

Sample 3-5

平滑化／先鋭化処理

境界処理

画像処理特論

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動作確認: MATLAB R2020a

Image smoothing/sharpening

Boundary operation

Advanced Topics in Image Processing

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Verified: MATLAB R2020a

配列のパディング

(Pad array)

- Zero padding
- Periodic extension
- Symmetric extension

```
% Pad size setting
```

```
padsizesize = 2;
```

```
%
```

```
A = randi(8,4)
```

```
A = 4x4
```

6	1	6	3
6	4	4	1
8	1	6	3
2	6	2	2

```
% Zero padding
```

```
B = padarray(A,[padsizesize padsizesize],0,'both')
```

```
B = 8x8
```

0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	6	1	6	3	0	0
0	0	6	4	4	1	0	0
0	0	8	1	6	3	0	0
0	0	2	6	2	2	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

```
% Periodic extension
```

```
C = padarray(A,[padsz padsz],'circular','both')
```

```
C = 8x8
    6     3     8     1     6     3     8     1
    2     2     2     6     2     2     2     6
    6     3     6     1     6     3     6     1
    4     1     6     4     4     1     6     4
    6     3     8     1     6     3     8     1
    2     2     2     6     2     2     2     6
    6     3     6     1     6     3     6     1
    4     1     6     4     4     1     6     4
```

```
% Symmetric extension
```

```
D = padarray(A,[padsz padsz],'symmetric','both')
```

```
D = 8x8
    4     6     6     4     4     1     1     4
    1     6     6     1     6     3     3     6
    1     6     6     1     6     3     3     6
    4     6     6     4     4     1     1     4
    1     8     8     1     6     3     3     6
    6     2     2     6     2     2     2     2
    6     2     2     6     2     2     2     2
    1     8     8     1     6     3     3     6
```

サンプル画像の準備

(Preparation of sample image)

本サンプルで利用する画像データを収めた data フォルダにパスをとおす。

Create a path to the data folder that contains images used in this sample.

```
addpath('./data')
close
% Reading original image
I = im2double(imread('barbaraFaceRgb.tif'));
figure(1)
imshow(I)
title('Original')
```



フィルタの設定

(Filter setting)

```
% Filter setting
hsize = 3;
f = fspecial('average',hsize);
```

零値拡張

(Zero padding)

```
% Zero padding
Jz = imfilter(I,f);

% Show result
figure(2)
imshow(Jz)
title('After filtering (zero padding)')
```

After filtering (zero padding)



周期拡張

(Periodic extension)

```
% Periodic extension
Jp = imfilter(I,f,'circular');

% Show result
figure(3)
imshow(Jp)
title('After filtering (periodic extension)')
```

After filtering (periodic extension)



対称拡張

(Symmetric extension)

```
% Symmetric extension
Js = imfilter(I,f,'symmetric');

% Show result
figure(4)
imshow(Js)
title('After filtering (symmetric extension)')
```

After filtering (symmetric extension)



結果の比較

(Comparison)

```
% Patch size
psize = 64;

% Zero padding
figure(5)
subplot(1,3,1)
imshow(Jz(end-psize+1:end,1:psize,:))
title('Zero padding')

% Periodic extension
subplot(1,3,2)
```

```
imshow(Jp(end-psize+1:end,1:psize,:))  
title('Periodic extension')  
  
% Zero padding  
subplot(1,3,3)  
imshow(Js(end-psize+1:end,1:psize,:))  
title('Symmetric extension')
```



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