

# 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 7 月号記事として再編集したものです。

### 作成者

- 新潟大学 村松 正吾, 高橋 勇希

Copyright (c), All rights reserved, 2014-2022, Shogo MURAMATSU and Yuki TAKAHASHI

### 準備

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

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

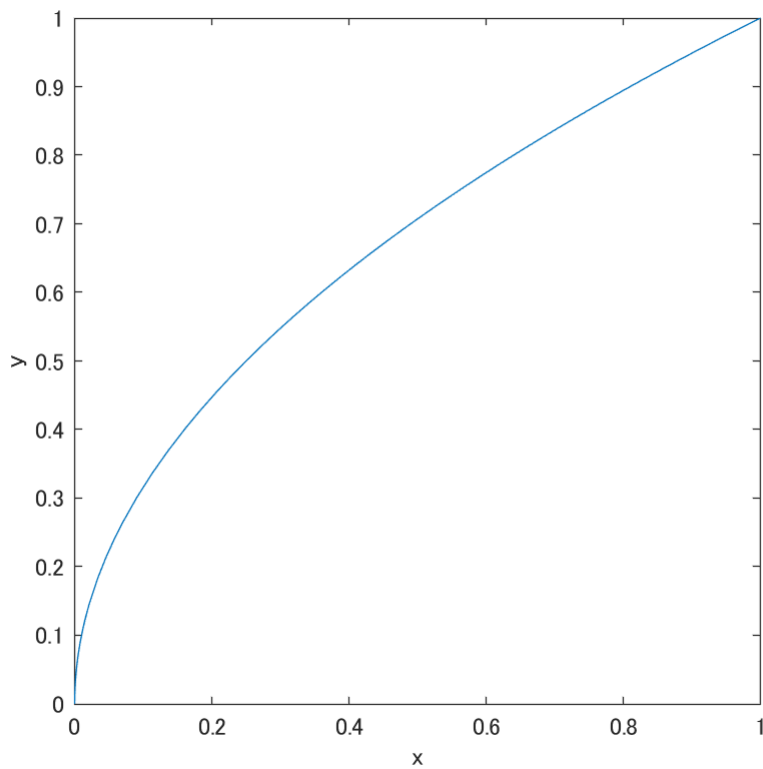
### Index

```
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 = get(vrObj,'FrameRate');
vwObj = VideoWriter('shuttlesobel.avi');
set(vwObj,'FrameRate',frameRate);
rgsObj = Rgb2GraySystem();
hrsObj = Hsv2RgbSystem();
gfsObj = GradFiltSystem('Kernel',[1 2 1; 0 0 0 ; -1 -2 -1]);
open(vwObj)
while (hasFrame(vrObj))
    frame      = readFrame(vrObj);           % Read frame
    graysc     = step(rgsObj,frame);         % To grayscale
    [mag,ang]  = step(gfsObj,graysc);        % Gradient filtering
    ang        = (ang+pi)/(2*pi);            % Normalize angle
    mag        = min(mag,1);                % Saturate magnitude
```

```

[r,g,b] = step(hrsObj,ang,mag,mag); % To pseudo color
frame   = cat(3,r,g,b);           % Concatinate RGB array
writeVideo(vwObj,frame);          % Write frame
end
close(vwObj)

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

%
publish([proj '.part4'],type);
rmrpath('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_blockparameter.png']);
copyfile('workcq/part5/tomultimediafile_blockparameter.png', [targetdir 'tomultimediafile_blockparameter.png']);
copyfile('workcq/part5/matlabssystem_blockparameter.png', [targetdir 'matlabssystem_blockparameter.png']);
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.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_01.png', [targetdir 'videogradfiltraspi_slx_01.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_02.png', [targetdir 'videogradfiltraspi_slx_02.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_03.png', [targetdir 'videogradfiltraspi_slx_03.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_04.png', [targetdir 'videogradfiltraspi_slx_04.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_05.png', [targetdir 'videogradfiltraspi_slx_05.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_06.png', [targetdir 'videogradfiltraspi_slx_06.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_07.png', [targetdir 'videogradfiltraspi_slx_07.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_08.png', [targetdir 'videogradfiltraspi_slx_08.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_09.png', [targetdir 'videogradfiltraspi_slx_09.png']);
copyfile('workcq/part6/videogradfiltraspi_slx_10.png', [targetdir 'videogradfiltraspi_slx_10.png']);
copyfile('workcq/part6/videogradfiltraspi_external.png', [targetdir 'videogradfiltraspi_external.png']);
copyfile('workcq/part6/videogradfiltraspi_ipaddress.png', [targetdir 'videogradfiltraspi_ipaddress.png']);

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

```

## ZIP 作成

```

close all

cdirc = 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 =
'C:\Users\shogo\Workspace\GitHub\EmbVision\publishallcq.pdf'
```