MATLAB(R)/Simulink(R) & Raspberry Pi で学ぶ組込みビジョン！

EmbVision チュートリアル(CQ 版)HTML ドキュメント発行ライブスクリプト

本ライブスクリプト PUBLISHALLCQ は、EmbVision チュートリアル(CQ 版)の HTML ドキュメントを発行します。

本資料は、新潟大学工学部電気電子工学科専門科目「電気電子創造設計」(2014 年度開講）の課題として作成したものを CQ 出版社 Interface 2022 年 9 月号記事用に再編集したものです。

作成者

- 新潟大学　村松　正吾，高橋　勇希

準備

```
proj = 'cq';
type = 'html';
targetdir = [ '+cq/' type '/' ];

if ~exist(targetdir,'dir')
    mkdir(targetdir)
end
```

Index

```
publish([proj '.index'],type);
```

Part 1

```
close all

% Exercise 1-1
RGB = imread('peppers.png');
I = im2double(rgb2gray(RGB));
J = sqrt(I);
imwrite(J,[targetdir 'brightpeppers.png'])
fplot(@sqrt,[0 1])
xlabel('x')
ylabel('y')
axis square
print('-dpng','-r72',[targetdir 'fplotsqrt.png'])

% Exercise 1-2
```

```
HSV = rgb2hsv(RGB);
HSV(:,:,2) = 2*HSV(:,:,2);
J = hsv2rgb(HSV);
imwrite(J,[targetdir 'highsatpeppers.png'])

% Publish
publish([proj '.part1'],type);
```

Part 2

```
close all

% Exercise 2-1
X = imread('cameraman.tif');
X = im2double(X);

Hh = [ 1 0 -1; 1 0 -1; 1 0 -1 ];
Yh = conv2(Hh,X);
Yh = Yh(2:end-1,2:end-1);
imwrite(Yh+0.5,[targetdir 'cameramangradx.png'])

freqz2(Hh)
print('-dpng','-r72',[targetdir 'freqz2gradx.png'])

% Exercise 2-2
Hv = [ 1 1 1; 0 0 0; -1 -1 -1 ];
Yv = conv2(Hv,X);
Yv = Yv(2:end-1,2:end-1);

dXmag = sqrt(Yv.^2+Yh.^2);
dXang = atan2(Yv,Yh);

imwrite(dXmag,[targetdir 'cameramangradmag.png'])
imwrite(dXang/(2*pi)+0.5,[targetdir 'cameramangradang.png'])

% Publish
publish([proj '.part2'],type);
```

Part 3

```
close all

addpath('workcq/part3')
publish([proj '.part3'],type);
rmpath('workcq/part3')
```

Part 4

```
close all
```

```
addpath('workcq/part4')

%
copyfile('workcq/part4/shuttleclone.png',[targetdir 'shuttleclone.png']);
copyfile('workcq/part4/shuttlegrad.png',[targetdir 'shuttlegrad.png']);
copyfile('workcq/part4/shuttleave.png',[targetdir 'shuttleave.png']);
copyfile('workcq/part4/shuttlesobel.png',[targetdir 'shuttlesobel.png']);
copyfile('workcq/part4/shuttlediff.png',[targetdir 'shuttlediff.png']);

% Exercise 4-1
vrObj = VideoReader('shuttle.avi');
frameRate = vrObj.FrameRate;
vwObj = VideoWriter('shuttlesobel.avi');
vwObj.FrameRate = frameRate;
rgsObj = Rgb2GraySystem();
hrsObj = Hsv2RgbSystem();
gfsObj = GradFiltSystem('Kernel',[1 2 1; 0 0 0 ; -1 -2 -1]);
vwObj.open()
while (hasFrame(vrObj))
    frame     = vrObj.readFrame();        % Read frame
    graysc    = rgsObj.step(frame);       % To grayscale
    [mag,ang] = gfs.step(graysc);         % Gradient filtering
    ang       = (ang+pi)/(2*pi);          % Normalize angle
    mag       = min(mag,1);               % Saturate magnitude
    [r,g,b]   = hrsObj.step(ang,mag,mag); % To pseudo color
    frame     = cat(3,r,g,b);             % Concatinate RGB array
    vwObj.writeVideo(frame);              % Write frame
end
vwObj.close()

% Exercise 4-2
% vrObj = VideoReader('shuttle.avi');
% frameRate = vrObj.FrameRate;
% vwObj = VideoWriter('shuttlediff.avi');
% vwObj.FrameRate = frameRate;
% fdfObj = FrameDiffSystem();
% vwObj.open()
% while (vrObj.hasFrame())
%     frame = vrObj.readFrame();  % Read frame
%     frame = im2double(frame);   % To float type
%     frame = fdfObj.step(frame); % Frame difference
%     frame = frame/2+0.5;        % Adjust for display
%     vwObj.writeVideo(frame);    % Write frame
% end
% vwObj.close()

%
publish([proj '.part4'],type);
rmpath('workcq/part4')
```

Part 5

```
close all

addpath('workcq/part5')

%
copyfile('workcq/part5/videoio_slx_00.png', [targetdir 'videoio_slx_00.png']);
copyfile('workcq/part5/videoio_slx_01.png', [targetdir 'videoio_slx_01.png']);
copyfile('workcq/part5/videoio_slx_02.png', [targetdir 'videoio_slx_02.png']);
copyfile('workcq/part5/videoio_slx_03.png', [targetdir 'videoio_slx_03.png']);
copyfile('workcq/part5/videoio_slx_04.png', [targetdir 'videoio_slx_04.png']);
copyfile('workcq/part5/videorgb2gray_slx_00.png', [targetdir 'videorgb2gray_slx_00.png']);
copyfile('workcq/part5/videorgb2gray_slx_01.png', [targetdir 'videorgb2gray_slx_01.png']);
copyfile('workcq/part5/videorgb2gray_slx_02.png', [targetdir 'videorgb2gray_slx_02.png']);
copyfile('workcq/part5/videorgb2gray_slx_03.png', [targetdir 'videorgb2gray_slx_03.png']);
copyfile('workcq/part5/videogradfilt_slx_00.png', [targetdir 'videogradfilt_slx_00.png']);
copyfile('workcq/part5/file_button.png', [targetdir 'file_button.png']);
copyfile('workcq/part5/library_button.png', [targetdir 'library_button.png']);
copyfile('workcq/part5/play_button.png', [targetdir 'play_button.png']);
copyfile('workcq/part5/library_browser.png', [targetdir 'library_browser.png']);
copyfile('workcq/part5/cvs_library.png', [targetdir 'cvs_library.png']);
copyfile('workcq/part5/cvs_sources.png', [targetdir 'cvs_sources.png']);
copyfile('workcq/part5/cvs_sources_blocks.png',[targetdir 'cvs_sources_blocks.png']);
copyfile('workcq/part5/cvs_sinks.png', [targetdir 'cvs_sinks.png']);
copyfile('workcq/part5/cvs_sinks_blocks.png', [targetdir 'cvs_sinks_blocks.png']);
copyfile('workcq/part5/frommultimediafile_blockparameter.png', [targetdir 'frommultimediafile_b
copyfile('workcq/part5/tomultimediafile_blockparameter.png', [targetdir 'tomultimediafile_block
copyfile('workcq/part5/matlabsystem_blockparameter.png', [targetdir 'matlabsystem_blockparamete
copyfile('workcq/part5/imaq_blocks.png', [targetdir 'imaq_blocks.png']);
copyfile('workcq/part5/udf_blocks.png', [targetdir 'udf_blocks.png']);
copyfile('workcq/part5/vipmengradfilt_avi.png', [targetdir 'vipmengradfilt_avi.png']);
copyfile('workcq/part5/vipmengradfilt_sobel_avi.png', [targetdir 'vipmengradfilt_sobel_avi.png'

%
publish([proj '.part5'],type);
rmpath('workcq/part5')
```

Part 6

```
close all

addpath('workcq/part6')

copyfile('workcq/part6/raspberrypi_blocks.png', [targetdir 'raspberrypi_blocks.png']);
copyfile('workcq/part6/gradfilt_kernel.png', [targetdir 'gradfilt_kernel.png']);
copyfile('workcq/part6/raspi_microsd.png', [targetdir 'raspi_microsd.png']);
copyfile('workcq/part6/raspi_cableconnection.png', [targetdir 'raspi_cableconnection.png']);
copyfile('workcq/part6/raspi_hdmi.png', [targetdir 'raspi_hdmi.png']);
```

```
copyfile('workcq/part6/raspi_videogradfilt.png', [targetdir 'raspi_videogradfilt.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_00.png', [targetdir 'videogradfiltraspi_slx_00.pn
copyfile('workcq/part6/videogradfiltraspi_slx_01.png', [targetdir 'videogradfiltraspi_slx_01.pn
copyfile('workcq/part6/videogradfiltraspi_slx_02.png', [targetdir 'videogradfiltraspi_slx_02.pn
copyfile('workcq/part6/videogradfiltraspi_slx_03.png', [targetdir 'videogradfiltraspi_slx_03.pn
copyfile('workcq/part6/videogradfiltraspi_slx_04.png', [targetdir 'videogradfiltraspi_slx_04.pn
copyfile('workcq/part6/videogradfiltraspi_slx_05.png', [targetdir 'videogradfiltraspi_slx_05.pn
copyfile('workcq/part6/videogradfiltraspi_slx_06.png', [targetdir 'videogradfiltraspi_slx_06.pn
copyfile('workcq/part6/videogradfiltraspi_slx_07.png', [targetdir 'videogradfiltraspi_slx_07.pn
copyfile('workcq/part6/videogradfiltraspi_slx_08.png', [targetdir 'videogradfiltraspi_slx_08.pn
copyfile('workcq/part6/videogradfiltraspi_slx_09.png', [targetdir 'videogradfiltraspi_slx_09.pn
copyfile('workcq/part6/videogradfiltraspi_slx_10.png', [targetdir 'videogradfiltraspi_slx_10.pn
copyfile('workcq/part6/videogradfiltraspi_external.png', [targetdir 'videogradfiltraspi_externa
copyfile('workcq/part6/videogradfiltraspi_ipaddress.png', [targetdir 'videogradfiltraspi_ipaddr

%
publish([proj '.part6'],type);
rmpath('workcq/part6')
```

Part 7

```
close all

% Exercise 7-1
...
% Exercise 7-2
...

% Publish
publish([proj '.part7'],type);
```

Part 8

```
close all

% Exercise 8-1
...
% Exercise 8-2
...

% Publish
publish([proj '.part8'],type);
```

ZIP 作成

```
close all

cdir = pwd;
cd(['+' proj])
```

```
if exist(['html/embvision_' proj '.zip'],'file')==2
    delete(['html/embvision_' proj '.zip'])
    disp(['Old embvision_' proj '.zip was deleted.'])
end
```

```
Old embvision_cq.zip was deleted.
```

```
zip(['embvision_' proj], 'html')
movefile(['embvision_' proj '.zip'], 'html')
cd(cdir)
```

HTML ドキュメントのオープン

```
showdemo([proj '.index'])
```

本ライブスクリプトの PDF 化

```
export("publishallcq.mlx")
```

```
ans =
'D:\Workspace\GitHub\EmbVision\publishallcq.pdf'
```