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數據分析與應用_作業 4：鋼鐵瑕疵影像分類實作

#載入套件

```
install.packages(c("imager","caret","EBImage"))
```

```
library(imager)
```

```
library(caret)
```

```
library(EBImage)
```

#load train data .jpg

```
root = 'C:/Users/MCUT/Desktop/Steel/train/'
```

```
filenames = list.files(path = root, pattern = ".jpg", recursive = TRUE)
```

```
feature = {}
```

```
label = {}
```

```
for (i in filenames) {
```

```
  img = readImage(paste(root, i, sep = ""))
```

```
  label = c(label, strsplit(i, "[/"])[[1]][1])
```

```
  feature = rbind(feature, computeFeatures.basic(x=matrix(1, dim(img)[1],  
dim(img)[2]), ref=img))
```

```
}
```

```
trainset = data.frame(feature, label)
```

#load test data .jpg

```
root = 'C:/Users/MCUT/Desktop/Steel/test/'
```

```
filenames = list.files(path = root, pattern = ".jpg", recursive = TRUE)
```

```
feature = {}
```

```
label = {}
```

```
for (i in filenames) {
```

```
  img = readImage(paste(root, i, sep = ""))
```

```
  label = c(label, strsplit(i, "[/"])[[1]][1])
```

```
  feature = rbind(feature, computeFeatures.basic(x=matrix(1, dim(img)[1],  
dim(img)[2]), ref=img))
```

```
}
```

```
testset = data.frame(feature, label)
```

train model

```
#set.seed(7)
```

```
control_fit <- trainControl(method='cv', number=5,  
                             classProbs=TRUE,
```

```
summaryFunction=multiClassSummary,
selectionFunction = 'best')
```

```
glmnet_fit<- caret::train(label~., data=trainset,
                           method='glmnet',
                           metric='Accuracy',
                           trControl=control_fit,
                           verbose = FALSE)
```

```
#predict
```

```
pred_res<-predict(glmnet_fit, newdata=testset)
```

```
#confusionMatrix
```

```
confusionMatrix1<-confusionMatrix(pred_res,
                                    factor(testset$label),
                                    dnn = c('Prediction', 'Reference'),
                                    mode = 'everything')
```

```
> confusionMatrix1
```

Confusion Matrix and Statistics

	Reference		
Prediction	nail_jpg	scratch_jpg	smear_jpg
nail_jpg	23	6	0
scratch_jpg	3	8	0
smear_jpg	2	0	21

Overall Statistics

```
Accuracy : 0.8254
95% CI : (0.709, 0.9095)
No Information Rate : 0.4444
P-Value [Acc > NIR] : 5.56e-10
```

```
Kappa : 0.725
```

```
Mcnemar's Test P-Value : NA
```

Statistics by Class:

	Class: nail_jpg	Class: scratch_jpg	Class: smear_jpg
sensitivity	0.8214	0.5714	1.0000
specificity	0.8286	0.9388	0.9524
Pos Pred value	0.7931	0.7273	0.9130
Neg Pred value	0.8529	0.8846	1.0000
Precision	0.7931	0.7273	0.9130
Recall	0.8214	0.5714	1.0000
F1	0.8070	0.6400	0.9545
Prevalence	0.4444	0.2222	0.3333
Detection Rate	0.3651	0.1270	0.3333
Detection Prevalence	0.4603	0.1746	0.3651
Balanced Accuracy	0.8250	0.7551	0.9762

```

# preProcess
preProValues<-preProcess(trainset, method = c('center', 'scale'))
traindata<-predict(preProValues,trainset)
testdata<-predict(preProValues,testset)
#train glmnet model
control_fit <- trainControl(method='cv', number=5,
                             classProbs=TRUE,
                             summaryFunction=multiClassSummary,
                             selectionFunction = 'best')
glmnet_fit<- caret::train(label~., data=traindata,
                           method='glmnet',
                           metric='Accuracy',
                           trControl=control_fit,
                           verbose = FALSE)

#predict
pred_res<-predict(glmnet_fit, newdata=testdata)

```

```

confusionMatrix1<-confusionMatrix(pred_res,
                                    factor(testdata$label),
                                    dnn = c('Prediction', 'Reference'),
                                    mode = 'everything')

```

Confusion Matrix and Statistics

	Reference		
Prediction	nail_jpg	scratch_jpg	smear_jpg
nail_jpg	23	7	0
scratch_jpg	3	7	0
smear_jpg	2	0	21

Overall Statistics

```

Accuracy : 0.8095
95% CI : (0.6909, 0.8975)
No Information Rate : 0.4444
P-Value [Acc > NIR] : 3.078e-09

```

```
Kappa : 0.6983
```

```
Mcnemar's Test P-Value : NA
```

Statistics by Class:

	Class: nail_jpg	Class: scratch_jpg	Class: smear_jpg
Sensitivity	0.8214	0.5000	1.0000
Specificity	0.8000	0.9388	0.9524
Pos Pred Value	0.7667	0.7000	0.9130
Neg Pred Value	0.8485	0.8679	1.0000
Precision	0.7667	0.7000	0.9130
Recall	0.8214	0.5000	1.0000
F1	0.7931	0.5833	0.9545
Prevalence	0.4444	0.2222	0.3333
Detection Rate	0.3651	0.1111	0.3333
Detection Prevalence	0.4762	0.1587	0.3651
Balanced Accuracy	0.8107	0.7194	0.9762