

Přednáška 5

Snížení barevné hloubky

Nahodné rozptylování zpracování prvek po prvku

```
f = rgb2gray(imread('pastelky.png'));  
  
f_max = max(max(f));  
  
g = uint8(zeros(size(f,1),size(f,2)));  
  
for i = 1 : size(f,1)  
    for j = 1 : size(f,2)  
        % randi vrati nahodne cislo  
        r = randi(f_max);  
        if f(i,j) > r  
            g(i,j) = g(i,j) +1;  
        end  
    end  
end  
  
figure  
subplot(1,2,1)  
imshow(f,[])  
subplot(1,2,2)  
imshow(g,[]);
```



zpracování pomocí maticových operací

```
f = rgb2gray(imread('pastelky.png'));
[m,n] = size(f);
f_max = max(max(f));
g = uint8(zeros(size(f,1),size(f,2)));

g = g + uint8(f >= randi(f_max,[m,n]));
figure
subplot(1,2,1)
imshow(f,[]);
subplot(1,2,2)
imshow(g,[]);
```



Špatný přístup

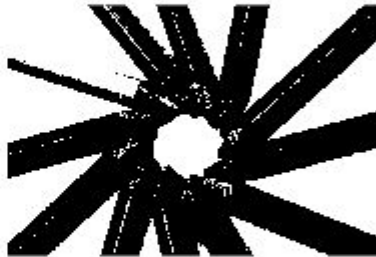
porovnávají se všechny pixely se stejnou hodnotou.

```
f = rgb2gray(imread('pastelky.png'));
[m,n] = size(f);
f_max = max(max(f));
g = uint8(zeros(size(f,1),size(f,2)));

g = (f >= randi(f_max));

figure
subplot(1,2,1)
```

```
imshow(f,[]);
subplot(1,2,2)
imshow(g,[]);
```



Maticové rozptylování

Zvětšení velikosti obrazu

```
f = rgb2gray(imread('pastelky.png'));
[ g ] = matrix_dithering( f );
```

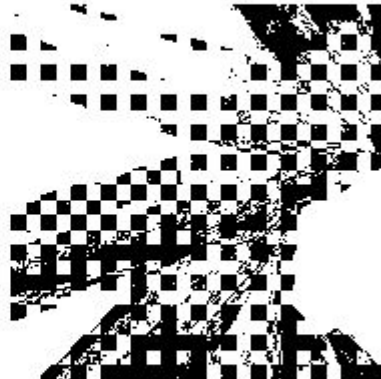
```
patern = 2x2
    204    153
    102     51
```

```
figure
subplot(1,2,1)
imshow(f(100:300,100:300),[]);
subplot(1,2,2)
imshow(g(200:600,200:600),[]);
```



Nevhodně zvolené matice

```
f = rgb2gray(imread('pastelky.png'));  
[ g ] = matrix_dithering2( f );  
  
figure  
subplot(1,2,1)  
imshow(f(100:300,100:300),[]);  
subplot(1,2,2)  
imshow(g(200:600,200:600),[]);
```



Maticové rozptylování se zachováním velikosti

```
f = rgb2gray(imread('pastelky.png'));  
[ g ] = matrix_dithering3( f );
```

```
patern = 2x2  
204    153  
102     51
```

```
figure  
subplot(1,2,1)  
imshow(f,[]);  
subplot(1,2,2)  
imshow(g,[]);
```



Rozptylování s distribucí chyby

Floyd Steinberg

```
f = rgb2gray(imread('pastelky.png'));  
g = floyd_steinberg( f );
```

```
figure  
subplot(1,2,1)  
imshow(f,[]);  
subplot(1,2,2)  
imshow(g,[]);
```



Barevné obrázky

Náhodné

```
f = imread('pastelky.png');  
[m,n,o] = size(f);  
f_red = f(:,:,1);  
f_green = f(:,:,2);  
f_blue = f(:,:,3);  
  
% červená složka  
f_max_r = max(max(f_red));  
g_red = uint8(zeros(m,n));  
g_red = g_red + uint8(f_red >= randi(f_max_r,[m,n]));  
  
% zelená složka  
f_max_g = max(max(f_green));  
g_green = uint8(zeros(m,n));  
g_green = g_green + uint8(f_green >= randi(f_max_g,[m,n]));  
  
% modrá složka  
f_max_b = max(max(f_blue));  
g_blue = uint8(zeros(m,n));  
g_blue = g_blue + uint8(f_blue >= randi(f_max_b,[m,n]));  
  
g=[];  
g(:,:,1) = g_red;
```

```
g(:,:,2) = g_green;
g(:,:,3) = g_blue;
```

```
figure
subplot(1,2,1)
imshow(f,[]);
subplot(1,2,2)
imshow(g,[]);
```



Maticové

```
f = imread('pastelky.png');
[m,n,o] = size(f);
f_red = f(:,:,1);
f_green = f(:,:,2);
f_blue = f(:,:,3);

g_red = matrix_dithering3( f_red );
```

```
patern = 2x2
    204    153
    102     51
```

```
g_green = matrix_dithering3( f_green );
```

```
patern = 2x2
    204    153
    102     51
```



```
g_blue = matrix_dithering3( f_blue );
```

```
patern = 2x2  
204 153  
102 51
```

```
g=[];  
g(:,:,1) = g_red;  
g(:,:,2) = g_green;  
g(:,:,3) = g_blue;
```

```
figure  
subplot(1,2,1)  
imshow(f,[]);  
subplot(1,2,2)  
imshow(g,[]);
```



s distribucí chyby

```
f = imread('pastelky.png');  
[m,n,o] = size(f);  
f_red = f(:,:,1);  
f_green = f(:,:,2);  
f_blue = f(:,:,3);  
  
g_red = floyd_steinberg( f_red );  
g_green = floyd_steinberg( f_green );
```

```
g_blue = floyd_steinberg( f_blue );
```

```
g=[];  
g(:,:,1) = g_red;  
g(:,:,2) = g_green;  
g(:,:,3) = g_blue;
```

```
figure  
subplot(1,2,1)  
imshow(f,[]);  
subplot(1,2,2)  
imshow(g,[]);
```



barevna paleta

```
f = imread('pastelky2.png');  
tol = 1/3;  
[x1,map1] = rgb2ind(f, tol, 'nodither');  
[x2,map2] = rgb2ind(f, 64, 'nodither');  
  
subplot(1,3,1), imshow(f);
```



```
subplot(1,3,2), imshow(x1,map1);  
subplot(1,3,3), imshow(x2,map2);
```



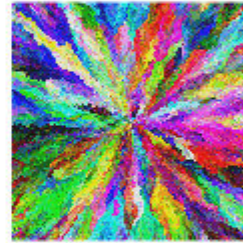
```
subplot(2,1,1), imshow((cat(3, map1(:,1)',map1(:,2)', map1(:,3)')));
title("Univerzalni");
subplot(2,1,2), imshow((cat(3, map2(:,1)',map2(:,2)', map2(:,3)')));
title("Adaptivni");
```



Všechny barvy

```
f = imread('allcolor.png');
tol = 1/3;
[x1,map3] = rgb2ind(f, tol, 'nodither');
[x2,map4] = rgb2ind(f, 64, 'nodither');

subplot(1,3,1), imshow(f);
subplot(1,3,2), imshow(x1,map3);
subplot(1,3,3), imshow(x2,map4);
```



```
subplot(2,1,1), imshow((cat(3, map3(:,1)',map3(:,2)', map3(:,3)')));  
title("Univerzalni");  
subplot(2,1,2), imshow((cat(3, map4(:,1)',map4(:,2)', map4(:,3)')));  
title("Adaptivni");
```

Univerzalni



Adaptivni

