

MATLAB Deep Learning Competition

王茗冠

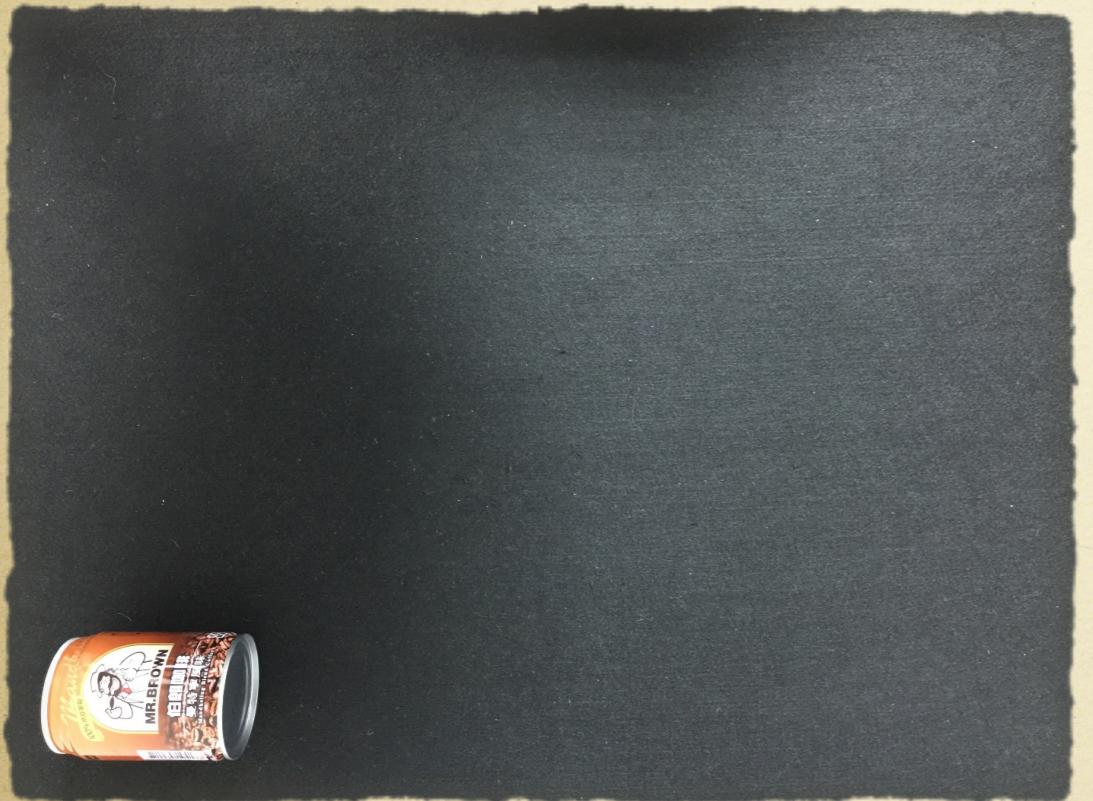
Apr. 2019

Data

英文標籤	中文標籤	英文標籤	中文標籤
B1	伯朗曼特寧咖啡	B54	義美檸檬紅茶
B2	伯朗咖啡	B55	光泉木瓜牛奶
B3	夏日蜜蘋果酒	B56	原萃日式綠茶
B4	熊霸激能飲料	B57	統一純喫茶紅茶
B5	光泉麥芽調味乳	B58	光泉富維他牛奶
B6	光泉皇家伯爵奶茶	B59	飲冰室茶集烏龍奶茶
B7	統一 AB 無糖優酪乳	B60	福樂翡翠檸檬茶
B8	貝納頌館藏咖啡(極品曼特寧風味)	B61	福樂葡萄冰茶
B9	台灣啤酒水果系列(芒果)	B62	光泉米漿
B10	可口可樂(易)	B63	義美無糖黑豆奶
B11	伯朗咖啡藍山風味	B64	瑞穗咖啡調味乳
B12	維大力汽水	B65	味全林鳳營高品質鮮乳
B13	CASS 凱獅啤酒	B66	統一純喫茶日式無糖

105 kinds of products

Data



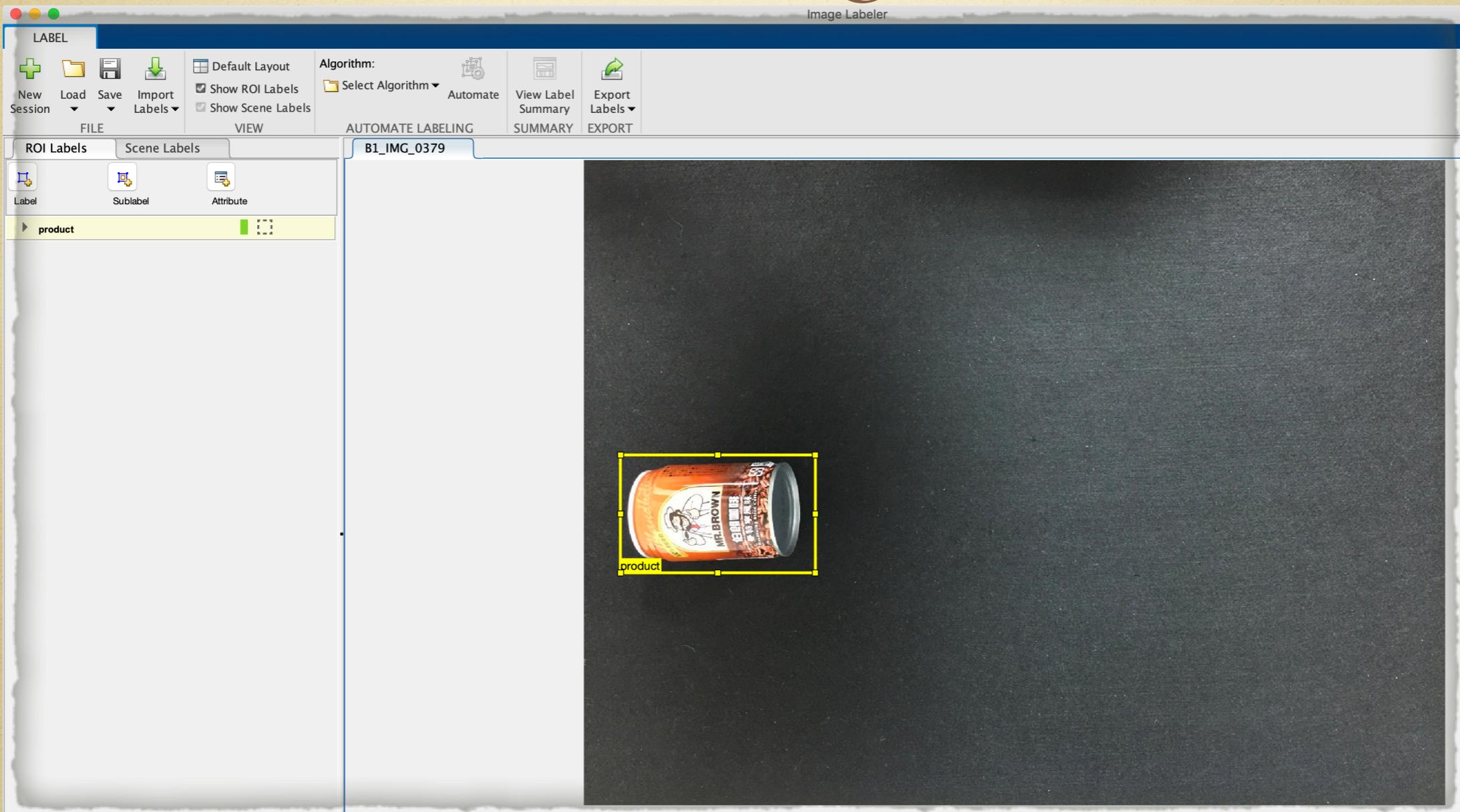
One product in each images in nine positions
3184 images

Data



Two products in each image
3612 images

Bounding Box



Used Image labeler App to label all images

Experiment



Compared with two methods

1. Original images
2. Crop images

Trained different models

1. Accuracy 50%
2. Accuracy 75%

Fast RCNN

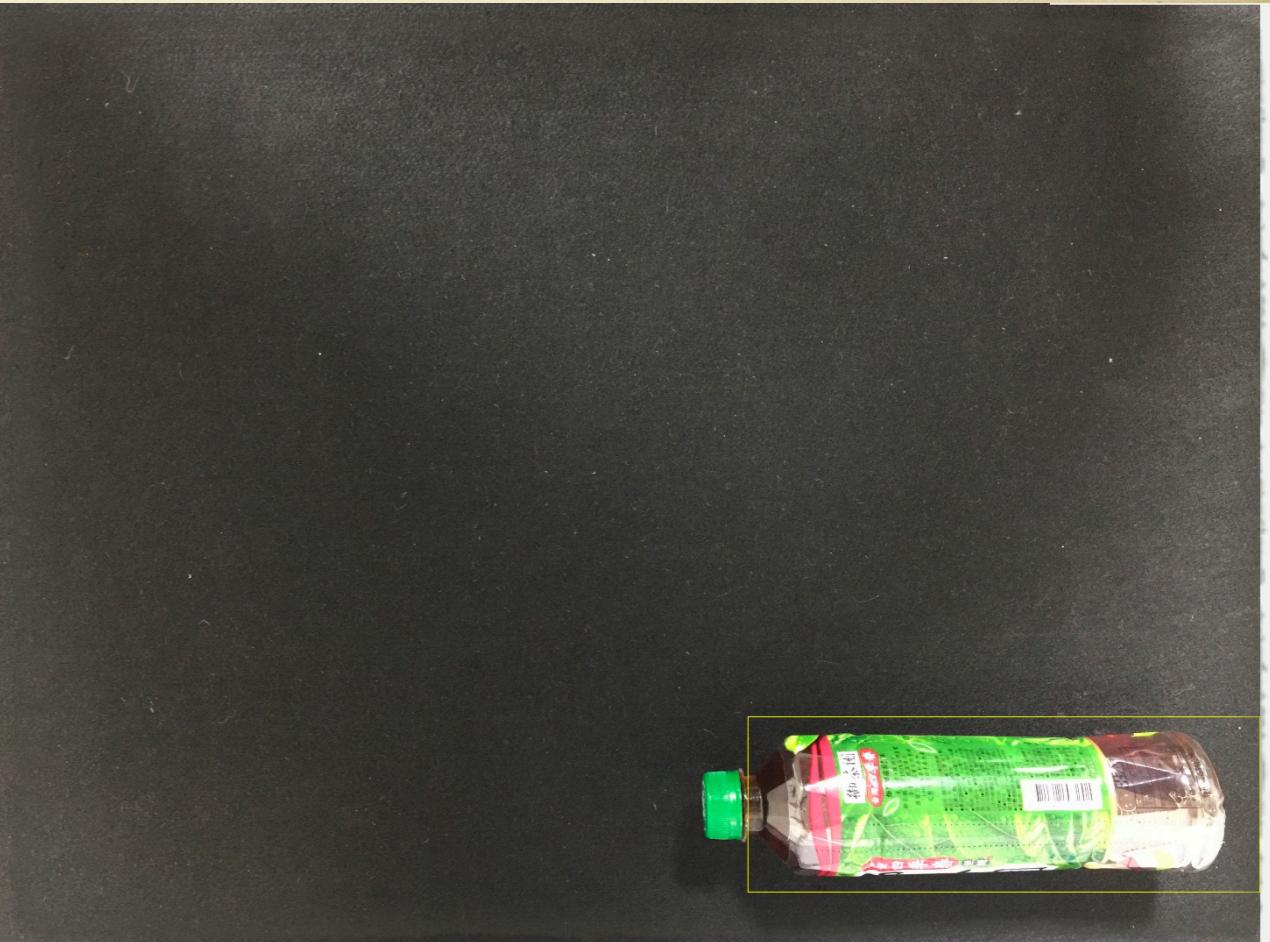
```
stock.imageFilename = fullfile('/Users/a326/Documents/Gary/training_data', 'trainval', 'img', 'img_000000000000.jpg');
stock.boundingBox = [100 100 200 200];
stock.classLabel = 'car';
options = trainingOptions('sgdm', ...
    'MiniBatchSize', 1, ...
    'InitialLearnRate', 1e-4, ...
    'MaxEpochs', 10, ...
    'CheckpointPath', tempdir);
frcnn = trainFastRCNNObjectDetector(data_info, fastRCNNLayers, options, ...
    'NegativeOverlapRange', [0 0.1], ...
    'PositiveOverlapRange', [0.6 1], ...
    'SmallestImageDimension', 600);
```

Used Fast RCNN to train the model

Fast RCNN

```
img = imread('/Users/a326/Documents/Gary/testing_data/B48_IMG_6414.JPG'
[bbox, score, label] = detect(frcnn, img);
detectedImg = insertShape(img, 'Rectangle', bbox);
figure
imshow(detectedImg)
```

Used Fast RCNN model
to find bounding box



CNN

```
imds = imageDatastore('/Users/a326/Documents/Gary/training_data','Includ
[imdsTrain,imdsValidation] = splitEachLabel(imds,0.7,'randomized');
net = alexnet;
%analyzeNetwork(net)
inputSize = net.Layers(1).InputSize
layersTransfer = net.Layers(1:end-3);
numClasses = numel(categories(imdsTrain.Labels))
layers = [
    layersTransfer
    fullyConnectedLayer(numClasses,'WeightLearnRateFactor',20,'BiasLearn
    softmaxLayer
    classificationLayer];
pixelRange = [-30 30];
```

Used alexnet for transfer learning

CNN

```
imageAugmenter = imageDataAugmenter( ...
    'RandXReflection',true, ...
    'RandXTranslation',pixelRange, ...
    'RandYTranslation',pixelRange);
augimdsTrain = augmentedImageDatastore(inputSize(1:2),imdsTrain, ...
    'DataAugmentation',imageAugmenter);
augimdsValidation = augmentedImageDatastore(inputSize(1:2),imdsValidation);
options = trainingOptions('sgdm', ...
    'MiniBatchSize',10, ...
    'MaxEpochs',6, ...
    'InitialLearnRate',1e-4, ...
    'Shuffle','every-epoch', ...
    'ValidationData',augimdsValidation, ...
    'ValidationFrequency',3, ...
    'Verbose',false, ...
    'Plots','training-progress');
netTransfer = trainNetwork(augimdsTrain,layers,options);
[YPred,scores] = classify(netTransfer,augimdsValidation);
```

```
YValidation = imdsValidation.Labels;
accuracy = mean(YPred == YValidation)
```

Set training option and check accuracy

Submission

```
%% Load image
imds = imageDatastore(imgPath);

%% Load model
load('frcnn_model0329.mat', 'frcnn');
load('cnn_model_crop.mat', 'netTransfer')
Pred = categorical();
Pred_num = [];
% Use frcnn to detect image position
for i = 1: length(imds.Files)
    img = imread(imds.Files{i,1});
    [bbox, score, label] = detect(frcnn, img);

    % Delete size of bbox smaller than 100*100
    del_p = [];
    for j = 1: size(bbox,1)
        if bbox(j,3) < 100 || bbox(j,4) < 100
            del_p = [del_p, j];
        end
    end
    bbox(del_p,:) = [];
```

Submission

```
% If number of bounding box = 1
if size(bbox, 1) == 1

% Crop image
img_new = imcrop(img,bbox);

% Use cnn to detect category of stock
img_new = imresize(img_new, [227,227]);
[YPred,scores] = classify(netTransfer,img_new);

%Pred(size(Pred)+1,1)= YPred;
%Pred=[Pred; YPred]
Pred(i,1) = YPred;
%Pred(i,3) = '1';
Pred_num = [Pred_num;1];
```

Problem of bounding box



← Multiple
bounding box

Submission

```
% If number of bounding box >= 2
elseif size(bbox, 1)>= 2
    %% Find top 2 biggest size of bounding box
    bbox_s = bbox(:,3:4);
    A1 = [];
    for k=1:size(bbox_s, 1)
        A = bbox_s(k,1) * bbox_s(k,2);
        A1 = [A1;A];
    end
    [a b] = max(A1);

    % Crop image
    img_new = imcrop(img,bbox(b,:));

    % Use cnn to detect category of stock
    img_new = imresize(img_new, [227,227])
    [YPred,scores] = classify(netTransfer,img_new)
    %Pred(size(Pred)+1,1)= YPred;
    Pred(i,1) = YPred;
    answer = YPred;
```

```
%% Find second large size of image
bbox(b,:) = [];
A1(b) = [];
[a b] = max(A1);

% Crop image
img_new = imcrop(img,bbox(b,:));

% Use cnn to detect category of stock
img_new = imresize(img_new, [227,227]);
[YPred,scores] = classify(netTransfer,img_new);
if YPred ~= answer
    Pred(i,2) = YPred;
    %Pred(i,3) = '2';
    Pred_num = [Pred_num; 2];
else
    %Pred(i,3) = '1';
    Pred_num = [Pred_num; 1];
end
```