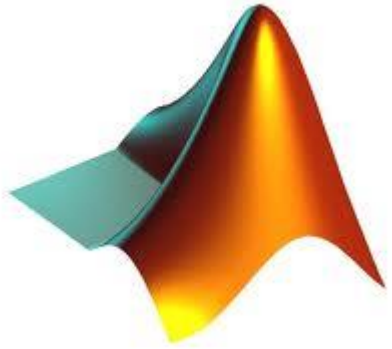
Matematická morfológia II

Cvičenia z Počítačového Videnia I.

Distance transform

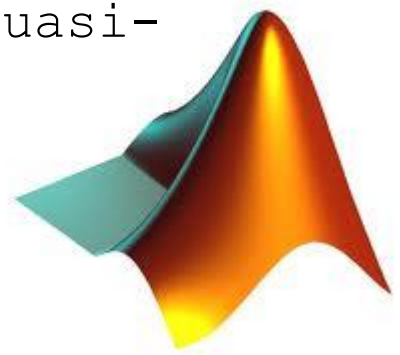
```
[D,L] = bwdist(BW,method)
```

- 'chessboard'
- 'cityblock‘
- 'euclidean‘
- 'quasi-euclidean'



Distance transform

```
bw = zeros(200,200);
bw(50,50) = 1; bw(50,150) = 1; bw(150,100) = 1;

D1 = bwdist(bw,'euclidean');
D2 = bwdist(bw,'cityblock');
D3 = bwdist(bw,'chessboard');
D4 = bwdist(bw,'quasi-euclidean');

figure
subplot(2,2,1), subimage(mat2gray(D1)), title('Euclidean')
hold on, imcontour(D1)
subplot(2,2,2), subimage(mat2gray(D2)), title('City block')
hold on, imcontour(D2)
subplot(2,2,3), subimage(mat2gray(D3)), title('Chessboard')
hold on, imcontour(D3)
subplot(2,2,4), subimage(mat2gray(D4)), title('Quasi-
Euclidean')
hold on, imcontour(D4)
```

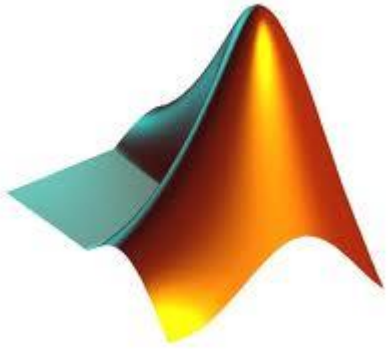


Kostra, hranica, ...

```
BW2 = bwmorph(BW,operation,n)
```

Operation

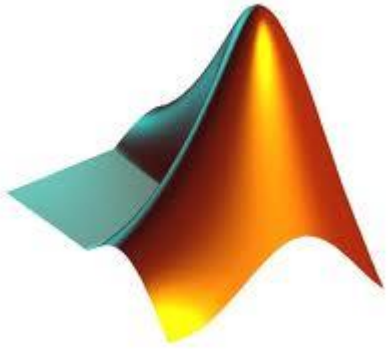
'dilate‘	'majority‘
'erode‘	'remove‘
'close'	'skel‘
'open‘	'tophat‘
se=ones(3)	…



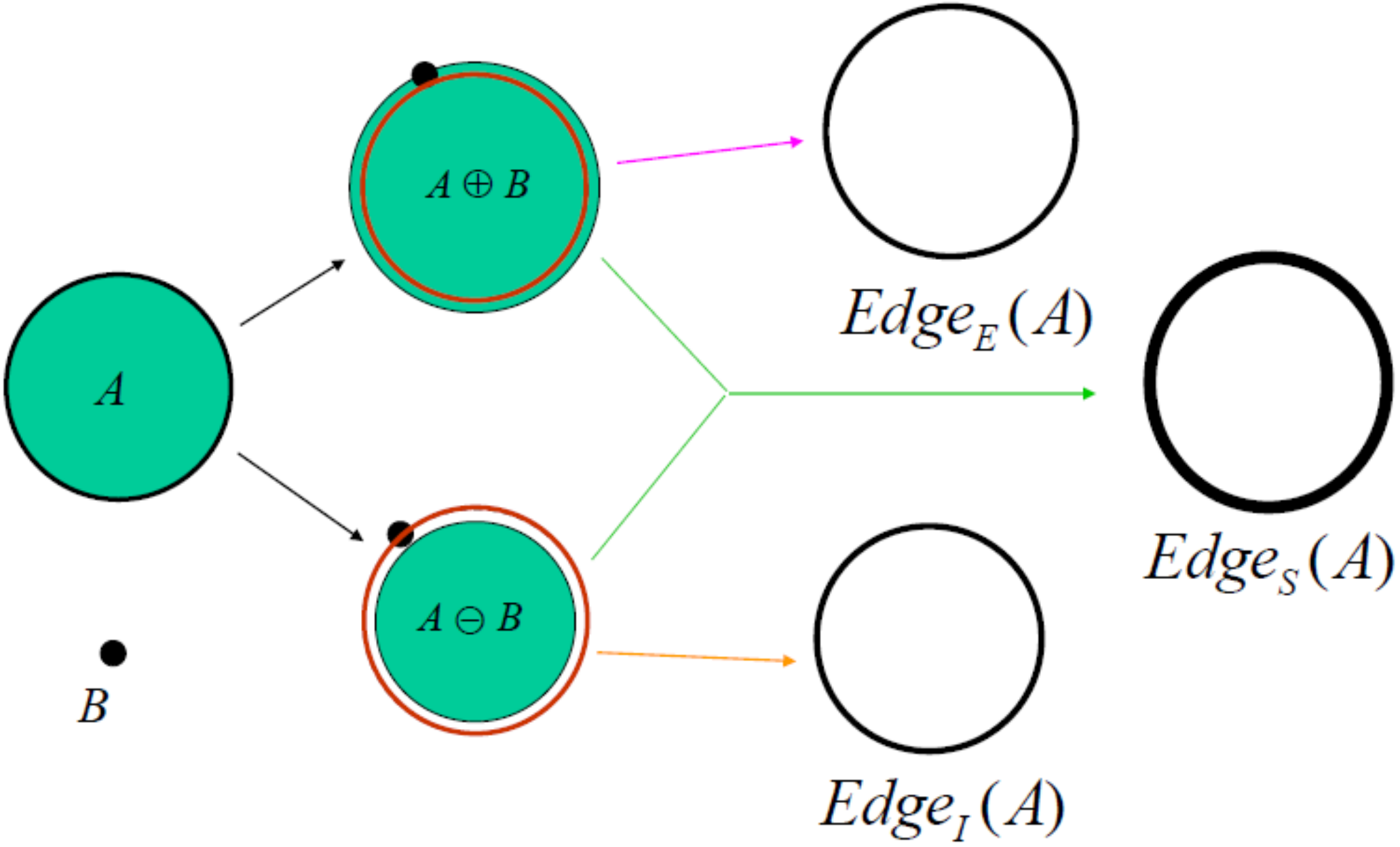
Hranica

- použitie dilatácie a erózie

- Algoritmy
  - Štandardné $Edge_S(A) = (A \oplus B) - (A \ominus B)$
  - Externé $Edge_E(A) = (A \oplus B) - A$
  - Interné $Edge_I(A) = A - (A \ominus B)$



Hranica



Hranica

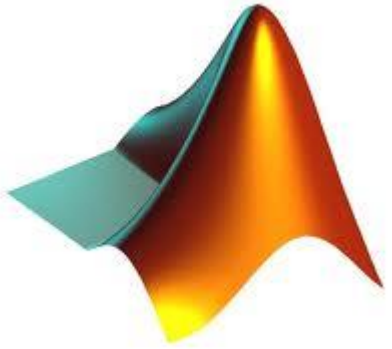
$$Edge_s(A) = (A \oplus B) - (A \ominus B)$$

$$Edge_E(A) = (A \oplus B) - A$$

$$Edge_I(A) = A - (A \ominus B)$$

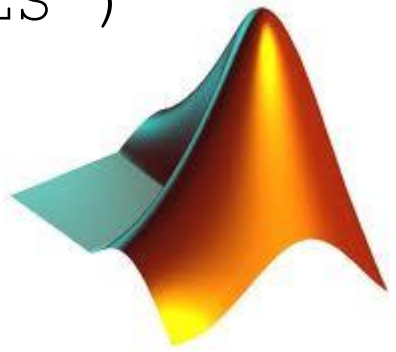
```
aa=zeros(100);
aa(20:80,30:70)=1;
```

```
ES = bwmorph(aa,'dilate') - bwmorph(aa,'erode');
EE = bwmorph(aa,'dilate') - aa;
EI = aa - bwmorph(aa,'erode');
```



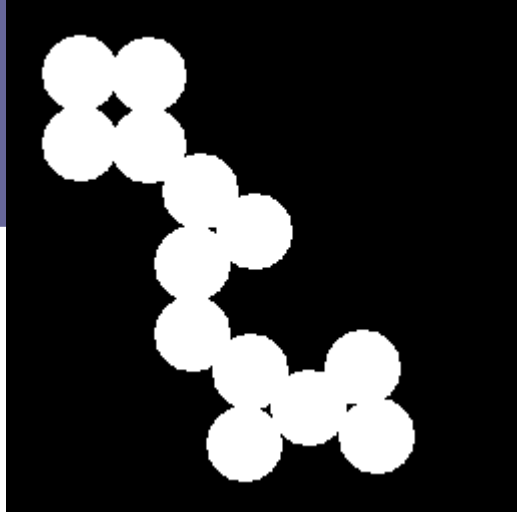
Hranica

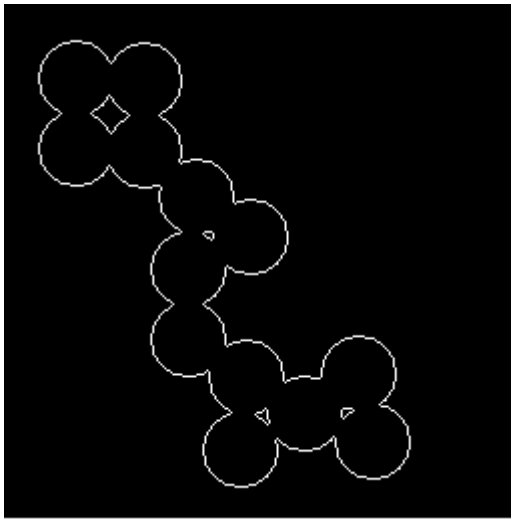
```
aa=3*aa;

ESrgb=label2rgb(ES+aa);

EIrgb=label2rgb(EI+aa);

EErgb=label2rgb(EE+aa);

figure

subplot(1,3,3), subimage(EIrgb), title('EI')

subplot(1,3,2), subimage(EErgb), title('EE')

subplot(1,3,1), subimage(ESrgb), title('ES')

aa - bwmorph(aa,'erode');
```

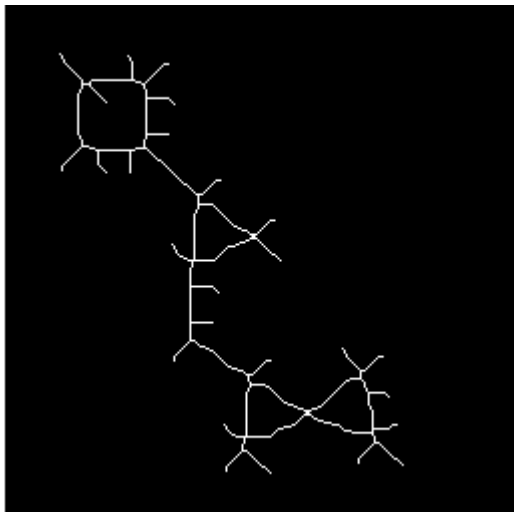


Príklad využitia

```
BW = imread('circles.png');
imshow(BW);

BW2 = bwmorph(BW,'remove');
figure, imshow(BW2)

BW3 = bwmorph(BW,'skel',Inf);
figure, imshow(BW3)
```

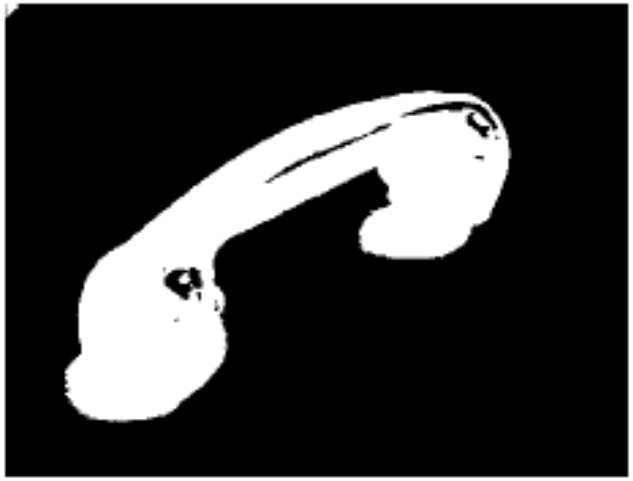




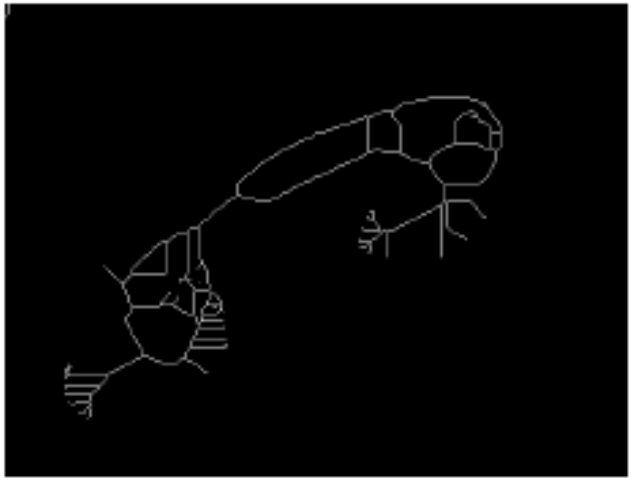


Príklad využitia

prahovanie



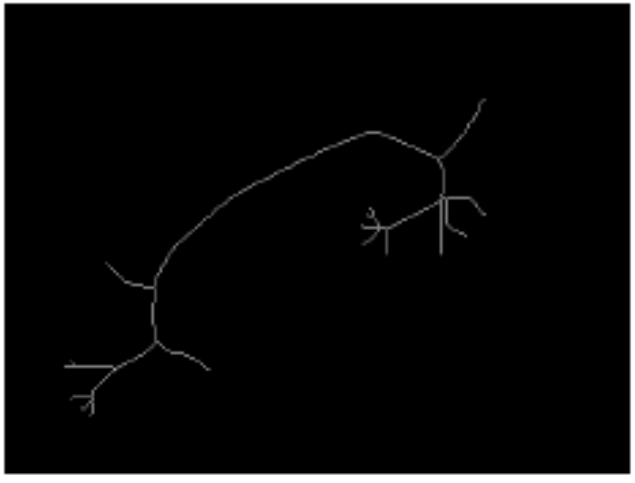
kostra



prahovanie

+ uzavretie

kostra

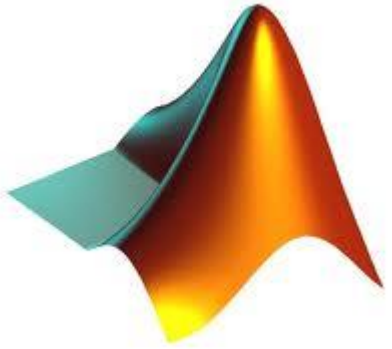


Príklad využitia

```
aa=imread('telefon.gif');
aa=double(aa)/255;
imhist(aa)
BW=double(aa>0.15&aa<0.3);
```

Kostra?

Uzavretie a kostra?



Príklad využitia

```
aa=zeros(100);
aa(20:80,30:70)=1;
```

Kostra?

```
bb=aa;
bb(50,70:72)=1;
```

Kostra?