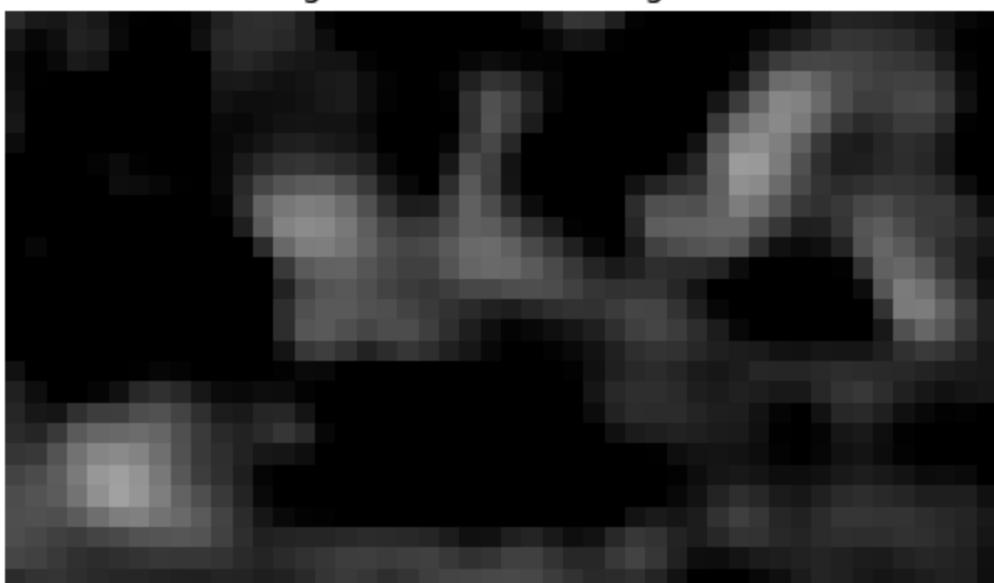


Image 2 - Width: 44, Height: 38

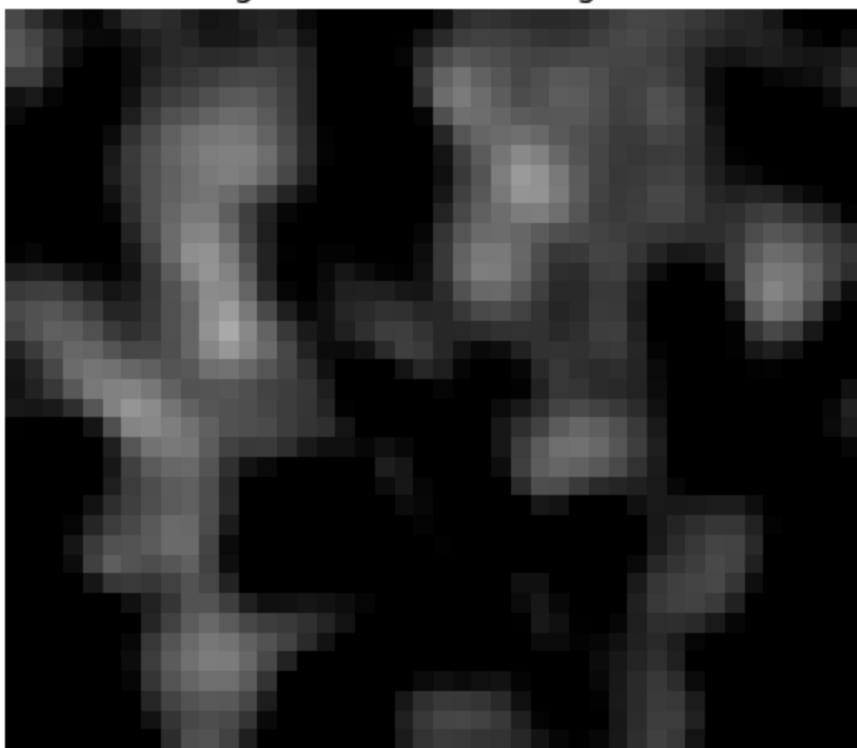


Image 2 - Width: 34, Height: 54

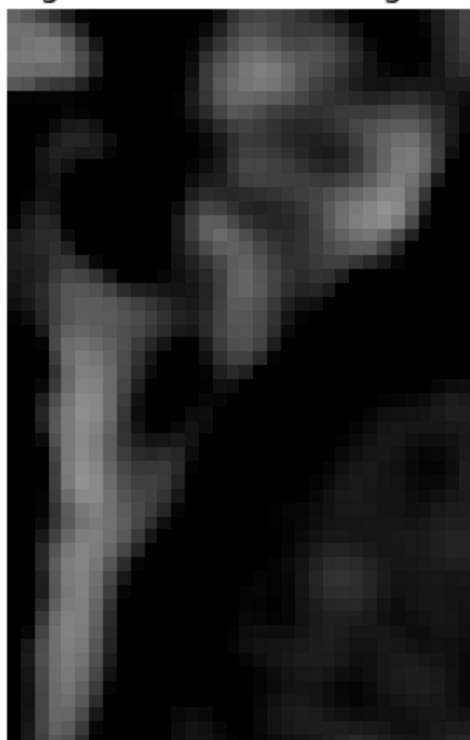


Image 2 - Width: 35, Height: 15

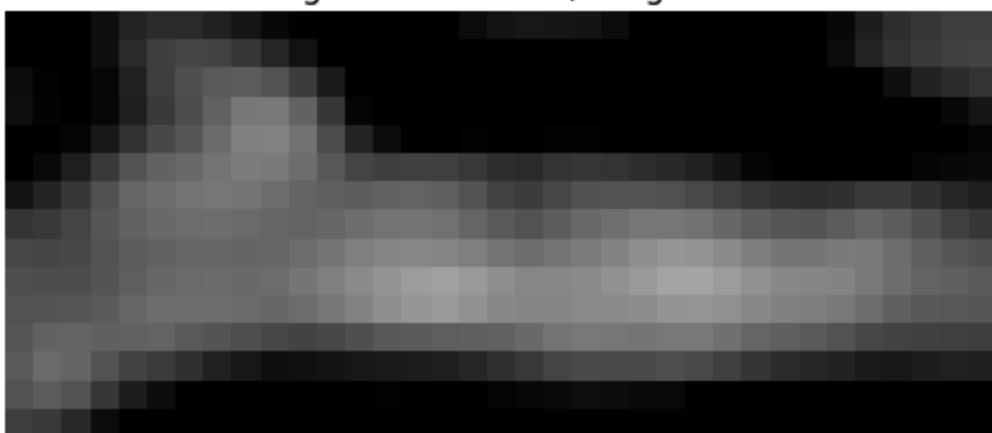


Image 2 - Width: 129, Height: 51

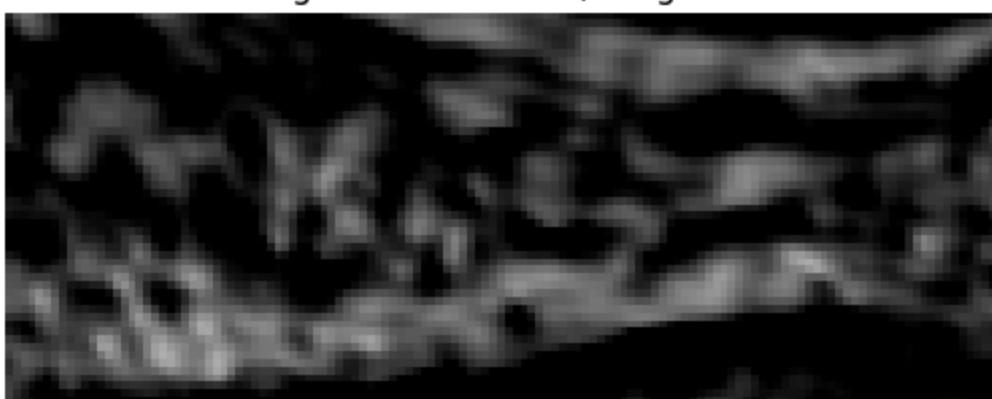


Image 2 - Width: 40, Height: 16

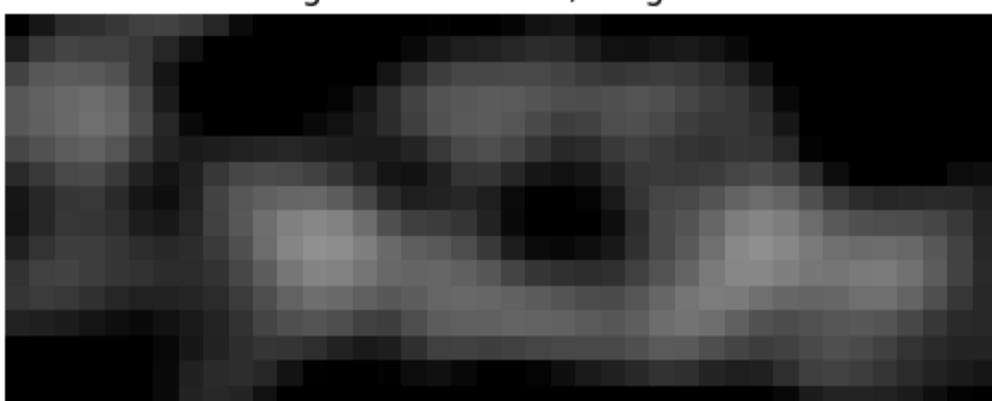


Image 2 - Width: 30, Height: 29

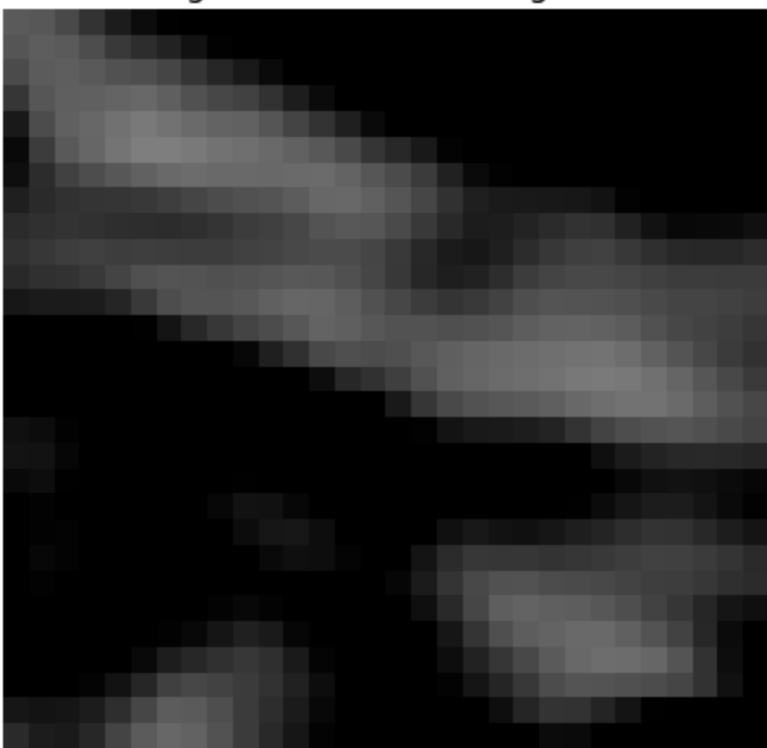


Image 2 - Width: 116, Height: 38

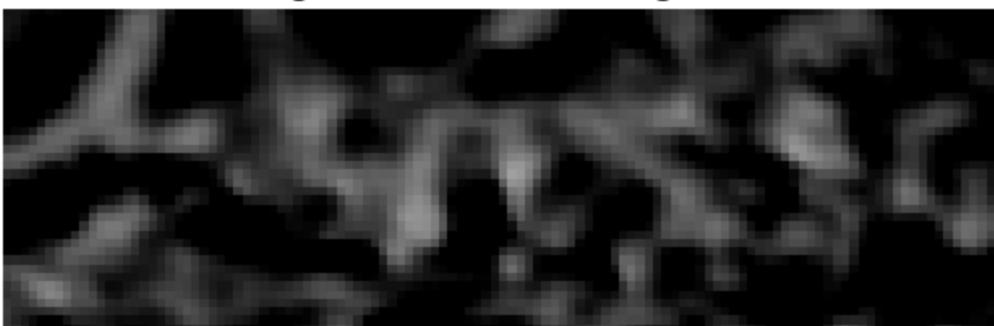


Image 2 - Width: 28, Height: 31

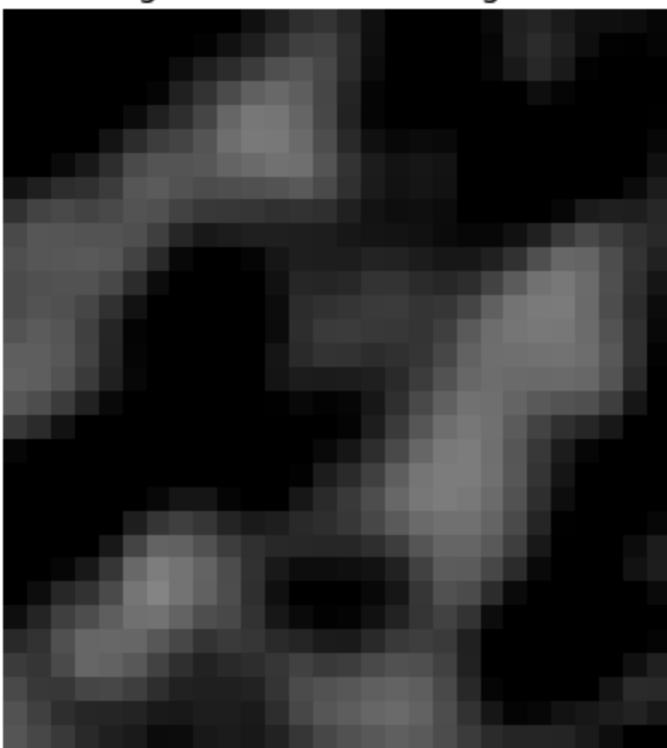


Image 2 - Width: 47, Height: 33

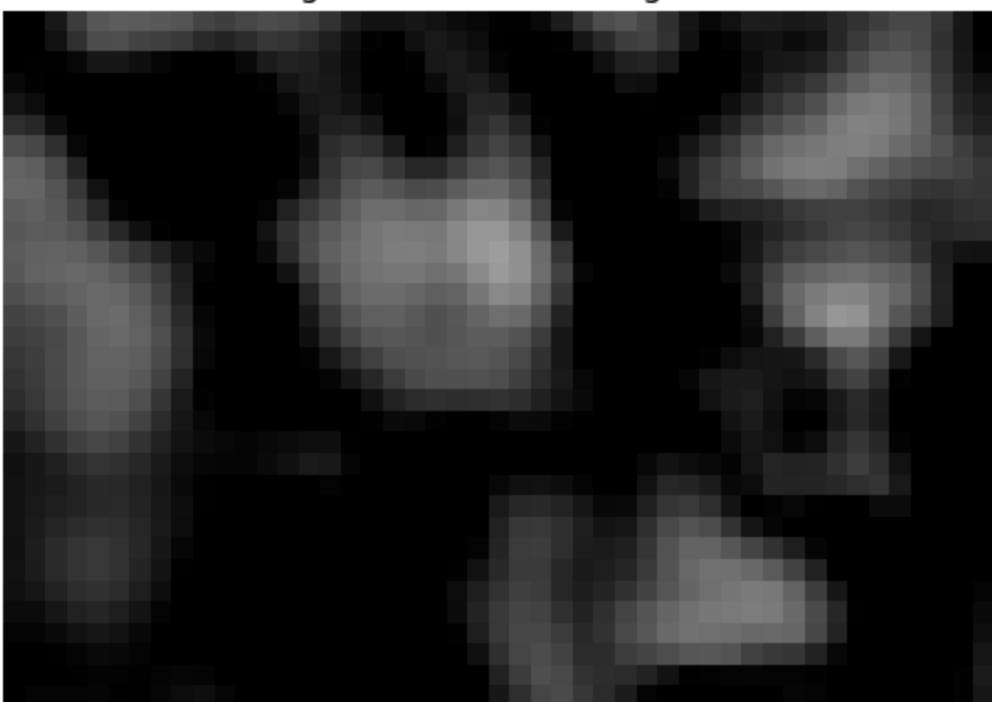


Image 2 - Width: 65, Height: 45



Image 2 - Width: 35, Height: 59



Image 2 - Width: 58, Height: 30

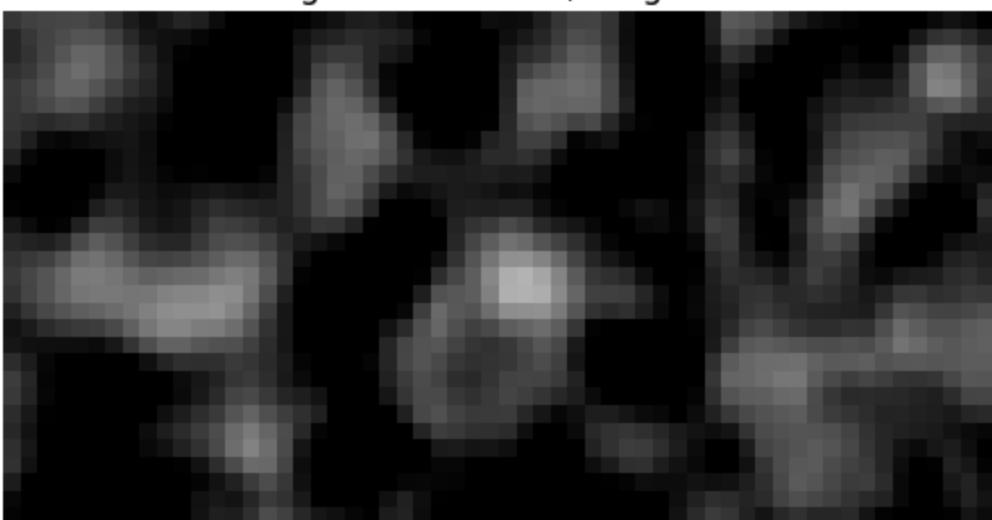


Image 2 - Width: 22, Height: 24

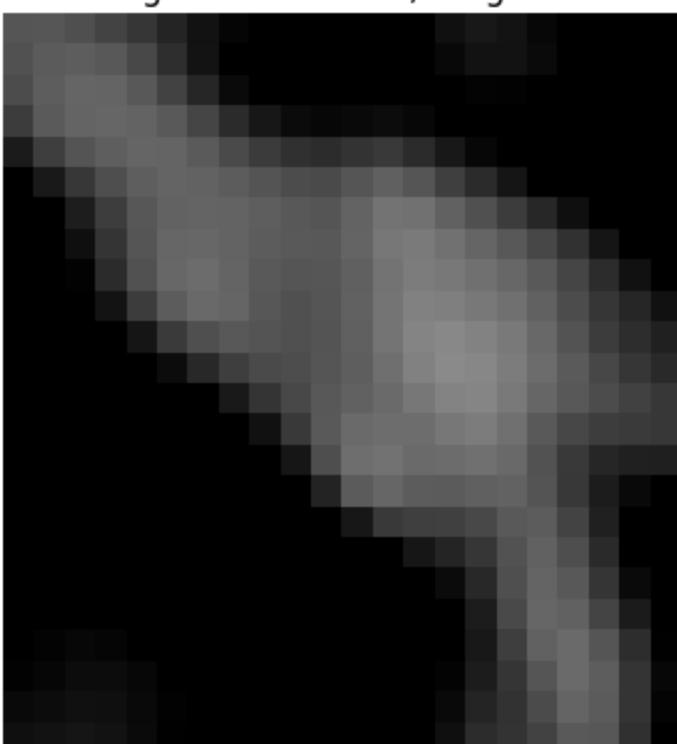


Image 2 - Width: 356, Height: 178

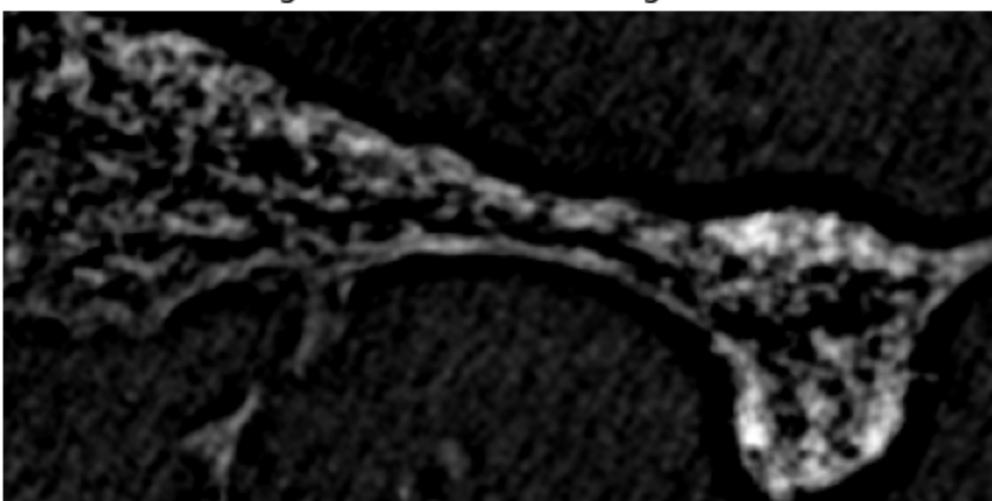


Image 2 - Width: 161, Height: 194

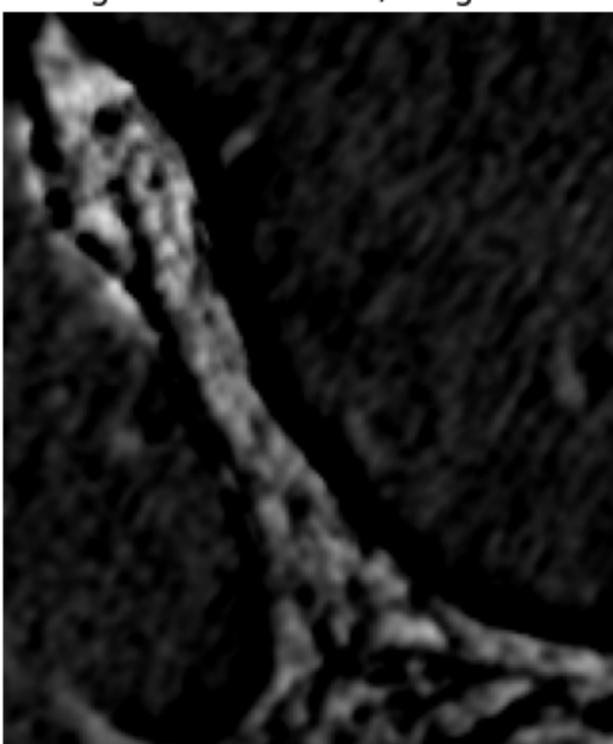


Image 2 - Width: 152, Height: 79

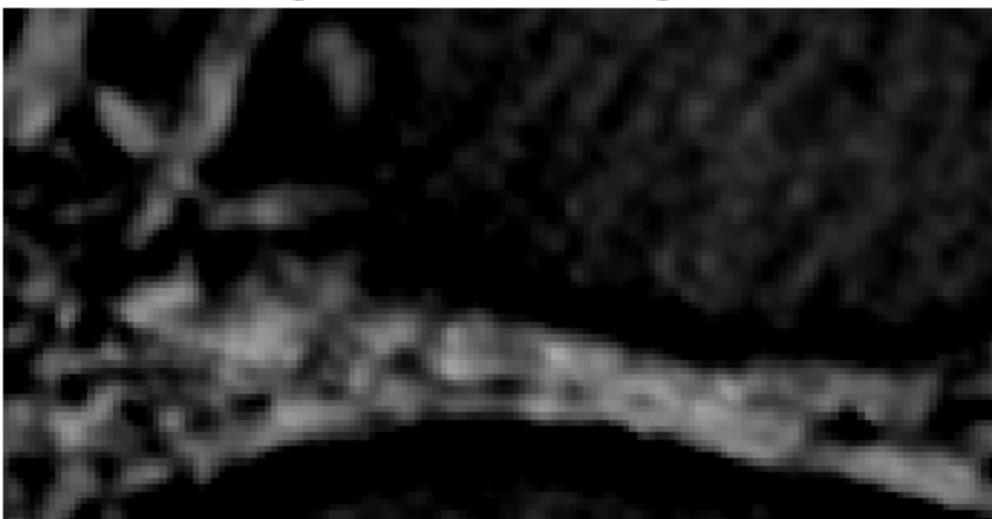


Image 2 - Width: 86, Height: 58

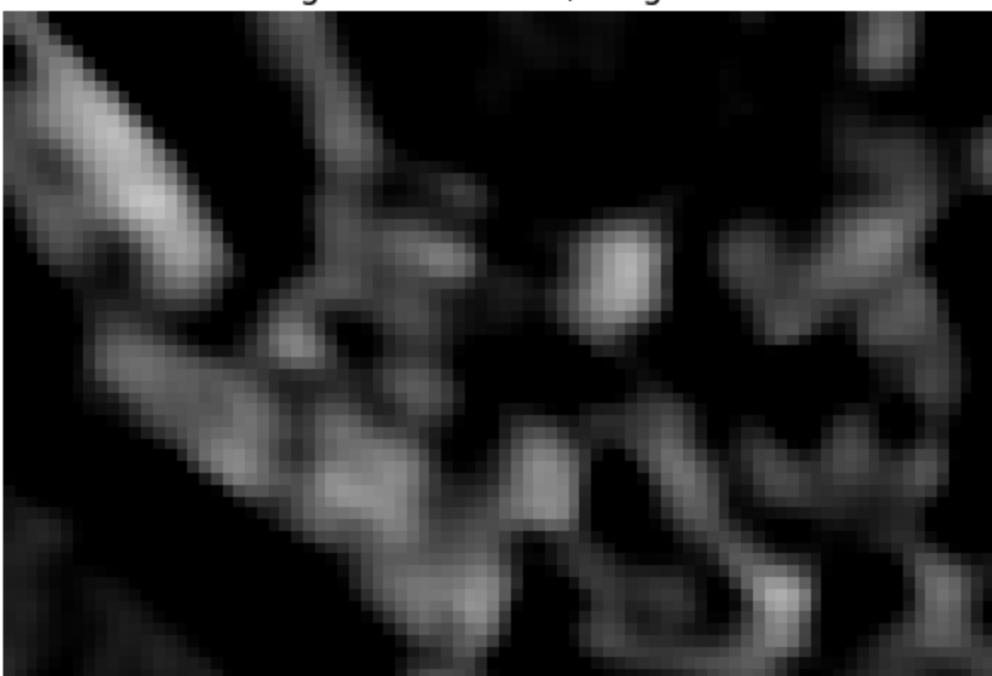


Image 2 - Width: 32, Height: 19

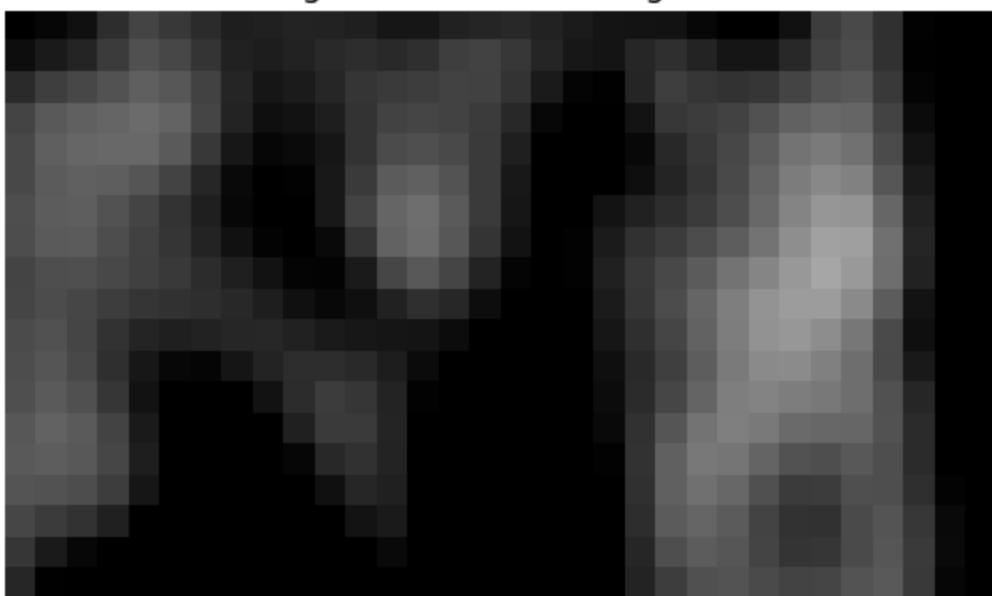


Image 2 - Width: 19, Height: 47

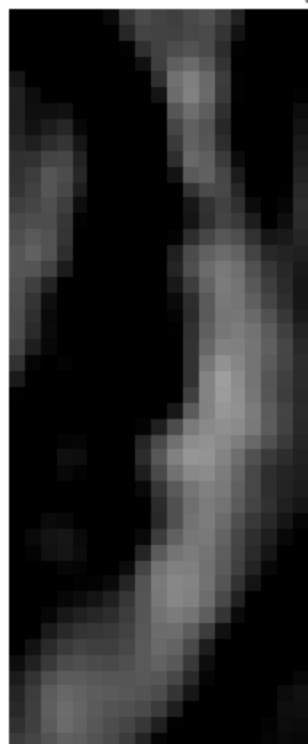


Image 2 - Width: 26, Height: 27

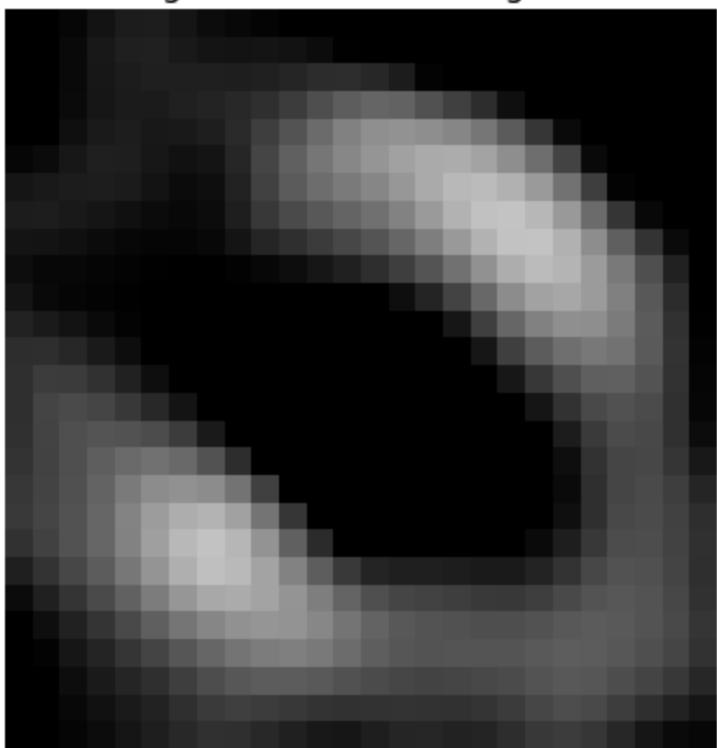


Image 2 - Width: 40, Height: 46



Image 2 - Width: 24, Height: 26

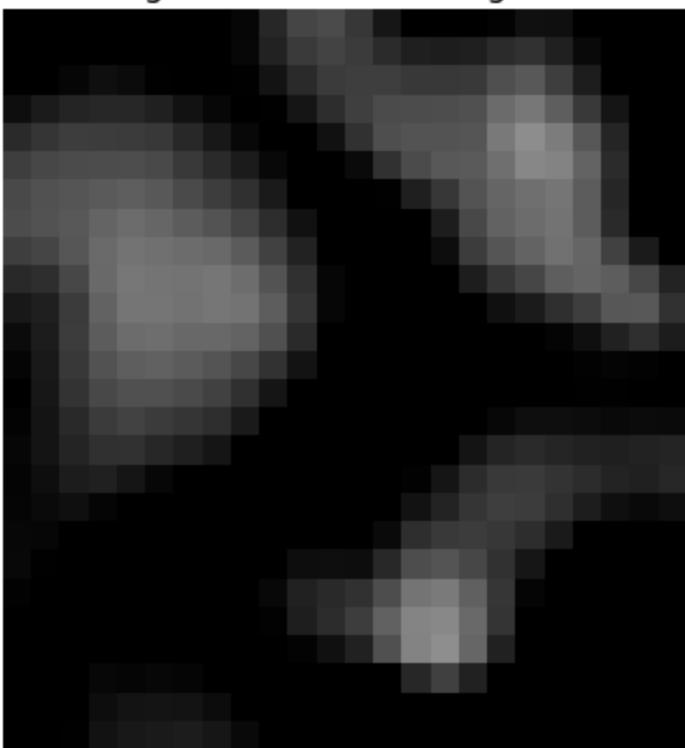


Image 2 - Width: 53, Height: 51

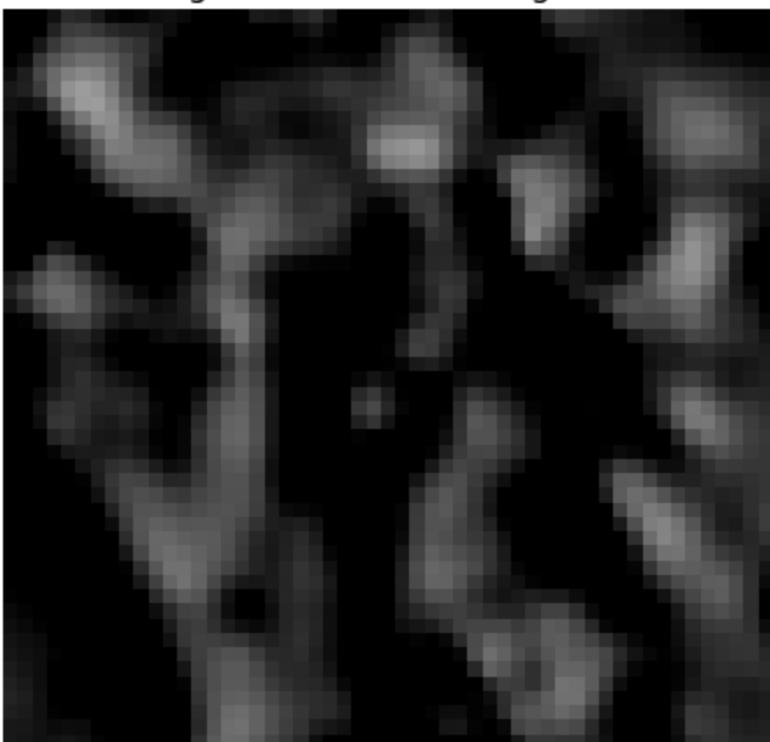


Image 2 - Width: 24, Height: 25

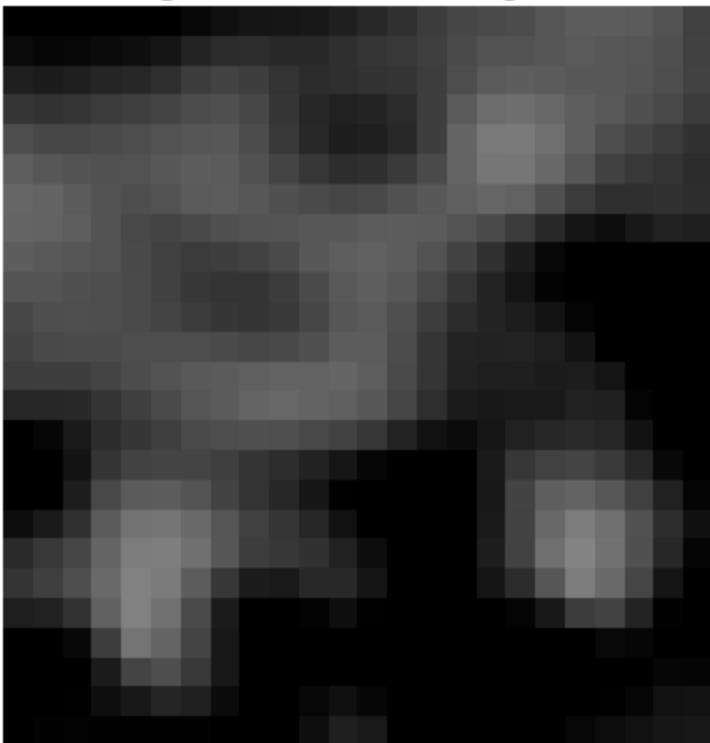


Image 2 - Width: 683, Height: 367

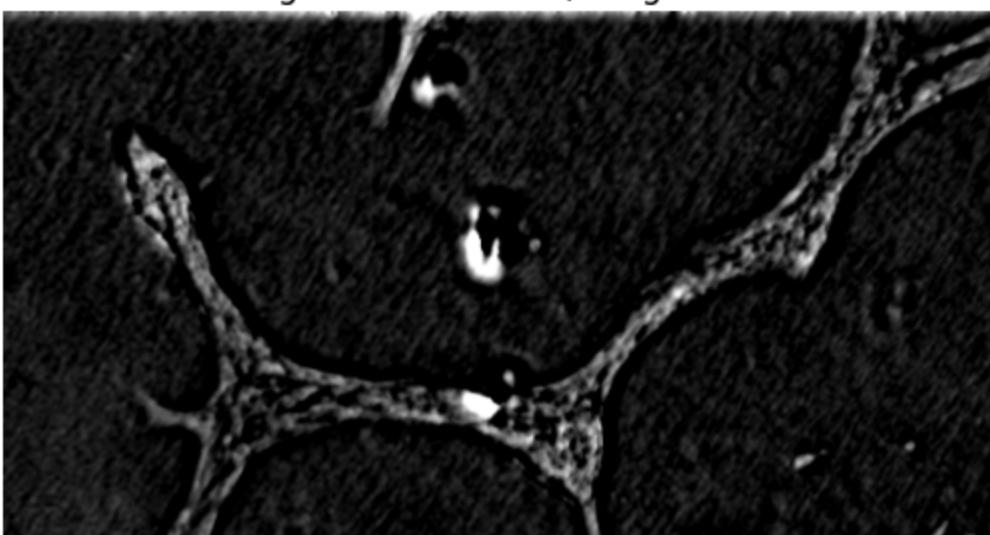


Image 2 - Width: 65, Height: 7



Image 2 - Width: 1809, Height: 123



```
In [104...]: dimensiones_df = pd.DataFrame(dimensiones_crops, columns=['Width', 'Height'])
```

```
mean_width = dimensiones_df['Width'].mean()
mean_height = dimensiones_df['Height'].mean()
std_width = dimensiones_df['Width'].std()
std_height = dimensiones_df['Height'].std()

print(f'Mean Width: {mean_width}, Std Width: {std_width}')
print(f'Mean Height: {mean_height}, Std Height: {std_height}')

plt.figure(figsize=(12, 5))

plt.subplot(1, 2, 1)
plt.hist(dimensiones_df['Width'], bins=20, color='blue', alpha=0.7)
plt.title('Distribución del Ancho de los Crops')
plt.xlabel('Ancho')
plt.ylabel('Frecuencia')

plt.subplot(1, 2, 2)
plt.hist(dimensiones_df['Height'], bins=20, color='orange', alpha=0.7)import matplotlib.pyplot as plt

# Convertir a un DataFrame para fácil análisis
dimensiones_df = pd.DataFrame(dimensiones_crops, columns=['Width', 'Height'])

# Calcular estimadores básicos
mean_width = dimensiones_df['Width'].mean()
mean_height = dimensiones_df['Height'].mean()
std_width = dimensiones_df['Width'].std()
std_height = dimensiones_df['Height'].std()

print(f'Mean Width: {mean_width}, Std Width: {std_width}')
print(f'Mean Height: {mean_height}, Std Height: {std_height}')

# Visualizar distribuciones
plt.figure(figsize=(12, 5))

# Gráfico de distribución del ancho
plt.subplot(1, 2, 1)
plt.hist(dimensiones_df['Width'], bins=20, color='blue', alpha=0.7)
plt.title('Distribución del Ancho de los Crops')
plt.xlabel('Ancho')
plt.ylabel('Frecuencia')

# Gráfico de distribución de la altura
plt.subplot(1, 2, 2)
plt.hist(dimensiones_df['Height'], bins=20, color='orange', alpha=0.7)
plt.title('Distribución de la Altura de los Crops')
plt.xlabel('Altura')
plt.ylabel('Frecuencia')

plt.tight_layout()
plt.show()

plt.title('Distribución de la Altura de los Crops')
plt.xlabel('Altura')
plt.ylabel('Frecuencia')

plt.tight_layout()
```

```
plt.show()
```

Mean Width: 54.254177660510116, Std Width: 120.75788962741815

Mean Height: 45.58575197889182, Std Height: 45.01537187745866

