基于bag of words和svm的图像分类

数据集

```
outputFolder = '../../datasets/caltech101'; % define output folder
url = 'http://www.vision.caltech.edu/Image_Datasets/Caltech101/101_ObjectCategories.tar.gz';
if ~exist(outputFolder, 'dir') % download only once
    disp('Downloading 126MB Caltech101 data set...');
    untar(url, outputFolder);
end
rootFolder = fullfile(outputFolder, '101_ObjectCategories');

% 加载数据集
categoriesFolders=dir(rootFolder);
categoriesFolders(1:3)=[];
categories= {categoriesFolders(:).name}';
% categories=categories(randperm(length(categories),20));
% categories=categories(1:10);

imds = imageDatastore(fullfile(rootFolder, categories), 'LabelSource', 'foldernames');
```

显示类别和数量

```
tbl = countEachLabel(imds);
tbl(1:5,:)
```

```
ans =
      Label       Count
    __________    _____

    Faces         435
    Faces_easy    435
    Leopards      200
    Motorbikes    798
    accordion      55
```

为了使各类样本数量平衡，选取数量最少的为基准抽取样本

```
minSetCount = min(tbl{:,2});
imds = splitEachLabel(imds, minSetCount, 'randomize');
tbl = countEachLabel(imds);
tbl(1:5,:)
```

```
ans =
      Label       Count
    __________    _____

    Faces         31
    Faces_easy    31
    Leopards      31
    Motorbikes    31
    accordion     31
```

分割样本

将样本随机分为训练集和测试集

```
[trainingSet, validationSet] = splitEachLabel(imds, 0.3, 'randomize');
```

提取 **bag of words** 词典

```
bag = bagOfFeatures(trainingSet);
```

根据词典训练**SVM**分类器

```
categoryClassifier = trainImageCategoryClassifier(trainingSet, bag);
```

测试分类器

测试训练集

```
confMatrix = evaluate(categoryClassifier, trainingSet);
mean(diag(confMatrix))
```

测试测试集

```
confMatrix = evaluate(categoryClassifier, validationSet);
mean(diag(confMatrix))
```

保存分类器

```
save('classifier','categoryClassifier');
```