Code ▾

main

Group 4

March 20, 2018

Hide

```
packages.used <- c("readr", "ggplot2", "caret", "Matrix",
                   "xgboost","EBImage", "e1071","knitr")
# check packages that need to be installed.
packages.needed <- setdiff(packages.used,
                           intersect(installed.packages()[,1],
                                     packages.used))
# install additional packages
if(length(packages.needed) > 0) {
  install.packages(packages.needed,dependencies = TRUE,
  repos = 'http://cran.us.r-project.org')
}
```

```
Warning in install.packages :
  package 'EBImage' is not available (for R version 3.4.4)
```

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```
library(readr)
library(ggplot2)
library(caret)
library(Matrix)
library(xgboost)
#library(EBImage)
library(e1071)
library(knitr)
```

Step 0: Specify directories.

Set the working directory to the image folder. Specify the training and the testing set. For data without an independent test/validation set, you need to create your own testing data by random subsampling. In order to obain reproducible results, set.seed() whenever randomization is used.

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```
#setwd("")
# here replace it with your own path or manually set it in RStudio to where this rmd f
ile is located.
```

Provide directories for raw images. Training set and test set should be in different subfolders.

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```
experiment_dir <- "../data/" # This will be modified for different data sets.
img_train_dir <- paste(experiment_dir, "train/", sep="")
img_test_dir <- paste(experiment_dir, "test/", sep="")
```

Step 1: Set up controls for evaluation experiments.

In this chunk, ,we have a set of controls for the evaluation experiments.

- (T/F) cross-validation on the training set
- (number) K, the number of CV folds
- (T/F) process features for training set
- (T/F) run evaluation on an independent test set
- (T/F) process features for test set

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```
run.cv=FALSE # run cross-validation on the training set
K <- 5  # number of CV folds
run.feature.train=FALSE # process features for training set
run.test=FALSE # run evaluation on an independent test set
run.feature.test=FALSE # process features for test set
run.train_nn = FALSE # run neural nerwork, model has been trained and
# saved to 'output/keras_model' no need to run again.
```

Using cross-validation or independent test set evaluation, we compare the performance of different classifiers or classifiers with different specifications.

Step 2: Import training images class labels.

In the dataset, label 1,2 and 3 correspond to fried chickens, dogs and blueberry muffins.

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```
label_train <- read.csv(paste(experiment_dir, "train/label_train.csv", sep=""), header
=T)$label
```

Step 3: Construct visual feature.

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```
source("../lib/feature.R")
if(run.feature.train){
set.seed(3)
time_ftrRGB <- system.time(rgb_feature <- featureRGB(img_train_dir,export = T))
cat("Time for constructing RGB features is",time_ftrRGB[3],"s \n")
rgb_feature$label <- label_train
trainimg <- sample(1:3000,2100)
testimg <- setdiff(1:3000,trainimg)
labeldf <- read.csv(paste(experiment_dir, "train/label_train.csv", sep=""), header=T)
img <- 1:3000
labeldf$train <- ifelse(img %in% trainimg,1,0)
write.csv(labeldf[,-1],file = "../data/train/label2.csv")
train.rgb <- rgb_feature[trainimg,]
test.rgb <- rgb_feature[testimg,]
write.csv(train.rgb,file = "../output/rgbftr_train.csv")
write.csv(test.rgb,file = "../output/rgbftr_test.csv")
write.csv(rgb_feature, file = "../output/rgbftr.csv")
}else{
train.rgb <- read.csv("../output/rgbftr_train.csv")[,-1]
test.rgb <- read.csv("../output/rgbftr_test.csv")[,-1]
}
```

Step 4: Train a classification model with training images.

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```
source("../lib/train.R")
```

```
Error in names(frame) <- `*vtmp*` : names() applied to a non-vector
```

Baseline model: GBM

Alternative model 1: Xgboost

In parameter selecting part, we select eta from 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, max depth from 3 to 8 by 5-fold cross validation.

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```
if(run.cv){
time_cv.Xgb <- system.time(cv_rgb <- xgb_param(train.rgb,K))
cat("Time for selecting best parameters is",time_cv.Xgb[3],"s \n")
param <- cv_rgb$best_param
}else{
param <- list(eta = 0.15, max_depth = 4)
}
time_model1 <- system.time(model <- xgb_model(train.rgb,param))
cat("Time for building xgboost model is",time_model1[3],"s \n")
```

```
Time for building xgboost model is 1.46 s
```

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```
time_pred1 <- system.time(pred <- xgb_pred(model, test.rgb))
cat("Time for predicting test data is",time_pred1[3],"s \n")
```

```
Time for predicting test data is 0.04 s
```

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```
err1 <- pred$err
err1
```

```
[1] 0.1111111
```

Alternative model 2: SVM

In parameter selecting part, for linear SVM, we select cost from 0.0001, 0.001, 0.01 and 0.1. For RBF kernal, we select cost from 0.0001, 0.001, 0.01 and 0.1, and selet gamma from 0.01, 0.1, 1, 10 and 100.

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```
if(run.cv){
train.X <- train.rgb[,-ncol(train.rgb)]
train.Y <- as.factor(train.rgb$label)
test.X <- test.rgb[,-ncol(test.rgb)]
test.Y <- as.factor(test.rgb$label)
# linear SVM with soft margin
linear_params <- list(cost = c(0.0001, 0.001, 0.01, 0.1))
lin_tc <- tune.control(cross = K)
time_cv.linsvm <- system.time(linsvm_tune <- tune(svm, train.x = train.X, train.y = tr
ain.Y,
                    kernel = "linear", scale = F, ranges = linear_params,
                    tunecontrol = lin_tc))
linsvm_summary <- summary(linsvm_tune)
perf_linsvm <- linsvm_tune$performances; perf_linsvm
# SVM with soft margin and RBF kernel
rbf_params <-list(cost=c(0.001, 0.01, 0.1, 1),gamma=c(0.01, 0.1, 1, 10, 100))
rbf_tc <- tune.control(cross = K)
time_cv.RBFsvm <- system.time(rbfsvm_tune <- tune(svm, train.x = train.X, train.y = tr
ain.Y,
                kernel = "radial", scale = F, ranges = rbf_params,
                tunecontrol = rbf_tc))
rbfsvm_summary <- summary(rbfsvm_tune)
perf_rbfsvm <- rbfsvm_tune$performances
linsvm_best_param <- linsvm_tune$best.parameters
rbfsvm_best_param <- rbfsvm_tune$best.parameters
}else{
  linsvm_best_param <- 0.1
  rbfsvm_best_param <- c(1,10)
}
# Linear SVM test set estimates of the error rates
time_model2 <- system.time(linsvm_best <- svm(as.factor(label)~.,data = train.rgb,
                                            cost = linsvm_best_param,
                                            kernel = "linear"))
time_pred2 <- system.time(linsvm_pred <- predict(linsvm_best, test.X))
err2 <- mean(linsvm_pred != test.Y)
cat(err2)
```

```
0.4111111
```

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```
# RBF SVM test set estimates of the error rates
time_model3 <- system.time(rbfsvm_best <- svm(as.factor(label)~.,data = train.rgb,
                                            cost = rbfsvm_best_param[1],
                                            gamma= rbfsvm_best_param[2]))
time_pred3 <- system.time(rbfsvm_pred <- predict(rbfsvm_best, test.X))
err3 <- mean(rbfsvm_pred != test.Y)
cat(err3)
```

```
0.2588889
```

Summary of performances

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```
showtable <- data.frame("Error"=c(err1,err2,err3),
                        "Model training time"=c(time_model1[3],time_model2[3],time_mod
el3[3]),
                        "Prediction time"=c(time_pred1[3],time_pred2[3],time_pred3[3])
)
rownames(showtable) <- c("Xgboost","Lineaer SVM", "RBF SVM")
kable(showtable, caption = "Performance Report")
```

	Error	Model.training.time	Prediction.time
Xgboost	0.1111111	1.46	0.04
Lineaer SVM	0.4111111	3.18	0.40
RBF SVM	0.2588889	2.45	0.33

Final Advanced Model: Fine tuning on MobileNet

This method is built on python 3.6, required packages: keras, tensorflow 1.4, opencv-python, skimage, pickle, scikit-learn. ### Preprocessing resize the images to a fixed size.

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```
if(run.feature.train){
  system('python ../lib/preprocessing.py --img_size=224')
}
```

Corss Validation

Conduct cross validation on the number of hidden unit in the last hidden dense layer.

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```
if(run.cv){
  system('python ../lib/cross_validation.py --k 5 --hidden_unit_list 256 512 1024 --ba
tch_size 128')
}
```

Running this on GCP with Nvidia K80, need 2 hours (about 20s an epoch). The result validation scores are [0.99095238095238103, 0.98857142857142866, 0.98999999999999999] for 256 512 1024 units. This would indicate that the hidden unit size might have minor effect on the result.

Here is the result copy from GCP

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```
cv_256 <- c(0.98809523809523814, 0.98809523809523814, 0.99523809523809526, 0.988095238
09523814, 0.99523809523809526)
cv_512 <- c(0.99047619047619051, 0.98333333333333328, 0.99047619047619051, 0.985714285
71428577, 0.99285714285714288)
cv_1024 <- c(0.98333333333333328, 0.98809523809523814, 0.99285714285714288, 0.99047619
047619051, 0.99523809523809526)
library(ggplot2)
cv_data <- NULL
cv_data$y <- c(cv_256, cv_512, cv_1024)
cv_data$x <- as.factor(rep(c(256,512,1024),each=5))
cv_data <- as.data.frame(cv_data)
ggplot(data=cv_data,aes(x=x,y=y))+
  geom_boxplot(aes(fill=x))+
  xlab('number of units in the last dense layer')+
  ylab('5 folds validation accuracy')
```

Training on partial of the provided training data (2100), predict on validation data (900) to compare with other models.

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```
system('python ../lib/train.py --hidden_unit 256 --epochs 30 --all_data 0')
```

```
2018-03-28 16:36:53.973545: I C:\tf_jenkins\home\workspace\rel-win\M\windows-gpu\PY\36
\tensorflow\core\platform\cpu_feature_guard.cc:137] Your CPU supports instructions tha
t this TensorFlow binary was not compiled to use: AVX AVX2
2018-03-28 16:36:54.328328: I C:\tf_jenkins\home\workspace\rel-win\M\windows-gpu\PY\36
\tensorflow\core\common_runtime\gpu\gpu_device.cc:1030] Found device 0 with properties
:
name: GeForce GTX 1060 major: 6 minor: 1 memoryClockRate(GHz): 1.6705
pciBusID: 0000:01:00.0
totalMemory: 3.00GiB freeMemory: 2.43GiB
2018-03-28 16:36:54.328676: I C:\tf_jenkins\home\workspace\rel-win\M\windows-gpu\PY\36
\tensorflow\core\common_runtime\gpu\gpu_device.cc:1120] Creating TensorFlow device (/d
evice:GPU:0) -> (device: 0, name: GeForce GTX 1060, pci bus id: 0000:01:00.0, compute
capability: 6.1)
train on 1890 data.
Epoch 1/30

 1/59 [..............................] - ETA: 1:34 - loss: 1.5785
 2/59 [>.............................] - ETA: 50s - loss: 3.3226
 3/59 [>.............................] - ETA: 34s - loss: 4.6150
 4/59 [=>............................] - ETA: 26s - loss: 3.9600
 5/59 [=>............................] - ETA: 21s - loss: 3.5316
 6/59 [==>...........................] - ETA: 18s - loss: 3.1902
 7/59 [==>...........................] - ETA: 16s - loss: 2.8778
 8/59 [===>..........................] - ETA: 16s - loss: 2.5655
 9/59 [===>..........................] - ETA: 15s - loss: 2.3170
10/59 [====>.........................] - ETA: 14s - loss: 2.1223
11/59 [====>.........................] - ETA: 14s - loss: 1.9429
12/59 [=====>........................] - ETA: 14s - loss: 1.8101
13/59 [=====>........................] - ETA: 13s - loss: 1.7173
14/59 [======>.......................] - ETA: 13s - loss: 1.6152
15/59 [======>.......................] - ETA: 12s - loss: 1.5328
16/59 [=======>......................] - ETA: 12s - loss: 1.4833
17/59 [=======>......................] - ETA: 12s - loss: 1.4516
18/59 [========>.....................] - ETA: 11s - loss: 1.4037
19/59 [========>.....................] - ETA: 11s - loss: 1.3490
20/59 [=========>....................] - ETA: 11s - loss: 1.3009
21/59 [=========>....................] - ETA: 10s - loss: 1.2548
22/59 [==========>...................] - ETA: 10s - loss: 1.2030
23/59 [==========>...................] - ETA: 10s - loss: 1.1574
24/59 [===========>..................] - ETA: 9s - loss: 1.1156
25/59 [===========>..................] - ETA: 9s - loss: 1.0791
26/59 [============>.................] - ETA: 9s - loss: 1.0425
27/59 [============>.................] - ETA: 8s - loss: 1.0068
28/59 [=============>................] - ETA: 8s - loss: 0.9811
29/59 [=============>................] - ETA: 8s - loss: 0.9561
30/59 [==============>...............] - ETA: 7s - loss: 0.9527
31/59 [==============>...............] - ETA: 7s - loss: 0.9559
32/59 [===============>..............] - ETA: 7s - loss: 0.9434
33/59 [===============>..............] - ETA: 7s - loss: 0.9310
34/59 [================>.............] - ETA: 6s - loss: 0.9077
```

```
35/59 [================>..............] - ETA: 6s - loss: 0.8846
36/59 [=================>.............] - ETA: 6s - loss: 0.8658
37/59 [=================>.............] - ETA: 5s - loss: 0.8463
38/59 [==================>............] - ETA: 5s - loss: 0.8259
39/59 [==================>............] - ETA: 5s - loss: 0.8104
40/59 [===================>...........] - ETA: 5s - loss: 0.7974
41/59 [===================>...........] - ETA: 4s - loss: 0.7807
42/59 [====================>..........] - ETA: 4s - loss: 0.7637
43/59 [====================>..........] - ETA: 4s - loss: 0.7487
44/59 [=====================>.........] - ETA: 3s - loss: 0.7349
45/59 [=====================>.........] - ETA: 3s - loss: 0.7194
47/59 [======================>........] - ETA: 3s - loss: 0.8574
48/59 [=======================>.......] - ETA: 2s - loss: 0.8530
49/59 [=======================>.......] - ETA: 2s - loss: 0.8385
50/59 [========================>......] - ETA: 2s - loss: 0.8241
51/59 [========================>......] - ETA: 2s - loss: 0.8097
52/59 [=========================>.....] - ETA: 1s - loss: 0.8002
53/59 [=========================>.....] - ETA: 1s - loss: 0.7862
54/59 [==========================>....] - ETA: 1s - loss: 0.7762
55/59 [==========================>....] - ETA: 1s - loss: 0.7641
56/59 [===========================>...] - ETA: 0s - loss: 0.7512
57/59 [===========================>...] - ETA: 0s - loss: 0.7386
58/59 [============================>..] - ETA: 0s - loss: 0.7280
59/59 [============================>..] - ETA: 0s - loss: 0.7172
Epoch 00001: val_loss improved from inf to 0.02098, saving model to ../output/keras_mo
del/mobilenet_partial_data.hdf5

60/59 [=============================] - 17s 291ms/step - loss: 0.7052 - val_loss: 0.0
210
Epoch 2/30

 1/59 [..............................] - ETA: 4s - loss: 0.0275
 2/59 [>.............................] - ETA: 4s - loss: 0.0717
 3/59 [>.............................] - ETA: 4s - loss: 0.1405
 4/59 [=>............................] - ETA: 4s - loss: 0.1246
 5/59 [=>............................] - ETA: 4s - loss: 0.1200
 6/59 [==>...........................] - ETA: 4s - loss: 0.1224
 7/59 [==>...........................] - ETA: 4s - loss: 0.1198
 8/59 [===>..........................] - ETA: 4s - loss: 0.1185
 9/59 [===>..........................] - ETA: 4s - loss: 0.1133
10/59 [====>.........................] - ETA: 4s - loss: 0.1317
11/59 [====>.........................] - ETA: 4s - loss: 0.1292
12/59 [=====>........................] - ETA: 5s - loss: 0.1327
13/59 [=====>........................] - ETA: 5s - loss: 0.1530
14/59 [======>.......................] - ETA: 6s - loss: 0.1709
15/59 [======>.......................] - ETA: 6s - loss: 0.1964
16/59 [=======>......................] - ETA: 6s - loss: 0.2087
17/59 [=======>......................] - ETA: 6s - loss: 0.2051
18/59 [========>.....................] - ETA: 6s - loss: 0.2100
19/59 [========>.....................] - ETA: 6s - loss: 0.2261
20/59 [=========>....................] - ETA: 6s - loss: 0.2282
```

```
21/59 [=========>....................] - ETA: 6s - loss: 0.2238
22/59 [==========>...................] - ETA: 6s - loss: 0.2203
23/59 [==========>...................] - ETA: 6s - loss: 0.2157
24/59 [==========>...................] - ETA: 6s - loss: 0.2087
25/59 [===========>..................] - ETA: 6s - loss: 0.2030
26/59 [===========>..................] - ETA: 6s - loss: 0.1971
27/59 [===========>..................] - ETA: 6s - loss: 0.1942
28/59 [============>.................] - ETA: 5s - loss: 0.1930
29/59 [============>.................] - ETA: 5s - loss: 0.1935
30/59 [=============>................] - ETA: 5s - loss: 0.1906
31/59 [=============>................] - ETA: 5s - loss: 0.1854
32/59 [==============>...............] - ETA: 5s - loss: 0.1800
33/59 [==============>...............] - ETA: 5s - loss: 0.1761
34/59 [===============>..............] - ETA: 5s - loss: 0.1746
35/59 [===============>..............] - ETA: 4s - loss: 0.1723
36/59 [================>.............] - ETA: 4s - loss: 0.1698
37/59 [================>.............] - ETA: 4s - loss: 0.1658
38/59 [=================>............] - ETA: 4s - loss: 0.1673
39/59 [=================>............] - ETA: 4s - loss: 0.1649
40/59 [==================>...........] - ETA: 3s - loss: 0.1619
41/59 [==================>...........] - ETA: 3s - loss: 0.1605
42/59 [===================>..........] - ETA: 3s - loss: 0.1593
43/59 [===================>..........] - ETA: 3s - loss: 0.1654
44/59 [====================>.........] - ETA: 3s - loss: 0.1879
45/59 [====================>.........] - ETA: 3s - loss: 0.2046
46/59 [=====================>........] - ETA: 2s - loss: 0.2079
47/59 [=====================>........] - ETA: 2s - loss: 0.2039
48/59 [======================>.......] - ETA: 2s - loss: 0.2002
49/59 [======================>.......] - ETA: 2s - loss: 0.1988
50/59 [=======================>......] - ETA: 1s - loss: 0.1963
51/59 [=======================>......] - ETA: 1s - loss: 0.1926
52/59 [========================>.....] - ETA: 1s - loss: 0.1915
53/59 [========================>.....] - ETA: 1s - loss: 0.1942
54/59 [=========================>....] - ETA: 1s - loss: 0.1920
55/59 [=========================>....] - ETA: 0s - loss: 0.1918
56/59 [==========================>...] - ETA: 0s - loss: 0.1924
57/59 [==========================>...] - ETA: 0s - loss: 0.1922
58/59 [===========================>..] - ETA: 0s - loss: 0.1890
Epoch 00002: val_loss did not improve

60/59 [============================] - 14s 231ms/step - loss: 0.3094 - val_loss: 0.1
202
Epoch 3/30

 1/59 [..............................] - ETA: 4s - loss: 0.2257
 2/59 [>.............................] - ETA: 4s - loss: 0.1586
 3/59 [>.............................] - ETA: 4s - loss: 0.1223
 4/59 [=>............................] - ETA: 5s - loss: 0.1374
 5/59 [=>............................] - ETA: 7s - loss: 0.1143
 6/59 [==>...........................] - ETA: 8s - loss: 0.1043
 7/59 [==>...........................] - ETA: 8s - loss: 0.0972
```

```
 8/59 [===>..........................] - ETA: 9s - loss: 0.1019
 9/59 [===>..........................] - ETA: 9s - loss: 0.0924
10/59 [====>.........................] - ETA: 9s - loss: 0.0973
11/59 [====>.........................] - ETA: 9s - loss: 0.1121
12/59 [=====>........................] - ETA: 9s - loss: 0.1105
13/59 [=====>........................] - ETA: 9s - loss: 0.1225
14/59 [======>.......................] - ETA: 9s - loss: 0.1183
15/59 [======>.......................] - ETA: 9s - loss: 0.1187
16/59 [=======>......................] - ETA: 9s - loss: 0.1398
17/59 [=======>......................] - ETA: 9s - loss: 0.1435
18/59 [========>.....................] - ETA: 8s - loss: 0.1384
19/59 [========>.....................] - ETA: 8s - loss: 0.1343
21/59 [=========>....................] - ETA: 8s - loss: 0.1272
22/59 [=========>....................] - ETA: 7s - loss: 0.1246
23/59 [=========>....................] - ETA: 7s - loss: 0.1214
24/59 [==========>...................] - ETA: 7s - loss: 0.1175
25/59 [==========>...................] - ETA: 7s - loss: 0.1162
26/59 [===========>..................] - ETA: 7s - loss: 0.1124
27/59 [===========>..................] - ETA: 7s - loss: 0.1090
28/59 [============>.................] - ETA: 6s - loss: 0.1056
29/59 [============>.................] - ETA: 6s - loss: 0.1050
30/59 [=============>................] - ETA: 6s - loss: 0.1054
31/59 [=============>................] - ETA: 6s - loss: 0.1047
32/59 [==============>...............] - ETA: 6s - loss: 0.1077
33/59 [==============>...............] - ETA: 5s - loss: 0.1103
34/59 [===============>..............] - ETA: 5s - loss: 0.1176
35/59 [===============>..............] - ETA: 5s - loss: 0.1282
36/59 [================>.............] - ETA: 5s - loss: 0.1439
37/59 [================>.............] - ETA: 5s - loss: 0.1443
38/59 [=================>............] - ETA: 4s - loss: 0.1413
39/59 [=================>............] - ETA: 4s - loss: 0.1405
40/59 [==================>...........] - ETA: 4s - loss: 0.1396
41/59 [==================>...........] - ETA: 4s - loss: 0.1377
42/59 [===================>..........] - ETA: 3s - loss: 0.1414
43/59 [===================>..........] - ETA: 3s - loss: 0.1425
44/59 [====================>.........] - ETA: 3s - loss: 0.1399
45/59 [====================>.........] - ETA: 3s - loss: 0.1371
46/59 [=====================>........] - ETA: 3s - loss: 0.1349
47/59 [=====================>........] - ETA: 2s - loss: 0.1338
48/59 [======================>.......] - ETA: 2s - loss: 0.1321
49/59 [======================>.......] - ETA: 2s - loss: 0.1299
50/59 [=======================>......] - ETA: 2s - loss: 0.1277
51/59 [=======================>......] - ETA: 1s - loss: 0.1300
52/59 [========================>.....] - ETA: 1s - loss: 0.1399
53/59 [========================>.....] - ETA: 1s - loss: 0.1541
54/59 [=========================>....] - ETA: 1s - loss: 0.1612
55/59 [=========================>....] - ETA: 0s - loss: 0.1599
56/59 [==========================>...] - ETA: 0s - loss: 0.1586
57/59 [==========================>...] - ETA: 0s - loss: 0.1613
58/59 [===========================>..] - ETA: 0s - loss: 0.1592
59/59 [===========================>..] - ETA: 0s - loss: 0.1577
```

```
Epoch 00003: val_loss did not improve

60/59 [==============================] - 15s 248ms/step - loss: 0.1553 - val_loss: 0.0
574
Epoch 4/30

 1/59 [..............................] - ETA: 5s - loss: 0.0186
 2/59 [>.............................] - ETA: 4s - loss: 0.0976
 3/59 [>.............................] - ETA: 4s - loss: 0.0938
 4/59 [=>............................] - ETA: 5s - loss: 0.0720
 5/59 [=>............................] - ETA: 6s - loss: 0.0617
 6/59 [==>...........................] - ETA: 8s - loss: 0.0698
 7/59 [==>...........................] - ETA: 8s - loss: 0.0618
 8/59 [===>..........................] - ETA: 8s - loss: 0.0579
 9/59 [===>..........................] - ETA: 9s - loss: 0.0593
10/59 [====>.........................] - ETA: 9s - loss: 0.0715
11/59 [====>.........................] - ETA: 9s - loss: 0.0652
12/59 [=====>........................] - ETA: 9s - loss: 0.0850
13/59 [=====>........................] - ETA: 9s - loss: 0.0864
14/59 [======>.......................] - ETA: 9s - loss: 0.0858
15/59 [======>.......................] - ETA: 9s - loss: 0.0818
16/59 [=======>......................] - ETA: 9s - loss: 0.0829
18/59 [========>.....................] - ETA: 8s - loss: 0.4943
19/59 [========>.....................] - ETA: 8s - loss: 0.4816
20/59 [=========>....................] - ETA: 8s - loss: 0.4594
21/59 [=========>....................] - ETA: 8s - loss: 0.4405
22/59 [==========>...................] - ETA: 7s - loss: 0.4260
23/59 [==========>...................] - ETA: 7s - loss: 0.4085
24/59 [===========>..................] - ETA: 7s - loss: 0.3938
25/59 [===========>..................] - ETA: 7s - loss: 0.3793
26/59 [============>.................] - ETA: 7s - loss: 0.3665
27/59 [============>.................] - ETA: 6s - loss: 0.3590
28/59 [=============>................] - ETA: 6s - loss: 0.3480
29/59 [=============>................] - ETA: 6s - loss: 0.3374
30/59 [==============>...............] - ETA: 6s - loss: 0.3275
31/59 [==============>...............] - ETA: 6s - loss: 0.3179
32/59 [===============>..............] - ETA: 6s - loss: 0.3118
33/59 [===============>..............] - ETA: 5s - loss: 0.3181
34/59 [================>.............] - ETA: 5s - loss: 0.3262
35/59 [================>.............] - ETA: 5s - loss: 0.3170
36/59 [=================>............] - ETA: 5s - loss: 0.3105
37/59 [=================>............] - ETA: 5s - loss: 0.3023
38/59 [==================>...........] - ETA: 4s - loss: 0.3014
39/59 [==================>...........] - ETA: 4s - loss: 0.2979
40/59 [===================>..........] - ETA: 4s - loss: 0.2926
41/59 [===================>..........] - ETA: 4s - loss: 0.2872
42/59 [====================>.........] - ETA: 3s - loss: 0.2835
43/59 [====================>.........] - ETA: 3s - loss: 0.2775
44/59 [=====================>........] - ETA: 3s - loss: 0.2721
45/59 [=====================>........] - ETA: 3s - loss: 0.2666
46/59 [=====================>.......] - ETA: 3s - loss: 0.2612
```

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47/59 [=====================>.......] - ETA: 2s - loss: 0.2559
48/59 [======================>......] - ETA: 2s - loss: 0.2528
49/59 [======================>......] - ETA: 2s - loss: 0.2492
50/59 [=======================>.....] - ETA: 2s - loss: 0.2449
51/59 [=======================>.....] - ETA: 1s - loss: 0.2404
52/59 [========================>....] - ETA: 1s - loss: 0.2367
53/59 [========================>....] - ETA: 1s - loss: 0.2460
54/59 [=========================>...] - ETA: 1s - loss: 0.2766
55/59 [=========================>...] - ETA: 0s - loss: 0.2893
56/59 [==========================>..] - ETA: 0s - loss: 0.2896
57/59 [==========================>..] - ETA: 0s - loss: 0.2849
58/59 [===========================>.] - ETA: 0s - loss: 0.2803
59/59 [===========================>.] - ETA: 0s - loss: 0.2758
Epoch 00004: val_loss did not improve

60/59 [============================] - 15s 249ms/step - loss: 0.2702 - val_loss: 0.0
226
Epoch 5/30

 1/59 [..............................] - ETA: 5s - loss: 0.0414
 2/59 [>.............................] - ETA: 5s - loss: 0.0415
 3/59 [>.............................] - ETA: 4s - loss: 0.0288
 4/59 [=>............................] - ETA: 4s - loss: 0.1751
 5/59 [=>............................] - ETA: 6s - loss: 0.2912
 6/59 [==>...........................] - ETA: 7s - loss: 0.2486
 7/59 [==>...........................] - ETA: 8s - loss: 0.2517
 8/59 [===>..........................] - ETA: 8s - loss: 0.2339
 9/59 [===>..........................] - ETA: 8s - loss: 0.2226
10/59 [====>.........................] - ETA: 9s - loss: 0.2035
11/59 [====>.........................] - ETA: 9s - loss: 0.1863
12/59 [=====>........................] - ETA: 9s - loss: 0.1773
13/59 [=====>........................] - ETA: 9s - loss: 0.1714
14/59 [======>.......................] - ETA: 9s - loss: 0.1634
15/59 [======>.......................] - ETA: 9s - loss: 0.1658
16/59 [=======>......................] - ETA: 9s - loss: 0.1652
17/59 [=======>......................] - ETA: 8s - loss: 0.1652
18/59 [========>.....................] - ETA: 8s - loss: 0.1569
19/59 [========>.....................] - ETA: 8s - loss: 0.1510
20/59 [=========>....................] - ETA: 8s - loss: 0.1501
21/59 [=========>....................] - ETA: 8s - loss: 0.1490
22/59 [==========>...................] - ETA: 8s - loss: 0.1434
23/59 [==========>...................] - ETA: 7s - loss: 0.1417
24/59 [===========>..................] - ETA: 7s - loss: 0.1359
25/59 [===========>..................] - ETA: 7s - loss: 0.1384
26/59 [============>.................] - ETA: 7s - loss: 0.1392
27/59 [============>.................] - ETA: 7s - loss: 0.1401
28/59 [=============>................] - ETA: 7s - loss: 0.1495
29/59 [=============>................] - ETA: 6s - loss: 0.1517
30/59 [==============>...............] - ETA: 6s - loss: 0.1564
31/59 [==============>...............] - ETA: 6s - loss: 0.1757
32/59 [===============>..............] - ETA: 6s - loss: 0.1855
```

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33/59 [==============>...............] - ETA: 5s - loss: 0.1824
34/59 [===============>..............] - ETA: 5s - loss: 0.1784
35/59 [===============>..............] - ETA: 5s - loss: 0.1740
36/59 [================>.............] - ETA: 5s - loss: 0.1717
37/59 [================>.............] - ETA: 5s - loss: 0.1680
38/59 [=================>............] - ETA: 4s - loss: 0.1717
39/59 [=================>............] - ETA: 4s - loss: 0.1682
40/59 [==================>...........] - ETA: 4s - loss: 0.1670
41/59 [==================>...........] - ETA: 4s - loss: 0.1645
42/59 [===================>..........] - ETA: 3s - loss: 0.1657
43/59 [===================>..........] - ETA: 3s - loss: 0.1674
44/59 [====================>.........] - ETA: 3s - loss: 0.1670
45/59 [====================>.........] - ETA: 3s - loss: 0.1653
46/59 [=====================>........] - ETA: 3s - loss: 0.1649
47/59 [=====================>........] - ETA: 2s - loss: 0.1625
48/59 [======================>.......] - ETA: 2s - loss: 0.1592
49/59 [======================>.......] - ETA: 2s - loss: 0.1569
50/59 [=======================>......] - ETA: 2s - loss: 0.1649
51/59 [=======================>......] - ETA: 1s - loss: 0.1705
52/59 [========================>.....] - ETA: 1s - loss: 0.1685
53/59 [========================>.....] - ETA: 1s - loss: 0.1677
54/59 [=========================>....] - ETA: 1s - loss: 0.1722
55/59 [=========================>....] - ETA: 0s - loss: 0.1722
56/59 [==========================>...] - ETA: 0s - loss: 0.1727
57/59 [==========================>...] - ETA: 0s - loss: 0.1717
58/59 [===========================>..] - ETA: 0s - loss: 0.1713
59/59 [===========================>..] - ETA: 0s - loss: 0.1694
Epoch 00005: val_loss did not improve

60/59 [==============================] - 15s 253ms/step - loss: 0.1735 - val_loss: 0.9
871
Epoch 6/30

 1/59 [..............................] - ETA: 4s - loss: 0.3086
 2/59 [>.............................] - ETA: 4s - loss: 0.1718
 3/59 [>.............................] - ETA: 4s - loss: 0.1168
 4/59 [=>............................] - ETA: 4s - loss: 0.0983
 5/59 [=>............................] - ETA: 4s - loss: 0.0874
 6/59 [==>...........................] - ETA: 6s - loss: 0.0971
 7/59 [==>...........................] - ETA: 7s - loss: 0.0889
 8/59 [===>..........................] - ETA: 7s - loss: 0.0826
 9/59 [===>..........................] - ETA: 8s - loss: 0.0747
10/59 [====>.........................] - ETA: 8s - loss: 0.0707
11/59 [====>.........................] - ETA: 8s - loss: 0.0675
12/59 [=====>........................] - ETA: 8s - loss: 0.0625
13/59 [=====>........................] - ETA: 8s - loss: 0.0662
14/59 [======>.......................] - ETA: 8s - loss: 0.0725
15/59 [======>.......................] - ETA: 8s - loss: 0.0686
16/59 [=======>......................] - ETA: 8s - loss: 0.0776
17/59 [=======>......................] - ETA: 8s - loss: 0.1199
18/59 [========>.....................] - ETA: 8s - loss: 0.1291
```

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19/59 [=======>......................] - ETA: 8s - loss: 0.1343
20/59 [========>.....................] - ETA: 8s - loss: 0.1382
21/59 [========>.....................] - ETA: 8s - loss: 0.1429
22/59 [=========>....................] - ETA: 7s - loss: 0.1414
23/59 [=========>....................] - ETA: 7s - loss: 0.1561
24/59 [==========>...................] - ETA: 7s - loss: 0.1532
25/59 [==========>...................] - ETA: 7s - loss: 0.1602
26/59 [===========>..................] - ETA: 7s - loss: 0.1620
27/59 [===========>..................] - ETA: 7s - loss: 0.1563
28/59 [============>.................] - ETA: 6s - loss: 0.1512
29/59 [============>.................] - ETA: 6s - loss: 0.1464
30/59 [=============>................] - ETA: 6s - loss: 0.1438
31/59 [=============>................] - ETA: 6s - loss: 0.1401
32/59 [==============>...............] - ETA: 6s - loss: 0.1357
34/59 [===============>..............] - ETA: 5s - loss: 0.2501
35/59 [===============>..............] - ETA: 5s - loss: 0.2456
36/59 [================>.............] - ETA: 5s - loss: 0.2397
37/59 [================>.............] - ETA: 4s - loss: 0.2337
38/59 [=================>............] - ETA: 4s - loss: 0.2292
39/59 [=================>............] - ETA: 4s - loss: 0.2240
40/59 [==================>...........] - ETA: 4s - loss: 0.2195
41/59 [==================>...........] - ETA: 4s - loss: 0.2153
42/59 [===================>..........] - ETA: 3s - loss: 0.2161
43/59 [===================>..........] - ETA: 3s - loss: 0.2111
44/59 [====================>.........] - ETA: 3s - loss: 0.2073
45/59 [====================>.........] - ETA: 3s - loss: 0.2041
46/59 [=====================>........] - ETA: 2s - loss: 0.2006
47/59 [=====================>........] - ETA: 2s - loss: 0.2042
48/59 [======================>.......] - ETA: 2s - loss: 0.2001
49/59 [======================>.......] - ETA: 2s - loss: 0.1962
50/59 [=======================>......] - ETA: 2s - loss: 0.1923
51/59 [=======================>......] - ETA: 1s - loss: 0.1890
52/59 [========================>.....] - ETA: 1s - loss: 0.1854
53/59 [========================>.....] - ETA: 1s - loss: 0.1820
54/59 [=========================>....] - ETA: 1s - loss: 0.1787
55/59 [=========================>....] - ETA: 0s - loss: 0.1767
56/59 [==========================>...] - ETA: 0s - loss: 0.1739
57/59 [==========================>...] - ETA: 0s - loss: 0.1711
58/59 [===========================>..] - ETA: 0s - loss: 0.1810
59/59 [===========================>..] - ETA: 0s - loss: 0.1895
Epoch 00006: val_loss did not improve

60/59 [=============================] - 15s 243ms/step - loss: 0.1885 - val_loss: 0.0
544
Epoch 7/30

 1/59 [..............................] - ETA: 5s - loss: 0.0191
 2/59 [>.............................] - ETA: 4s - loss: 0.0418
 3/59 [>.............................] - ETA: 4s - loss: 0.0287
 4/59 [=>............................] - ETA: 5s - loss: 0.0224
 5/59 [=>............................] - ETA: 7s - loss: 0.0224
```

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 6/59 [==>...........................] - ETA: 7s - loss: 0.0198
 7/59 [==>...........................] - ETA: 8s - loss: 0.0261
 8/59 [===>..........................] - ETA: 8s - loss: 0.0251
 9/59 [===>..........................] - ETA: 9s - loss: 0.0226
10/59 [====>.........................] - ETA: 9s - loss: 0.0244
11/59 [====>.........................] - ETA: 9s - loss: 0.0227
12/59 [=====>........................] - ETA: 9s - loss: 0.0242
13/59 [=====>........................] - ETA: 9s - loss: 0.0323
14/59 [======>.......................] - ETA: 9s - loss: 0.0350
15/59 [======>.......................] - ETA: 9s - loss: 0.0428
16/59 [=======>......................] - ETA: 9s - loss: 0.0578
17/59 [=======>......................] - ETA: 8s - loss: 0.0685
18/59 [========>.....................] - ETA: 8s - loss: 0.0660
19/59 [========>.....................] - ETA: 8s - loss: 0.0687
21/59 [=========>....................] - ETA: 8s - loss: 0.0791
22/59 [=========>....................] - ETA: 7s - loss: 0.0758
23/59 [==========>...................] - ETA: 7s - loss: 0.0729
24/59 [==========>...................] - ETA: 7s - loss: 0.0704
25/59 [==========>...................] - ETA: 7s - loss: 0.0677
26/59 [===========>..................] - ETA: 7s - loss: 0.0659
27/59 [===========>..................] - ETA: 7s - loss: 0.0785
28/59 [============>.................] - ETA: 6s - loss: 0.0767
29/59 [============>.................] - ETA: 6s - loss: 0.0998
30/59 [=============>................] - ETA: 6s - loss: 0.0976
31/59 [=============>................] - ETA: 6s - loss: 0.1029
32/59 [==============>...............] - ETA: 6s - loss: 0.1011
33/59 [==============>...............] - ETA: 5s - loss: 0.0994
34/59 [===============>..............] - ETA: 5s - loss: 0.0970
35/59 [===============>..............] - ETA: 5s - loss: 0.0943
36/59 [================>.............] - ETA: 5s - loss: 0.0936
37/59 [================>.............] - ETA: 5s - loss: 0.0941
38/59 [=================>............] - ETA: 4s - loss: 0.0917
39/59 [=================>............] - ETA: 4s - loss: 0.0951
40/59 [==================>...........] - ETA: 4s - loss: 0.1032
41/59 [==================>...........] - ETA: 4s - loss: 0.1016
42/59 [===================>..........] - ETA: 3s - loss: 0.1003
43/59 [===================>..........] - ETA: 3s - loss: 0.0994
44/59 [====================>.........] - ETA: 3s - loss: 0.0971
45/59 [====================>.........] - ETA: 3s - loss: 0.0973
46/59 [=====================>........] - ETA: 3s - loss: 0.0961
47/59 [=====================>........] - ETA: 2s - loss: 0.0972
48/59 [======================>.......] - ETA: 2s - loss: 0.0959
49/59 [======================>.......] - ETA: 2s - loss: 0.0949
50/59 [=======================>......] - ETA: 2s - loss: 0.0967
51/59 [=======================>......] - ETA: 1s - loss: 0.0968
52/59 [========================>.....] - ETA: 1s - loss: 0.0976
53/59 [========================>.....] - ETA: 1s - loss: 0.0966
54/59 [=========================>....] - ETA: 1s - loss: 0.0953
55/59 [=========================>....] - ETA: 0s - loss: 0.0964
56/59 [==========================>...] - ETA: 0s - loss: 0.0951
57/59 [==========================>...] - ETA: 0s - loss: 0.0945
```

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58/59 [=============================>.] - ETA: 0s - loss: 0.0932
59/59 [=============================>.] - ETA: 0s - loss: 0.0918
Epoch 00007: val_loss did not improve

60/59 [==============================] - 15s 248ms/step - loss: 0.0915 - val_loss: 0.0
286
Epoch 8/30

 1/59 [..............................] - ETA: 4s - loss: 0.1212
 2/59 [>.............................] - ETA: 4s - loss: 0.0953
 3/59 [>.............................] - ETA: 4s - loss: 0.0678
 4/59 [=>............................] - ETA: 5s - loss: 0.2034
 5/59 [=>............................] - ETA: 6s - loss: 0.2460
 6/59 [==>...........................] - ETA: 7s - loss: 0.2196
 7/59 [==>...........................] - ETA: 8s - loss: 0.1935
 8/59 [===>..........................] - ETA: 8s - loss: 0.1914
 9/59 [===>..........................] - ETA: 9s - loss: 0.1778
10/59 [====>.........................] - ETA: 9s - loss: 0.1672
11/59 [====>.........................] - ETA: 9s - loss: 0.1524
12/59 [=====>........................] - ETA: 9s - loss: 0.1568
13/59 [=====>........................] - ETA: 9s - loss: 0.1535
14/59 [======>.......................] - ETA: 9s - loss: 0.1459
15/59 [======>.......................] - ETA: 9s - loss: 0.1476
16/59 [=======>......................] - ETA: 9s - loss: 0.1446
17/59 [=======>......................] - ETA: 8s - loss: 0.1424
18/59 [========>.....................] - ETA: 8s - loss: 0.1384
19/59 [========>.....................] - ETA: 8s - loss: 0.1340
20/59 [=========>....................] - ETA: 8s - loss: 0.1277
21/59 [=========>....................] - ETA: 8s - loss: 0.1219
22/59 [==========>...................] - ETA: 8s - loss: 0.1267
23/59 [==========>...................] - ETA: 8s - loss: 0.1409
24/59 [===========>..................] - ETA: 7s - loss: 0.1384
25/59 [===========>..................] - ETA: 7s - loss: 0.1418
26/59 [============>.................] - ETA: 7s - loss: 0.1430
27/59 [============>.................] - ETA: 7s - loss: 0.1469
28/59 [=============>................] - ETA: 7s - loss: 0.1417
29/59 [=============>................] - ETA: 6s - loss: 0.1376
30/59 [==============>...............] - ETA: 6s - loss: 0.1332
31/59 [==============>...............] - ETA: 6s - loss: 0.1308
32/59 [===============>..............] - ETA: 6s - loss: 0.1365
33/59 [===============>..............] - ETA: 6s - loss: 0.1339
35/59 [================>.............] - ETA: 5s - loss: 0.1276
36/59 [=================>............] - ETA: 5s - loss: 0.1357
37/59 [=================>............] - ETA: 5s - loss: 0.1410
38/59 [==================>...........] - ETA: 4s - loss: 0.1395
39/59 [==================>...........] - ETA: 4s - loss: 0.1361
40/59 [===================>..........] - ETA: 4s - loss: 0.1331
41/59 [===================>..........] - ETA: 4s - loss: 0.1300
42/59 [====================>.........] - ETA: 3s - loss: 0.1285
43/59 [====================>.........] - ETA: 3s - loss: 0.1333
44/59 [=====================>........] - ETA: 3s - loss: 0.1306
```

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45/59 [====================>........] - ETA: 3s - loss: 0.1383
46/59 [=====================>.......] - ETA: 3s - loss: 0.1465
47/59 [=====================>.......] - ETA: 2s - loss: 0.1447
48/59 [======================>......] - ETA: 2s - loss: 0.1421
49/59 [======================>......] - ETA: 2s - loss: 0.1416
50/59 [=======================>.....] - ETA: 2s - loss: 0.1390
51/59 [=======================>.....] - ETA: 1s - loss: 0.1378
52/59 [========================>....] - ETA: 1s - loss: 0.1356
53/59 [========================>....] - ETA: 1s - loss: 0.1338
54/59 [=========================>...] - ETA: 1s - loss: 0.1324
55/59 [=========================>...] - ETA: 0s - loss: 0.1301
56/59 [==========================>..] - ETA: 0s - loss: 0.1282
57/59 [==========================>..] - ETA: 0s - loss: 0.1263
58/59 [===========================>.] - ETA: 0s - loss: 0.1254
59/59 [===========================>.] - ETA: 0s - loss: 0.1233
Epoch 00008: val_loss did not improve

60/59 [==============================] - 15s 252ms/step - loss: 0.1241 - val_loss: 0.0
256
Epoch 9/30

 1/59 [..............................] - ETA: 4s - loss: 0.0092
 2/59 [>.............................] - ETA: 4s - loss: 0.0451
 3/59 [>.............................] - ETA: 4s - loss: 0.0903
 4/59 [=>............................] - ETA: 5s - loss: 0.1668
 5/59 [=>............................] - ETA: 6s - loss: 0.1942
 6/59 [==>...........................] - ETA: 7s - loss: 0.1772
 7/59 [==>...........................] - ETA: 8s - loss: 0.1814
 8/59 [===>..........................] - ETA: 8s - loss: 0.1591
 9/59 [===>..........................] - ETA: 9s - loss: 0.1674
10/59 [====>.........................] - ETA: 9s - loss: 0.1513
11/59 [====>.........................] - ETA: 9s - loss: 0.1420
12/59 [=====>........................] - ETA: 9s - loss: 0.1319
13/59 [=====>........................] - ETA: 9s - loss: 0.1222
14/59 [======>.......................] - ETA: 9s - loss: 0.1137
15/59 [======>.......................] - ETA: 9s - loss: 0.1065
16/59 [=======>......................] - ETA: 9s - loss: 0.1126
17/59 [=======>......................] - ETA: 8s - loss: 0.1062
18/59 [========>.....................] - ETA: 8s - loss: 0.1010
19/59 [========>.....................] - ETA: 8s - loss: 0.0989
20/59 [=========>....................] - ETA: 8s - loss: 0.0964
21/59 [=========>....................] - ETA: 8s - loss: 0.0925
22/59 [==========>...................] - ETA: 8s - loss: 0.0892
23/59 [==========>...................] - ETA: 8s - loss: 0.0856
24/59 [===========>..................] - ETA: 7s - loss: 0.0887
25/59 [===========>..................] - ETA: 7s - loss: 0.0863
26/59 [============>.................] - ETA: 7s - loss: 0.0830
27/59 [============>.................] - ETA: 7s - loss: 0.0977
28/59 [=============>................] - ETA: 7s - loss: 0.1097
29/59 [=============>................] - ETA: 6s - loss: 0.1079
30/59 [==============>...............] - ETA: 6s - loss: 0.1109
```

```
31/59 [=============>................] - ETA: 6s - loss: 0.1079
32/59 [==============>..............] - ETA: 6s - loss: 0.1060
33/59 [==============>..............] - ETA: 5s - loss: 0.1029
34/59 [===============>.............] - ETA: 5s - loss: 0.1063
35/59 [===============>.............] - ETA: 5s - loss: 0.1109
36/59 [================>............] - ETA: 5s - loss: 0.1081
37/59 [================>............] - ETA: 5s - loss: 0.1066
38/59 [=================>...........] - ETA: 4s - loss: 0.1039
39/59 [=================>...........] - ETA: 4s - loss: 0.1045
40/59 [==================>..........] - ETA: 4s - loss: 0.1029
41/59 [==================>..........] - ETA: 4s - loss: 0.1004
42/59 [===================>.........] - ETA: 3s - loss: 0.0984
43/59 [===================>.........] - ETA: 3s - loss: 0.0968
44/59 [====================>........] - ETA: 3s - loss: 0.0950
46/59 [=====================>.......] - ETA: 3s - loss: 0.1253
47/59 [=====================>.......] - ETA: 2s - loss: 0.1287
48/59 [======================>......] - ETA: 2s - loss: 0.1280
49/59 [======================>......] - ETA: 2s - loss: 0.1278
50/59 [=======================>.....] - ETA: 2s - loss: 0.1268
51/59 [=======================>.....] - ETA: 1s - loss: 0.1302
52/59 [========================>....] - ETA: 1s - loss: 0.1290
53/59 [========================>....] - ETA: 1s - loss: 0.1279
54/59 [=========================>...] - ETA: 1s - loss: 0.1263
55/59 [=========================>...] - ETA: 0s - loss: 0.1248
56/59 [==========================>..] - ETA: 0s - loss: 0.1233
57/59 [==========================>..] - ETA: 0s - loss: 0.1221
58/59 [===========================>.] - ETA: 0s - loss: 0.1248
59/59 [===========================>.] - ETA: 0s - loss: 0.1285
Epoch 00009: val_loss improved from 0.02098 to 0.01302, saving model to ../output/kera
s_model/mobilenet_partial_data.hdf5

60/59 [=============================] - 15s 250ms/step - loss: 0.1262 - val_loss: 0.0
130
Epoch 10/30

 1/59 [..............................] - ETA: 4s - loss: 0.0917
 2/59 [>.............................] - ETA: 4s - loss: 0.0540
 3/59 [>.............................] - ETA: 4s - loss: 0.0601
 4/59 [=>............................] - ETA: 4s - loss: 0.0564
 5/59 [=>............................] - ETA: 5s - loss: 0.0774
 6/59 [==>...........................] - ETA: 6s - loss: 0.0669
 7/59 [==>...........................] - ETA: 7s - loss: 0.0624
 8/59 [===>..........................] - ETA: 8s - loss: 0.0854
 9/59 [===>..........................] - ETA: 8s - loss: 0.0791
10/59 [====>.........................] - ETA: 8s - loss: 0.0750
11/59 [====>.........................] - ETA: 8s - loss: 0.0702
12/59 [=====>........................] - ETA: 8s - loss: 0.0663
13/59 [=====>........................] - ETA: 9s - loss: 0.0674
14/59 [======>.......................] - ETA: 8s - loss: 0.0648
15/59 [======>.......................] - ETA: 8s - loss: 0.0605
16/59 [=======>......................] - ETA: 8s - loss: 0.0634
```

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17/59 [======>.......................] - ETA: 8s - loss: 0.0671
18/59 [=======>......................] - ETA: 8s - loss: 0.0648
19/59 [=======>......................] - ETA: 8s - loss: 0.0657
20/59 [========>.....................] - ETA: 8s - loss: 0.0637
22/59 [=========>....................] - ETA: 7s - loss: 0.0643
23/59 [=========>....................] - ETA: 7s - loss: 0.0773
24/59 [==========>...................] - ETA: 7s - loss: 0.0978
25/59 [==========>...................] - ETA: 7s - loss: 0.0952
26/59 [===========>..................] - ETA: 7s - loss: 0.0991
27/59 [===========>..................] - ETA: 6s - loss: 0.0962
28/59 [============>.................] - ETA: 6s - loss: 0.0931
29/59 [============>.................] - ETA: 6s - loss: 0.0904
30/59 [=============>................] - ETA: 6s - loss: 0.0998
31/59 [=============>................] - ETA: 6s - loss: 0.0971
32/59 [==============>...............] - ETA: 5s - loss: 0.1035
33/59 [==============>...............] - ETA: 5s - loss: 0.1118
34/59 [===============>..............] - ETA: 5s - loss: 0.1128
35/59 [===============>..............] - ETA: 5s - loss: 0.1098
36/59 [================>.............] - ETA: 5s - loss: 0.1070
37/59 [================>.............] - ETA: 4s - loss: 0.1046
38/59 [=================>............] - ETA: 4s - loss: 0.1023
39/59 [=================>............] - ETA: 4s - loss: 0.1029
40/59 [==================>...........] - ETA: 4s - loss: 0.1010
41/59 [==================>...........] - ETA: 4s - loss: 0.0987
42/59 [===================>..........] - ETA: 3s - loss: 0.0987
43/59 [===================>..........] - ETA: 3s - loss: 0.1013
44/59 [====================>.........] - ETA: 3s - loss: 0.0990
45/59 [====================>.........] - ETA: 3s - loss: 0.1006
46/59 [=====================>........] - ETA: 3s - loss: 0.1061
47/59 [=====================>........] - ETA: 2s - loss: 0.1040
48/59 [======================>.......] - ETA: 2s - loss: 0.1027
49/59 [======================>.......] - ETA: 2s - loss: 0.1008
50/59 [=======================>......] - ETA: 2s - loss: 0.0992
51/59 [========================>.....] - ETA: 1s - loss: 0.0974
52/59 [========================>.....] - ETA: 1s - loss: 0.0965
53/59 [=========================>....] - ETA: 1s - loss: 0.0992
54/59 [=========================>....] - ETA: 1s - loss: 0.0980
55/59 [==========================>...] - ETA: 0s - loss: 0.0964
56/59 [===========================>..] - ETA: 0s - loss: 0.0951
57/59 [===========================>..] - ETA: 0s - loss: 0.0981
58/59 [============================>.] - ETA: 0s - loss: 0.0969
59/59 [============================>.] - ETA: 0s - loss: 0.0982
Epoch 00010: val_loss improved from 0.01302 to 0.00759, saving model to ../output/kera
s_model/mobilenet_partial_data.hdf5


60/59 [==============================] - 15s 250ms/step - loss: 0.1079 - val_loss: 0.0
076
Epoch 11/30

 1/59 [..............................] - ETA: 4s - loss: 0.0263
 2/59 [>.............................] - ETA: 4s - loss: 0.0464
```

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 3/59 [>.............................] - ETA: 4s - loss: 0.0325
 4/59 [=>............................] - ETA: 4s - loss: 0.0247
 5/59 [=>............................] - ETA: 5s - loss: 0.0204
 6/59 [==>...........................] - ETA: 6s - loss: 0.0175
 7/59 [==>...........................] - ETA: 7s - loss: 0.0165
 8/59 [===>..........................] - ETA: 8s - loss: 0.0428
 9/59 [===>..........................] - ETA: 8s - loss: 0.0718
10/59 [====>.........................] - ETA: 8s - loss: 0.0649
11/59 [====>.........................] - ETA: 8s - loss: 0.0760
12/59 [=====>........................] - ETA: 8s - loss: 0.0866
13/59 [=====>........................] - ETA: 8s - loss: 0.0822
14/59 [======>.......................] - ETA: 8s - loss: 0.0767
15/59 [======>.......................] - ETA: 8s - loss: 0.0856
16/59 [=======>......................] - ETA: 8s - loss: 0.0897
17/59 [=======>......................] - ETA: 8s - loss: 0.0908
18/59 [========>.....................] - ETA: 8s - loss: 0.0977
19/59 [========>.....................] - ETA: 8s - loss: 0.0965
20/59 [=========>....................] - ETA: 8s - loss: 0.0931
21/59 [=========>....................] - ETA: 8s - loss: 0.0929
22/59 [==========>...................] - ETA: 8s - loss: 0.0911
23/59 [==========>...................] - ETA: 7s - loss: 0.0880
24/59 [===========>..................] - ETA: 7s - loss: 0.0848
25/59 [===========>..................] - ETA: 7s - loss: 0.0815
26/59 [============>.................] - ETA: 7s - loss: 0.0787
27/59 [============>.................] - ETA: 7s - loss: 0.0762
28/59 [=============>................] - ETA: 6s - loss: 0.0760
29/59 [=============>................] - ETA: 6s - loss: 0.0750
30/59 [==============>...............] - ETA: 6s - loss: 0.0741
31/59 [==============>...............] - ETA: 6s - loss: 0.0731
32/59 [===============>..............] - ETA: 6s - loss: 0.0794
34/59 [================>.............] - ETA: 5s - loss: 0.2356
35/59 [================>.............] - ETA: 5s - loss: 0.2381
36/59 [=================>............] - ETA: 5s - loss: 0.2361
37/59 [=================>............] - ETA: 4s - loss: 0.2465
38/59 [==================>...........] - ETA: 4s - loss: 0.2401
39/59 [==================>...........] - ETA: 4s - loss: 0.2340
40/59 [===================>..........] - ETA: 4s - loss: 0.2286
41/59 [===================>..........] - ETA: 4s - loss: 0.2234
42/59 [====================>.........] - ETA: 3s - loss: 0.2182
43/59 [====================>.........] - ETA: 3s - loss: 0.2140
44/59 [=====================>........] - ETA: 3s - loss: 0.2120
45/59 [=====================>........] - ETA: 3s - loss: 0.2075
46/59 [======================>.......] - ETA: 3s - loss: 0.2080
47/59 [======================>.......] - ETA: 2s - loss: 0.2055
48/59 [=======================>......] - ETA: 2s - loss: 0.2056
49/59 [=======================>......] - ETA: 2s - loss: 0.2115
50/59 [========================>.....] - ETA: 2s - loss: 0.2170
51/59 [========================>.....] - ETA: 1s - loss: 0.2137
52/59 [=========================>....] - ETA: 1s - loss: 0.2099
53/59 [=========================>....] - ETA: 1s - loss: 0.2078
54/59 [==========================>...] - ETA: 1s - loss: 0.2045
```

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55/59 [==========================>...] - ETA: 0s - loss: 0.2011
56/59 [===========================>..] - ETA: 0s - loss: 0.1976
57/59 [===========================>..] - ETA: 0s - loss: 0.1951
58/59 [============================>.] - ETA: 0s - loss: 0.1918
59/59 [============================>.] - ETA: 0s - loss: 0.1913
Epoch 00011: val_loss improved from 0.00759 to 0.00409, saving model to ../output/kera
s_model/mobilenet_partial_data.hdf5


60/59 [==============================] - 15s 253ms/step - loss: 0.1869 - val_loss: 0.0
041
Epoch 12/30

 1/59 [..............................] - ETA: 4s - loss: 0.0253
 2/59 [>.............................] - ETA: 4s - loss: 0.0176
 3/59 [>.............................] - ETA: 4s - loss: 0.0142
 5/59 [=>............................] - ETA: 3s - loss: 0.4281
 6/59 [==>...........................] - ETA: 5s - loss: 0.3575
 7/59 [==>...........................] - ETA: 6s - loss: 0.3486
 8/59 [===>..........................] - ETA: 7s - loss: 0.3171
 9/59 [===>..........................] - ETA: 7s - loss: 0.2821
10/59 [====>.........................] - ETA: 7s - loss: 0.2549
11/59 [====>.........................] - ETA: 8s - loss: 0.2331
12/59 [=====>........................] - ETA: 8s - loss: 0.2159
13/59 [=====>........................] - ETA: 8s - loss: 0.1994
14/59 [======>.......................] - ETA: 8s - loss: 0.1854
15/59 [======>.......................] - ETA: 8s - loss: 0.1741
16/59 [=======>......................] - ETA: 8s - loss: 0.1667
17/59 [=======>......................] - ETA: 8s - loss: 0.1576
18/59 [========>.....................] - ETA: 8s - loss: 0.1493
19/59 [========>.....................] - ETA: 8s - loss: 0.1417
20/59 [=========>....................] - ETA: 8s - loss: 0.1358
21/59 [=========>....................] - ETA: 7s - loss: 0.1321
22/59 [==========>...................] - ETA: 7s - loss: 0.1277
23/59 [==========>...................] - ETA: 7s - loss: 0.1224
24/59 [===========>..................] - ETA: 7s - loss: 0.1320
25/59 [===========>..................] - ETA: 7s - loss: 0.1344
26/59 [===========>..................] - ETA: 7s - loss: 0.1295
27/59 [============>.................] - ETA: 7s - loss: 0.1248
28/59 [=============>................] - ETA: 6s - loss: 0.1221
29/59 [=============>................] - ETA: 6s - loss: 0.1180
30/59 [=============>................] - ETA: 6s - loss: 0.1150
31/59 [==============>...............] - ETA: 6s - loss: 0.1155
32/59 [==============>...............] - ETA: 6s - loss: 0.1139
33/59 [==============>...............] - ETA: 5s - loss: 0.1107
34/59 [================>.............] - ETA: 5s - loss: 0.1080
35/59 [================>.............] - ETA: 5s - loss: 0.1054
36/59 [=================>............] - ETA: 5s - loss: 0.1052
37/59 [=================>............] - ETA: 5s - loss: 0.1024
38/59 [==================>...........] - ETA: 4s - loss: 0.0997
39/59 [==================>...........] - ETA: 4s - loss: 0.1009
40/59 [===================>..........] - ETA: 4s - loss: 0.1016
```

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41/59 [==================>..........] - ETA: 4s - loss: 0.1056
42/59 [==================>.........] - ETA: 3s - loss: 0.1090
43/59 [==================>.........] - ETA: 3s - loss: 0.1077
44/59 [===================>........] - ETA: 3s - loss: 0.1096
45/59 [===================>........] - ETA: 3s - loss: 0.1077
46/59 [====================>.......] - ETA: 3s - loss: 0.1056
47/59 [=====================>.......] - ETA: 2s - loss: 0.1035
48/59 [=====================>......] - ETA: 2s - loss: 0.1014
49/59 [======================>......] - ETA: 2s - loss: 0.0999
50/59 [=======================>.....] - ETA: 2s - loss: 0.0995
51/59 [=======================>.....] - ETA: 1s - loss: 0.1052
52/59 [========================>....] - ETA: 1s - loss: 0.1058
53/59 [========================>....] - ETA: 1s - loss: 0.1074
54/59 [=========================>...] - ETA: 1s - loss: 0.1062
55/59 [=========================>...] - ETA: 0s - loss: 0.1134
56/59 [==========================>..] - ETA: 0s - loss: 0.1166
57/59 [==========================>..] - ETA: 0s - loss: 0.1149
58/59 [===========================>.] - ETA: 0s - loss: 0.1195
59/59 [===========================>.] - ETA: 0s - loss: 0.1182
Epoch 00012: val_loss did not improve

60/59 [==============================] - 15s 248ms/step - loss: 0.1167 - val_loss: 0.0
229
Epoch 13/30

 1/59 [..............................] - ETA: 5s - loss: 0.3215
 2/59 [>.............................] - ETA: 4s - loss: 0.1907
 3/59 [>.............................] - ETA: 4s - loss: 0.1446
 4/59 [=>............................] - ETA: 5s - loss: 0.1102
 5/59 [=>............................] - ETA: 6s - loss: 0.1441
 6/59 [==>...........................] - ETA: 7s - loss: 0.1501
 7/59 [==>...........................] - ETA: 8s - loss: 0.1292
 8/59 [===>..........................] - ETA: 8s - loss: 0.1304
 9/59 [===>..........................] - ETA: 9s - loss: 0.1265
10/59 [====>.........................] - ETA: 9s - loss: 0.1175
11/59 [====>.........................] - ETA: 9s - loss: 0.1069
12/59 [=====>........................] - ETA: 9s - loss: 0.1013
13/59 [=====>........................] - ETA: 9s - loss: 0.0952
14/59 [======>.......................] - ETA: 9s - loss: 0.0884
15/59 [======>.......................] - ETA: 9s - loss: 0.0825
16/59 [=======>......................] - ETA: 9s - loss: 0.0801
17/59 [=======>......................] - ETA: 8s - loss: 0.0760
18/59 [========>.....................] - ETA: 8s - loss: 0.0775
19/59 [========>.....................] - ETA: 8s - loss: 0.0748
20/59 [=========>....................] - ETA: 8s - loss: 0.0717
21/59 [=========>....................] - ETA: 8s - loss: 0.0698
22/59 [==========>...................] - ETA: 8s - loss: 0.0972
23/59 [==========>...................] - ETA: 8s - loss: 0.1401
24/59 [===========>..................] - ETA: 7s - loss: 0.1542
25/59 [===========>..................] - ETA: 7s - loss: 0.1480
26/59 [===========>..................] - ETA: 7s - loss: 0.1494
```

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28/59 [=============>................] - ETA: 6s - loss: 0.1415
29/59 [=============>................] - ETA: 6s - loss: 0.1369
30/59 [=============>................] - ETA: 6s - loss: 0.1337
31/59 [=============>................] - ETA: 6s - loss: 0.1364
32/59 [==============>...............] - ETA: 6s - loss: 0.1371
33/59 [==============>...............] - ETA: 5s - loss: 0.1377
34/59 [===============>..............] - ETA: 5s - loss: 0.1348
35/59 [===============>..............] - ETA: 5s - loss: 0.1325
36/59 [================>.............] - ETA: 5s - loss: 0.1291
37/59 [================>.............] - ETA: 4s - loss: 0.1258
38/59 [=================>............] - ETA: 4s - loss: 0.1236
39/59 [=================>............] - ETA: 4s - loss: 0.1228
40/59 [==================>...........] - ETA: 4s - loss: 0.1241
41/59 [==================>...........] - ETA: 4s - loss: 0.1212
42/59 [===================>..........] - ETA: 3s - loss: 0.1206
43/59 [===================>..........] - ETA: 3s - loss: 0.1180
44/59 [====================>.........] - ETA: 3s - loss: 0.1156
45/59 [====================>.........] - ETA: 3s - loss: 0.1133
46/59 [=====================>........] - ETA: 3s - loss: 0.1175
47/59 [=====================>........] - ETA: 2s - loss: 0.1180
48/59 [======================>.......] - ETA: 2s - loss: 0.1177
49/59 [======================>.......] - ETA: 2s - loss: 0.1175
50/59 [=======================>......] - ETA: 2s - loss: 0.1172
51/59 [=======================>......] - ETA: 1s - loss: 0.1221
52/59 [========================>.....] - ETA: 1s - loss: 0.1200
53/59 [========================>.....] - ETA: 1s - loss: 0.1179
54/59 [=========================>....] - ETA: 1s - loss: 0.1167
55/59 [=========================>....] - ETA: 0s - loss: 0.1148
56/59 [==========================>...] - ETA: 0s - loss: 0.1131
57/59 [==========================>...] - ETA: 0s - loss: 0.1117
58/59 [===========================>..] - ETA: 0s - loss: 0.1104
59/59 [===========================>..] - ETA: 0s - loss: 0.1089
Epoch 00013: val_loss improved from 0.00409 to 0.00057, saving model to ../output/kera
s_model/mobilenet_partial_data.hdf5

60/59 [==============================] - 15s 251ms/step - loss: 0.1094 - val_loss: 5.6
952e-04
Epoch 14/30

 1/59 [..............................] - ETA: 5s - loss: 0.7776
 2/59 [>.............................] - ETA: 4s - loss: 0.5829
 3/59 [>.............................] - ETA: 4s - loss: 0.3947
 4/59 [=>............................] - ETA: 4s - loss: 0.2979
 5/59 [=>............................] - ETA: 6s - loss: 0.2981
 6/59 [==>...........................] - ETA: 7s - loss: 0.2506
 7/59 [==>...........................] - ETA: 7s - loss: 0.2165
 8/59 [===>..........................] - ETA: 8s - loss: 0.2027
 9/59 [===>..........................] - ETA: 8s - loss: 0.1852
10/59 [====>.........................] - ETA: 8s - loss: 0.1668
11/59 [====>.........................] - ETA: 8s - loss: 0.1520
12/59 [=====>........................] - ETA: 9s - loss: 0.1417
```

```
13/59 [=====>........................] - ETA: 9s - loss: 0.1319
14/59 [======>.......................] - ETA: 8s - loss: 0.1227
15/59 [======>.......................] - ETA: 8s - loss: 0.1163
16/59 [=======>......................] - ETA: 8s - loss: 0.1140
17/59 [=======>......................] - ETA: 8s - loss: 0.1073
18/59 [========>.....................] - ETA: 8s - loss: 0.1014
19/59 [========>.....................] - ETA: 8s - loss: 0.0999
20/59 [=========>....................] - ETA: 8s - loss: 0.0965
21/59 [=========>....................] - ETA: 8s - loss: 0.0969
22/59 [==========>...................] - ETA: 8s - loss: 0.0949
23/59 [==========>...................] - ETA: 7s - loss: 0.0913
24/59 [===========>..................] - ETA: 7s - loss: 0.0882
25/59 [===========>..................] - ETA: 7s - loss: 0.0850
26/59 [============>.................] - ETA: 7s - loss: 0.0835
27/59 [============>.................] - ETA: 7s - loss: 0.0870
28/59 [=============>................] - ETA: 6s - loss: 0.0839
29/59 [=============>................] - ETA: 6s - loss: 0.0817
30/59 [==============>...............] - ETA: 6s - loss: 0.0800
31/59 [==============>...............] - ETA: 6s - loss: 0.0886
32/59 [===============>..............] - ETA: 6s - loss: 0.0919
33/59 [===============>..............] - ETA: 5s - loss: 0.0933
35/59 [================>.............] - ETA: 5s - loss: 0.0883
36/59 [=================>............] - ETA: 5s - loss: 0.0923
37/59 [=================>............] - ETA: 4s - loss: 0.0918
38/59 [==================>...........] - ETA: 4s - loss: 0.0903
39/59 [==================>...........] - ETA: 4s - loss: 0.0881
40/59 [===================>..........] - ETA: 4s - loss: 0.0859
41/59 [===================>..........] - ETA: 4s - loss: 0.0840
42/59 [====================>.........] - ETA: 3s - loss: 0.0900
43/59 [====================>.........] - ETA: 3s - loss: 0.0963
44/59 [=====================>........] - ETA: 3s - loss: 0.0946
45/59 [=====================>........] - ETA: 3s - loss: 0.0936
46/59 [======================>.......] - ETA: 3s - loss: 0.0916
47/59 [======================>.......] - ETA: 2s - loss: 0.0903
48/59 [=======================>......] - ETA: 2s - loss: 0.0884
49/59 [=======================>......] - ETA: 2s - loss: 0.0891
50/59 [========================>.....] - ETA: 2s - loss: 0.0891
51/59 [========================>.....] - ETA: 1s - loss: 0.0874
52/59 [=========================>....] - ETA: 1s - loss: 0.0860
53/59 [=========================>....] - ETA: 1s - loss: 0.0880
54/59 [==========================>...] - ETA: 1s - loss: 0.0868
55/59 [==========================>...] - ETA: 0s - loss: 0.0884
56/59 [===========================>..] - ETA: 0s - loss: 0.0942
57/59 [===========================>..] - ETA: 0s - loss: 0.0987
58/59 [============================>.] - ETA: 0s - loss: 0.0974
59/59 [============================>.] - ETA: 0s - loss: 0.0984
Epoch 00014: val_loss did not improve

60/59 [==============================] - 15s 247ms/step - loss: 0.1026 - val_loss: 0.0
239
Epoch 15/30
```

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 1/59 [..............................] - ETA: 4s - loss: 0.0044
 2/59 [>.............................] - ETA: 4s - loss: 0.0287
 3/59 [>.............................] - ETA: 4s - loss: 0.0223
 4/59 [=>............................] - ETA: 5s - loss: 0.0184
 5/59 [=>............................] - ETA: 7s - loss: 0.0149
 6/59 [==>...........................] - ETA: 7s - loss: 0.0124
 7/59 [==>...........................] - ETA: 8s - loss: 0.0177
 8/59 [===>..........................] - ETA: 8s - loss: 0.0160
 9/59 [===>..........................] - ETA: 9s - loss: 0.0146
10/59 [====>.........................] - ETA: 9s - loss: 0.0190
11/59 [====>.........................] - ETA: 9s - loss: 0.0641
12/59 [=====>........................] - ETA: 9s - loss: 0.0652
13/59 [=====>........................] - ETA: 9s - loss: 0.0627
14/59 [======>.......................] - ETA: 9s - loss: 0.0630
15/59 [======>.......................] - ETA: 9s - loss: 0.0618
16/59 [=======>......................] - ETA: 9s - loss: 0.0581
17/59 [=======>......................] - ETA: 9s - loss: 0.0547
18/59 [========>.....................] - ETA: 8s - loss: 0.0598
19/59 [========>.....................] - ETA: 8s - loss: 0.0616
20/59 [=========>....................] - ETA: 8s - loss: 0.0625
21/59 [=========>....................] - ETA: 8s - loss: 0.0603
22/59 [==========>...................] - ETA: 8s - loss: 0.0647
23/59 [==========>...................] - ETA: 8s - loss: 0.1139
24/59 [===========>..................] - ETA: 7s - loss: 0.1148
25/59 [===========>..................] - ETA: 7s - loss: 0.1108
26/59 [============>.................] - ETA: 7s - loss: 0.1070
27/59 [============>.................] - ETA: 7s - loss: 0.1045
28/59 [=============>................] - ETA: 7s - loss: 0.1014
29/59 [=============>................] - ETA: 6s - loss: 0.0982
30/59 [==============>...............] - ETA: 6s - loss: 0.1056
31/59 [==============>...............] - ETA: 6s - loss: 0.1081
32/59 [===============>..............] - ETA: 6s - loss: 0.1099
33/59 [===============>..............] - ETA: 6s - loss: 0.1126
34/59 [================>.............] - ETA: 5s - loss: 0.1093
35/59 [================>.............] - ETA: 5s - loss: 0.1136
36/59 [=================>............] - ETA: 5s - loss: 0.1108
37/59 [=================>............] - ETA: 5s - loss: 0.1090
38/59 [==================>...........] - ETA: 4s - loss: 0.1078
39/59 [==================>...........] - ETA: 4s - loss: 0.1055
40/59 [===================>..........] - ETA: 4s - loss: 0.1046
41/59 [===================>..........] - ETA: 4s - loss: 0.1062
42/59 [====================>.........] - ETA: 4s - loss: 0.1060
43/59 [====================>.........] - ETA: 3s - loss: 0.1083
44/59 [=====================>........] - ETA: 3s - loss: 0.1074
45/59 [=====================>........] - ETA: 3s - loss: 0.1064
46/59 [======================>.......] - ETA: 3s - loss: 0.1046
47/59 [======================>.......] - ETA: 2s - loss: 0.1069
48/59 [=======================>......] - ETA: 2s - loss: 0.1063
49/59 [=======================>......] - ETA: 2s - loss: 0.1041
50/59 [========================>.....] - ETA: 2s - loss: 0.1022
```

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51/59 [=======================>.....] - ETA: 1s - loss: 0.1026
52/59 [========================>....] - ETA: 1s - loss: 0.1018
53/59 [========================>....] - ETA: 1s - loss: 0.1000
54/59 [=========================>...] - ETA: 1s - loss: 0.0983
55/59 [=========================>...] - ETA: 0s - loss: 0.0983
56/59 [==========================>..] - ETA: 0s - loss: 0.0982
57/59 [==========================>..] - ETA: 0s - loss: 0.0965
58/59 [===========================>.] - ETA: 0s - loss: 0.0949
Epoch 00015: val_loss did not improve

60/59 [=============================] - 15s 250ms/step - loss: 0.0958 - val_loss: 0.0
124
Epoch 16/30

 1/59 [..............................] - ETA: 4s - loss: 0.0495
 2/59 [>.............................] - ETA: 5s - loss: 0.0271
 3/59 [>.............................] - ETA: 4s - loss: 0.0287
 4/59 [=>............................] - ETA: 5s - loss: 0.0235
 5/59 [=>............................] - ETA: 6s - loss: 0.0190
 6/59 [==>...........................] - ETA: 7s - loss: 0.0655
 7/59 [==>...........................] - ETA: 8s - loss: 0.0805
 8/59 [===>..........................] - ETA: 8s - loss: 0.0719
 9/59 [===>..........................] - ETA: 9s - loss: 0.0735
10/59 [====>.........................] - ETA: 9s - loss: 0.0701
11/59 [====>.........................] - ETA: 9s - loss: 0.0661
12/59 [=====>........................] - ETA: 9s - loss: 0.0655
13/59 [=====>........................] - ETA: 9s - loss: 0.0881
14/59 [======>.......................] - ETA: 9s - loss: 0.0893
15/59 [======>.......................] - ETA: 9s - loss: 0.0942
16/59 [=======>......................] - ETA: 9s - loss: 0.0899
17/59 [=======>......................] - ETA: 8s - loss: 0.0867
18/59 [========>.....................] - ETA: 8s - loss: 0.0961
19/59 [========>.....................] - ETA: 8s - loss: 0.1052
20/59 [=========>....................] - ETA: 8s - loss: 0.1021
21/59 [=========>....................] - ETA: 8s - loss: 0.0988
22/59 [==========>...................] - ETA: 8s - loss: 0.0943
23/59 [==========>...................] - ETA: 8s - loss: 0.0954
24/59 [===========>..................] - ETA: 7s - loss: 0.0939
25/59 [===========>..................] - ETA: 7s - loss: 0.0905
26/59 [============>.................] - ETA: 7s - loss: 0.0918
27/59 [============>.................] - ETA: 7s - loss: 0.1002
28/59 [=============>................] - ETA: 7s - loss: 0.0968
29/59 [=============>................] - ETA: 6s - loss: 0.0936
30/59 [==============>...............] - ETA: 6s - loss: 0.0941
31/59 [==============>...............] - ETA: 6s - loss: 0.0937
32/59 [===============>..............] - ETA: 6s - loss: 0.0919
33/59 [===============>..............] - ETA: 6s - loss: 0.0892
34/59 [================>.............] - ETA: 5s - loss: 0.0873
35/59 [================>.............] - ETA: 5s - loss: 0.0849
36/59 [=================>............] - ETA: 5s - loss: 0.0840
37/59 [==================>...........] - ETA: 5s - loss: 0.0826
```

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38/59 [=================>...........] - ETA: 4s - loss: 0.0832
39/59 [=================>...........] - ETA: 4s - loss: 0.0811
40/59 [==================>..........] - ETA: 4s - loss: 0.0876
41/59 [==================>..........] - ETA: 4s - loss: 0.0855
42/59 [==================>.........] - ETA: 4s - loss: 0.0911
43/59 [==================>.........] - ETA: 3s - loss: 0.0890
44/59 [===================>........] - ETA: 3s - loss: 0.0956
45/59 [===================>........] - ETA: 3s - loss: 0.0990
46/59 [====================>.......] - ETA: 3s - loss: 0.1016
47/59 [=====================>.......] - ETA: 2s - loss: 0.0999
48/59 [=====================>......] - ETA: 2s - loss: 0.0987
49/59 [=====================>......] - ETA: 2s - loss: 0.0972
50/59 [======================>.....] - ETA: 2s - loss: 0.0958
51/59 [=======================>.....] - ETA: 1s - loss: 0.0957
52/59 [=======================>....] - ETA: 1s - loss: 0.0966
53/59 [=======================>....] - ETA: 1s - loss: 0.0949
54/59 [========================>...] - ETA: 1s - loss: 0.0932
56/59 [=========================>..] - ETA: 0s - loss: 0.0917
57/59 [=========================>..] - ETA: 0s - loss: 0.0919
58/59 [==========================>.] - ETA: 0s - loss: 0.0905
59/59 [==========================>.] - ETA: 0s - loss: 0.0924
Epoch 00016: val_loss did not improve

60/59 [============================] - 15s 249ms/step - loss: 0.0922 - val_loss: 9.2
823e-04
Epoch 17/30

 1/59 [..............................] - ETA: 4s - loss: 0.5454
 2/59 [>.............................] - ETA: 4s - loss: 0.3076
 3/59 [>.............................] - ETA: 4s - loss: 0.2930
 4/59 [=>............................] - ETA: 6s - loss: 0.3040
 5/59 [=>............................] - ETA: 8s - loss: 0.2436
 6/59 [==>...........................] - ETA: 9s - loss: 0.2037
 7/59 [==>...........................] - ETA: 10s - loss: 0.1749
 9/59 [===>..........................] - ETA: 9s - loss: 0.1431
10/59 [====>.........................] - ETA: 9s - loss: 0.1294
11/59 [====>.........................] - ETA: 9s - loss: 0.1218
12/59 [=====>........................] - ETA: 10s - loss: 0.1119
13/59 [=====>........................] - ETA: 10s - loss: 0.1042
14/59 [======>.......................] - ETA: 9s - loss: 0.1154
15/59 [======>.......................] - ETA: 9s - loss: 0.1145
16/59 [=======>......................] - ETA: 9s - loss: 0.1235
17/59 [=======>......................] - ETA: 9s - loss: 0.1163
18/59 [========>.....................] - ETA: 9s - loss: 0.1099
19/59 [========>.....................] - ETA: 9s - loss: 0.1043
20/59 [=========>....................] - ETA: 9s - loss: 0.1461
21/59 [=========>....................] - ETA: 8s - loss: 0.1535
22/59 [==========>...................] - ETA: 8s - loss: 0.1485
23/59 [==========>...................] - ETA: 8s - loss: 0.1422
24/59 [==========>...................] - ETA: 8s - loss: 0.1363
25/59 [===========>..................] - ETA: 8s - loss: 0.1312
```

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26/59 [===========>..................] - ETA: 7s - loss: 0.1267
27/59 [============>.................] - ETA: 7s - loss: 0.1268
28/59 [============>.................] - ETA: 7s - loss: 0.1228
29/59 [=============>................] - ETA: 7s - loss: 0.1188
30/59 [=============>................] - ETA: 7s - loss: 0.1163
31/59 [=============>................] - ETA: 6s - loss: 0.1136
32/59 [==============>...............] - ETA: 6s - loss: 0.1107
33/59 [==============>...............] - ETA: 6s - loss: 0.1074
34/59 [===============>..............] - ETA: 6s - loss: 0.1045
35/59 [===============>..............] - ETA: 5s - loss: 0.1015
36/59 [=================>............] - ETA: 5s - loss: 0.0990
37/59 [=================>............] - ETA: 5s - loss: 0.0965
38/59 [==================>...........] - ETA: 5s - loss: 0.0939
39/59 [==================>...........] - ETA: 4s - loss: 0.0978
40/59 [===================>..........] - ETA: 4s - loss: 0.1302
41/59 [===================>..........] - ETA: 4s - loss: 0.1454
42/59 [====================>.........] - ETA: 4s - loss: 0.1420
43/59 [====================>.........] - ETA: 3s - loss: 0.1431
44/59 [=====================>........] - ETA: 3s - loss: 0.1399
45/59 [=====================>........] - ETA: 3s - loss: 0.1380
46/59 [======================>.......] - ETA: 3s - loss: 0.1353
47/59 [======================>.......] - ETA: 2s - loss: 0.1326
48/59 [=======================>......] - ETA: 2s - loss: 0.1398
49/59 [=======================>......] - ETA: 2s - loss: 0.1370
50/59 [========================>.....] - ETA: 2s - loss: 0.1343
51/59 [========================>.....] - ETA: 1s - loss: 0.1325
52/59 [=========================>....] - ETA: 1s - loss: 0.1327
53/59 [=========================>....] - ETA: 1s - loss: 0.1306
54/59 [==========================>...] - ETA: 1s - loss: 0.1284
55/59 [==========================>...] - ETA: 1s - loss: 0.1270
56/59 [===========================>..] - ETA: 0s - loss: 0.1250
57/59 [===========================>..] - ETA: 0s - loss: 0.1228
58/59 [============================>.] - ETA: 0s - loss: 0.1224
59/59 [============================>.] - ETA: 0s - loss: 0.1208
Epoch 00017: val_loss did not improve

60/59 [==============================] - 16s 259ms/step - loss: 0.1190 - val_loss: 0.0
366
Epoch 18/30

 1/59 [..............................] - ETA: 4s - loss: 0.1631
 2/59 [>.............................] - ETA: 4s - loss: 0.0942
 3/59 [>.............................] - ETA: 4s - loss: 0.0717
 4/59 [=>............................] - ETA: 5s - loss: 0.0539
 5/59 [=>............................] - ETA: 6s - loss: 0.0433
 6/59 [==>...........................] - ETA: 7s - loss: 0.0876
 7/59 [==>...........................] - ETA: 8s - loss: 0.0773
 8/59 [===>..........................] - ETA: 8s - loss: 0.0728
10/59 [====>.........................] - ETA: 8s - loss: 0.0780
11/59 [====>.........................] - ETA: 8s - loss: 0.1218
12/59 [=====>........................] - ETA: 8s - loss: 0.1138
```

```
13/59 [=====>........................] - ETA: 8s - loss: 0.1316
14/59 [======>.......................] - ETA: 8s - loss: 0.1223
15/59 [======>.......................] - ETA: 8s - loss: 0.1175
16/59 [=======>......................] - ETA: 8s - loss: 0.1429
17/59 [=======>......................] - ETA: 8s - loss: 0.1615
18/59 [========>.....................] - ETA: 8s - loss: 0.1570
19/59 [========>.....................] - ETA: 8s - loss: 0.1497
20/59 [=========>....................] - ETA: 8s - loss: 0.1430
21/59 [=========>....................] - ETA: 7s - loss: 0.1385
22/59 [==========>...................] - ETA: 7s - loss: 0.1332
23/59 [==========>...................] - ETA: 7s - loss: 0.1284
24/59 [===========>..................] - ETA: 7s - loss: 0.1261
25/59 [===========>..................] - ETA: 7s - loss: 0.1212
26/59 [============>.................] - ETA: 7s - loss: 0.1166
27/59 [============>.................] - ETA: 6s - loss: 0.1127
28/59 [=============>................] - ETA: 6s - loss: 0.1157
29/59 [=============>................] - ETA: 6s - loss: 0.1152
30/59 [==============>...............] - ETA: 6s - loss: 0.1114
31/59 [==============>...............] - ETA: 6s - loss: 0.1094
32/59 [===============>..............] - ETA: 6s - loss: 0.1099
33/59 [===============>..............] - ETA: 5s - loss: 0.1100
34/59 [================>.............] - ETA: 5s - loss: 0.1165
35/59 [================>.............] - ETA: 5s - loss: 0.1134
36/59 [=================>............] - ETA: 5s - loss: 0.1111
37/59 [=================>............] - ETA: 4s - loss: 0.1121
38/59 [==================>...........] - ETA: 4s - loss: 0.1097
39/59 [==================>...........] - ETA: 4s - loss: 0.1073
40/59 [===================>..........] - ETA: 4s - loss: 0.1050
41/59 [===================>..........] - ETA: 4s - loss: 0.1026
42/59 [====================>.........] - ETA: 3s - loss: 0.1002
43/59 [====================>.........] - ETA: 3s - loss: 0.0981
44/59 [=====================>........] - ETA: 3s - loss: 0.0969
45/59 [=====================>........] - ETA: 3s - loss: 0.0951
46/59 [======================>.......] - ETA: 3s - loss: 0.0961
47/59 [======================>.......] - ETA: 2s - loss: 0.1014
48/59 [=======================>......] - ETA: 2s - loss: 0.1042
49/59 [=======================>......] - ETA: 2s - loss: 0.1036
50/59 [========================>.....] - ETA: 2s - loss: 0.1060
51/59 [========================>.....] - ETA: 1s - loss: 0.1045
52/59 [=========================>....] - ETA: 1s - loss: 0.1025
53/59 [=========================>....] - ETA: 1s - loss: 0.1007
54/59 [==========================>...] - ETA: 1s - loss: 0.0989
55/59 [==========================>...] - ETA: 0s - loss: 0.0982
56/59 [===========================>..] - ETA: 0s - loss: 0.0965
57/59 [===========================>..] - ETA: 0s - loss: 0.0949
58/59 [============================>.] - ETA: 0s - loss: 0.0962
59/59 [============================>.] - ETA: 0s - loss: 0.0947
Epoch 00018: val_loss did not improve

60/59 [==============================] - 15s 248ms/step - loss: 0.0951 - val_loss: 0.0
088
```

```
Epoch 19/30

 1/59 [..............................] - ETA: 4s - loss: 0.0083
 2/59 [>.............................] - ETA: 4s - loss: 0.0213
 3/59 [>.............................] - ETA: 4s - loss: 0.0143
 4/59 [=>............................] - ETA: 5s - loss: 0.0532
 5/59 [=>............................] - ETA: 7s - loss: 0.1537
 6/59 [==>...........................] - ETA: 8s - loss: 0.1295
 7/59 [==>...........................] - ETA: 8s - loss: 0.1295
 8/59 [===>..........................] - ETA: 9s - loss: 0.1234
 9/59 [===>..........................] - ETA: 9s - loss: 0.1099
10/59 [====>.........................] - ETA: 9s - loss: 0.0990
11/59 [====>.........................] - ETA: 9s - loss: 0.0901
12/59 [=====>........................] - ETA: 9s - loss: 0.1181
13/59 [=====>........................] - ETA: 9s - loss: 0.1176
14/59 [======>.......................] - ETA: 9s - loss: 0.1393
15/59 [======>.......................] - ETA: 9s - loss: 0.1425
16/59 [=======>......................] - ETA: 9s - loss: 0.1337
17/59 [=======>......................] - ETA: 9s - loss: 0.1259
18/59 [========>.....................] - ETA: 9s - loss: 0.1192
19/59 [========>.....................] - ETA: 8s - loss: 0.1129
20/59 [=========>....................] - ETA: 8s - loss: 0.1114
21/59 [=========>....................] - ETA: 8s - loss: 0.1063
22/59 [==========>...................] - ETA: 8s - loss: 0.1018
23/59 [==========>...................] - ETA: 8s - loss: 0.1015
24/59 [===========>..................] - ETA: 8s - loss: 0.1044
25/59 [===========>..................] - ETA: 7s - loss: 0.1074
26/59 [============>.................] - ETA: 7s - loss: 0.1040
27/59 [============>.................] - ETA: 7s - loss: 0.1004
29/59 [=============>................] - ETA: 6s - loss: 0.1019
30/59 [==============>...............] - ETA: 6s - loss: 0.1018
31/59 [==============>...............] - ETA: 6s - loss: 0.1025
32/59 [===============>..............] - ETA: 6s - loss: 0.1034
33/59 [===============>..............] - ETA: 5s - loss: 0.1029
34/59 [================>.............] - ETA: 5s - loss: 0.1009
35/59 [================>.............] - ETA: 5s - loss: 0.0998
36/59 [=================>............] - ETA: 5s - loss: 0.0976
37/59 [=================>............] - ETA: 5s - loss: 0.0950
38/59 [==================>...........] - ETA: 4s - loss: 0.0925
39/59 [==================>...........] - ETA: 4s - loss: 0.0909
40/59 [===================>..........] - ETA: 4s - loss: 0.0887
41/59 [===================>..........] - ETA: 4s - loss: 0.0881
42/59 [====================>.........] - ETA: 4s - loss: 0.0939
43/59 [====================>.........] - ETA: 3s - loss: 0.0956
44/59 [=====================>........] - ETA: 3s - loss: 0.0934
45/59 [=====================>........] - ETA: 3s - loss: 0.0914
46/59 [======================>.......] - ETA: 3s - loss: 0.0905
47/59 [======================>.......] - ETA: 2s - loss: 0.0893
48/59 [=======================>......] - ETA: 2s - loss: 0.0875
49/59 [=======================>......] - ETA: 2s - loss: 0.0883
50/59 [========================>.....] - ETA: 2s - loss: 0.0874
```

```
51/59 [========================>.....] - ETA: 1s - loss: 0.0859
52/59 [=========================>....] - ETA: 1s - loss: 0.0866
53/59 [=========================>....] - ETA: 1s - loss: 0.0856
54/59 [==========================>...] - ETA: 1s - loss: 0.0937
55/59 [==========================>...] - ETA: 0s - loss: 0.1000
56/59 [===========================>..] - ETA: 0s - loss: 0.1003
57/59 [===========================>..] - ETA: 0s - loss: 0.0991
58/59 [============================>.] - ETA: 0s - loss: 0.0975
59/59 [============================>.] - ETA: 0s - loss: 0.0959
Epoch 00019: val_loss did not improve

60/59 [==============================] - 15s 252ms/step - loss: 0.0948 - val_loss: 0.0
343
Epoch 20/30

 1/59 [..............................] - ETA: 4s - loss: 0.0029
 2/59 [>.............................] - ETA: 4s - loss: 0.0716
 3/59 [>.............................] - ETA: 4s - loss: 0.0672
 4/59 [=>............................] - ETA: 4s - loss: 0.0675
 6/59 [==>...........................] - ETA: 5s - loss: 0.0799
 7/59 [==>...........................] - ETA: 6s - loss: 0.0905
 8/59 [===>..........................] - ETA: 7s - loss: 0.0990
 9/59 [===>..........................] - ETA: 7s - loss: 0.0965
10/59 [====>.........................] - ETA: 8s - loss: 0.0869
11/59 [====>.........................] - ETA: 8s - loss: 0.0808
12/59 [=====>........................] - ETA: 8s - loss: 0.0742
13/59 [=====>........................] - ETA: 8s - loss: 0.0723
14/59 [======>.......................] - ETA: 8s - loss: 0.0714
15/59 [======>.......................] - ETA: 8s - loss: 0.0667
16/59 [=======>......................] - ETA: 8s - loss: 0.0768
17/59 [=======>......................] - ETA: 8s - loss: 0.0764
18/59 [========>.....................] - ETA: 8s - loss: 0.0758
19/59 [========>.....................] - ETA: 8s - loss: 0.0728
20/59 [=========>....................] - ETA: 8s - loss: 0.0697
21/59 [=========>....................] - ETA: 7s - loss: 0.0699
22/59 [==========>...................] - ETA: 7s - loss: 0.0683
23/59 [==========>...................] - ETA: 7s - loss: 0.0663
24/59 [===========>..................] - ETA: 7s - loss: 0.0642
25/59 [===========>..................] - ETA: 7s - loss: 0.0623
26/59 [============>.................] - ETA: 7s - loss: 0.0604
27/59 [============>.................] - ETA: 6s - loss: 0.0585
28/59 [=============>................] - ETA: 6s - loss: 0.0617
29/59 [=============>................] - ETA: 6s - loss: 0.0662
30/59 [==============>...............] - ETA: 6s - loss: 0.0655
31/59 [==============>...............] - ETA: 6s - loss: 0.0651
32/59 [===============>..............] - ETA: 6s - loss: 0.0715
33/59 [===============>..............] - ETA: 5s - loss: 0.0695
34/59 [================>.............] - ETA: 5s - loss: 0.0849
35/59 [================>.............] - ETA: 5s - loss: 0.0830
36/59 [=================>............] - ETA: 5s - loss: 0.0830
37/59 [==================>...........] - ETA: 5s - loss: 0.0838
```

```
38/59 [=================>...........] - ETA: 4s - loss: 0.0822
39/59 [=================>...........] - ETA: 4s - loss: 0.0805
40/59 [==================>..........] - ETA: 4s - loss: 0.0785
41/59 [==================>..........] - ETA: 4s - loss: 0.0767
42/59 [===================>.........] - ETA: 3s - loss: 0.0750
43/59 [===================>.........] - ETA: 3s - loss: 0.0736
44/59 [====================>........] - ETA: 3s - loss: 0.0733
45/59 [====================>........] - ETA: 3s - loss: 0.0743
46/59 [=====================>.......] - ETA: 3s - loss: 0.0732
47/59 [=====================>.......] - ETA: 2s - loss: 0.0717
48/59 [======================>......] - ETA: 2s - loss: 0.0759
49/59 [======================>......] - ETA: 2s - loss: 0.0750
50/59 [=======================>.....] - ETA: 2s - loss: 0.0755
51/59 [=======================>.....] - ETA: 1s - loss: 0.0745
52/59 [========================>....] - ETA: 1s - loss: 0.0757
53/59 [========================>....] - ETA: 1s - loss: 0.0747
54/59 [=========================>...] - ETA: 1s - loss: 0.0755
55/59 [=========================>...] - ETA: 0s - loss: 0.0844
56/59 [==========================>..] - ETA: 0s - loss: 0.1019
57/59 [==========================>..] - ETA: 0s - loss: 0.1016
58/59 [===========================>.] - ETA: 0s - loss: 0.0998
59/59 [===========================>.] - ETA: 0s - loss: 0.0981
Epoch 00020: val_loss did not improve

60/59 [============================] - 15s 250ms/step - loss: 0.0967 - val_loss: 0.0
109
Epoch 21/30

 1/59 [..............................] - ETA: 4s - loss: 0.0047
 2/59 [>.............................] - ETA: 4s - loss: 0.0038
 3/59 [>.............................] - ETA: 4s - loss: 0.0082
 4/59 [=>............................] - ETA: 6s - loss: 0.0096
 5/59 [=>............................] - ETA: 7s - loss: 0.0114
 6/59 [==>...........................] - ETA: 8s - loss: 0.0211
 7/59 [==>...........................] - ETA: 9s - loss: 0.0516
 8/59 [===>..........................] - ETA: 9s - loss: 0.0459
 9/59 [===>..........................] - ETA: 9s - loss: 0.0418
10/59 [====>.........................] - ETA: 9s - loss: 0.0389
11/59 [====>.........................] - ETA: 9s - loss: 0.0371
12/59 [=====>........................] - ETA: 9s - loss: 0.0507
13/59 [=====>........................] - ETA: 9s - loss: 0.0473
14/59 [======>.......................] - ETA: 9s - loss: 0.0582
15/59 [======>.......................] - ETA: 9s - loss: 0.0555
16/59 [=======>......................] - ETA: 9s - loss: 0.0584
17/59 [=======>......................] - ETA: 9s - loss: 0.0590
18/59 [========>.....................] - ETA: 9s - loss: 0.0582
19/59 [========>.....................] - ETA: 9s - loss: 0.0554
20/59 [=========>....................] - ETA: 8s - loss: 0.0537
21/59 [=========>....................] - ETA: 8s - loss: 0.0523
22/59 [==========>...................] - ETA: 8s - loss: 0.0503
23/59 [==========>...................] - ETA: 8s - loss: 0.0494
```

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24/59 [==========>...................] - ETA: 8s - loss: 0.0526
25/59 [==========>..................] - ETA: 7s - loss: 0.0506
26/59 [===========>.................] - ETA: 7s - loss: 0.0489
27/59 [===========>.................] - ETA: 7s - loss: 0.0526
28/59 [============>................] - ETA: 7s - loss: 0.0573
29/59 [============>................] - ETA: 7s - loss: 0.0565
30/59 [=============>...............] - ETA: 6s - loss: 0.0548
31/59 [=============>...............] - ETA: 6s - loss: 0.0540
32/59 [==============>..............] - ETA: 6s - loss: 0.0527
33/59 [==============>..............] - ETA: 6s - loss: 0.0522
34/59 [===============>.............] - ETA: 5s - loss: 0.0508
35/59 [===============>.............] - ETA: 5s - loss: 0.0494
36/59 [================>............] - ETA: 5s - loss: 0.0591
37/59 [================>............] - ETA: 5s - loss: 0.0614
38/59 [=================>...........] - ETA: 5s - loss: 0.0601
39/59 [=================>...........] - ETA: 4s - loss: 0.0586
40/59 [==================>..........] - ETA: 4s - loss: 0.0690
41/59 [==================>..........] - ETA: 4s - loss: 0.0677
42/59 [===================>.........] - ETA: 4s - loss: 0.0661
43/59 [====================>........] - ETA: 3s - loss: 0.0702
44/59 [====================>........] - ETA: 3s - loss: 0.0715
45/59 [=====================>.......] - ETA: 3s - loss: 0.0751
46/59 [=====================>.......] - ETA: 3s - loss: 0.0738
47/59 [======================>......] - ETA: 2s - loss: 0.0785
48/59 [======================>......] - ETA: 2s - loss: 0.0776
50/59 [=======================>.....] - ETA: 2s - loss: 0.1271
51/59 [=======================>.....] - ETA: 1s - loss: 0.1247
52/59 [========================>....] - ETA: 1s - loss: 0.1246
53/59 [========================>....] - ETA: 1s - loss: 0.1231
54/59 [=========================>...] - ETA: 1s - loss: 0.1209
55/59 [=========================>...] - ETA: 0s - loss: 0.1190
56/59 [==========================>..] - ETA: 0s - loss: 0.1186
57/59 [==========================>..] - ETA: 0s - loss: 0.1171
58/59 [===========================>.] - ETA: 0s - loss: 0.1152
59/59 [===========================>.] - ETA: 0s - loss: 0.1144
Epoch 00021: val_loss did not improve

60/59 [============================] - 15s 250ms/step - loss: 0.1203 - val_loss: 0.0
191
Epoch 22/30

 1/59 [..............................] - ETA: 5s - loss: 7.2464e-04
 2/59 [>.............................] - ETA: 4s - loss: 0.0060
 3/59 [>.............................] - ETA: 4s - loss: 0.0096
 4/59 [=>............................] - ETA: 4s - loss: 0.0086
 5/59 [=>............................] - ETA: 6s - loss: 0.0666
 6/59 [==>...........................] - ETA: 7s - loss: 0.0562
 7/59 [==>...........................] - ETA: 8s - loss: 0.0601
 8/59 [===>..........................] - ETA: 8s - loss: 0.0528
 9/59 [===>..........................] - ETA: 8s - loss: 0.0471
10/59 [====>.........................] - ETA: 9s - loss: 0.0424
```

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11/59 [====>..........................] - ETA: 9s - loss: 0.0387
12/59 [=====>.........................] - ETA: 9s - loss: 0.0443
13/59 [=====>.........................] - ETA: 9s - loss: 0.0413
14/59 [======>........................] - ETA: 9s - loss: 0.0385
15/59 [======>........................] - ETA: 9s - loss: 0.0378
16/59 [=======>.......................] - ETA: 8s - loss: 0.0414
17/59 [=======>.......................] - ETA: 8s - loss: 0.0404
18/59 [========>......................] - ETA: 8s - loss: 0.0519
19/59 [========>......................] - ETA: 8s - loss: 0.0519
20/59 [=========>.....................] - ETA: 8s - loss: 0.0756
21/59 [=========>.....................] - ETA: 8s - loss: 0.0732
22/59 [==========>....................] - ETA: 8s - loss: 0.0790
23/59 [==========>....................] - ETA: 7s - loss: 0.0879
24/59 [===========>...................] - ETA: 7s - loss: 0.0850
25/59 [===========>...................] - ETA: 7s - loss: 0.0818
26/59 [============>..................] - ETA: 7s - loss: 0.0793
27/59 [============>..................] - ETA: 7s - loss: 0.0766
28/59 [=============>.................] - ETA: 7s - loss: 0.0739
29/59 [=============>.................] - ETA: 6s - loss: 0.0792
31/59 [==============>................] - ETA: 6s - loss: 0.2384
32/59 [===============>...............] - ETA: 6s - loss: 0.2318
33/59 [===============>...............] - ETA: 5s - loss: 0.2269
34/59 [================>..............] - ETA: 5s - loss: 0.2340
35/59 [================>..............] - ETA: 5s - loss: 0.2285
36/59 [=================>.............] - ETA: 5s - loss: 0.2230
37/59 [=================>.............] - ETA: 4s - loss: 0.2171
38/59 [==================>............] - ETA: 4s - loss: 0.2117
39/59 [==================>............] - ETA: 4s - loss: 0.2065
40/59 [===================>...........] - ETA: 4s - loss: 0.2024
41/59 [===================>...........] - ETA: 4s - loss: 0.1989
42/59 [====================>..........] - ETA: 3s - loss: 0.1967
43/59 [====================>..........] - ETA: 3s - loss: 0.1922
44/59 [=====================>.........] - ETA: 3s - loss: 0.1881
45/59 [=====================>.........] - ETA: 3s - loss: 0.1898
46/59 [======================>........] - ETA: 3s - loss: 0.1871
47/59 [======================>........] - ETA: 2s - loss: 0.1832
48/59 [=======================>.......] - ETA: 2s - loss: 0.1795
49/59 [=======================>.......] - ETA: 2s - loss: 0.1763
50/59 [========================>......] - ETA: 2s - loss: 0.1729
51/59 [========================>......] - ETA: 1s - loss: 0.1701
52/59 [=========================>.....] - ETA: 1s - loss: 0.1671
53/59 [=========================>.....] - ETA: 1s - loss: 0.1641
54/59 [==========================>....] - ETA: 1s - loss: 0.1612
55/59 [==========================>....] - ETA: 0s - loss: 0.1583
56/59 [===========================>...] - ETA: 0s - loss: 0.1571
57/59 [===========================>...] - ETA: 0s - loss: 0.1564
58/59 [============================>..] - ETA: 0s - loss: 0.1539
59/59 [============================>..] - ETA: 0s - loss: 0.1517
Epoch 00022: val_loss did not improve

60/59 [=============================] - 15s 248ms/step - loss: 0.1487 - val_loss: 9.2
```

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067e-04
Epoch 23/30

 1/59 [..............................] - ETA: 5s - loss: 0.0012
 2/59 [>.............................] - ETA: 4s - loss: 0.0022
 3/59 [>.............................] - ETA: 4s - loss: 0.0040
 4/59 [=>............................] - ETA: 5s - loss: 0.0305
 5/59 [=>............................] - ETA: 7s - loss: 0.0249
 6/59 [==>...........................] - ETA: 7s - loss: 0.0303
 7/59 [==>...........................] - ETA: 8s - loss: 0.0560
 8/59 [===>..........................] - ETA: 8s - loss: 0.0505
 9/59 [===>..........................] - ETA: 9s - loss: 0.0480
10/59 [====>.........................] - ETA: 9s - loss: 0.0775
11/59 [====>.........................] - ETA: 9s - loss: 0.0707
12/59 [=====>........................] - ETA: 9s - loss: 0.0923
13/59 [=====>........................] - ETA: 9s - loss: 0.0859
14/59 [======>.......................] - ETA: 9s - loss: 0.0810
15/59 [======>.......................] - ETA: 9s - loss: 0.0757
16/59 [=======>......................] - ETA: 9s - loss: 0.0712
17/59 [=======>......................] - ETA: 9s - loss: 0.0683
18/59 [========>.....................] - ETA: 9s - loss: 0.0706
19/59 [========>.....................] - ETA: 8s - loss: 0.0701
20/59 [=========>....................] - ETA: 8s - loss: 0.0824
21/59 [=========>....................] - ETA: 8s - loss: 0.0801
22/59 [==========>...................] - ETA: 8s - loss: 0.0812
23/59 [==========>...................] - ETA: 8s - loss: 0.1041
24/59 [===========>..................] - ETA: 7s - loss: 0.1074
25/59 [===========>..................] - ETA: 7s - loss: 0.1047
26/59 [============>.................] - ETA: 7s - loss: 0.1028
27/59 [============>.................] - ETA: 7s - loss: 0.1015
28/59 [=============>................] - ETA: 7s - loss: 0.0979
29/59 [=============>................] - ETA: 6s - loss: 0.0957
30/59 [==============>...............] - ETA: 6s - loss: 0.0927
31/59 [==============>...............] - ETA: 6s - loss: 0.0907
32/59 [===============>..............] - ETA: 6s - loss: 0.0880
33/59 [===============>..............] - ETA: 6s - loss: 0.0867
34/59 [================>.............] - ETA: 5s - loss: 0.0842
35/59 [================>.............] - ETA: 5s - loss: 0.0826
36/59 [=================>............] - ETA: 5s - loss: 0.0811
37/59 [=================>............] - ETA: 5s - loss: 0.0791
38/59 [==================>...........] - ETA: 5s - loss: 0.0772
39/59 [==================>...........] - ETA: 4s - loss: 0.0839
40/59 [===================>..........] - ETA: 4s - loss: 0.0830
41/59 [===================>..........] - ETA: 4s - loss: 0.0863
42/59 [====================>.........] - ETA: 4s - loss: 0.0853
43/59 [====================>.........] - ETA: 3s - loss: 0.0834
44/59 [=====================>........] - ETA: 3s - loss: 0.0859
45/59 [=====================>........] - ETA: 3s - loss: 0.0841
46/59 [======================>.......] - ETA: 3s - loss: 0.0840
47/59 [======================>.......] - ETA: 2s - loss: 0.0823
48/59 [=======================>......] - ETA: 2s - loss: 0.0827
```

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49/59 [======================>......] - ETA: 2s - loss: 0.0811
50/59 [=======================>.....] - ETA: 2s - loss: 0.0795
51/59 [=======================>.....] - ETA: 1s - loss: 0.0786
52/59 [========================>....] - ETA: 1s - loss: 0.0771
53/59 [========================>....] - ETA: 1s - loss: 0.0771
54/59 [=========================>...] - ETA: 1s - loss: 0.0794
56/59 [==========================>..] - ETA: 0s - loss: 0.0768
57/59 [==========================>..] - ETA: 0s - loss: 0.0755
58/59 [===========================>.] - ETA: 0s - loss: 0.0785
59/59 [===========================>.] - ETA: 0s - loss: 0.0773
Epoch 00023: val_loss did not improve

60/59 [=============================] - 15s 253ms/step - loss: 0.0761 - val_loss: 0.0
238
Epoch 24/30

 1/59 [..............................] - ETA: 5s - loss: 0.0097
 2/59 [>.............................] - ETA: 4s - loss: 0.0173
 3/59 [>.............................] - ETA: 4s - loss: 0.0287
 4/59 [=>............................] - ETA: 5s - loss: 0.0220
 5/59 [=>............................] - ETA: 7s - loss: 0.0177
 6/59 [==>...........................] - ETA: 8s - loss: 0.0431
 7/59 [==>...........................] - ETA: 8s - loss: 0.0445
 8/59 [===>..........................] - ETA: 9s - loss: 0.0540
 9/59 [===>..........................] - ETA: 9s - loss: 0.0626
10/59 [====>.........................] - ETA: 9s - loss: 0.0606
11/59 [====>.........................] - ETA: 9s - loss: 0.0704
12/59 [=====>........................] - ETA: 9s - loss: 0.0987
13/59 [=====>........................] - ETA: 9s - loss: 0.1263
14/59 [======>.......................] - ETA: 9s - loss: 0.1442
15/59 [======>.......................] - ETA: 9s - loss: 0.1429
16/59 [=======>......................] - ETA: 9s - loss: 0.1347
17/59 [=======>......................] - ETA: 9s - loss: 0.1377
18/59 [========>.....................] - ETA: 9s - loss: 0.1309
19/59 [========>.....................] - ETA: 9s - loss: 0.1264
20/59 [=========>....................] - ETA: 8s - loss: 0.1203
21/59 [=========>....................] - ETA: 8s - loss: 0.1211
22/59 [==========>...................] - ETA: 8s - loss: 0.1219
23/59 [==========>...................] - ETA: 8s - loss: 0.1171
24/59 [===========>..................] - ETA: 8s - loss: 0.1149
25/59 [===========>..................] - ETA: 8s - loss: 0.1107
26/59 [============>.................] - ETA: 7s - loss: 0.1106
27/59 [============>.................] - ETA: 7s - loss: 0.1083
28/59 [=============>................] - ETA: 7s - loss: 0.1057
29/59 [=============>................] - ETA: 7s - loss: 0.1020
30/59 [==============>...............] - ETA: 6s - loss: 0.1016
31/59 [==============>...............] - ETA: 6s - loss: 0.0984
32/59 [===============>..............] - ETA: 6s - loss: 0.0992
33/59 [===============>..............] - ETA: 6s - loss: 0.0962
34/59 [================>.............] - ETA: 5s - loss: 0.0936
35/59 [================>.............] - ETA: 5s - loss: 0.0909
```

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36/59 [================>.............] - ETA: 5s - loss: 0.0917
37/59 [================>............] - ETA: 5s - loss: 0.0933
38/59 [=================>...........] - ETA: 5s - loss: 0.0929
39/59 [=================>...........] - ETA: 4s - loss: 0.0932
40/59 [==================>..........] - ETA: 4s - loss: 0.0911
41/59 [==================>..........] - ETA: 4s - loss: 0.0892
42/59 [===================>.........] - ETA: 4s - loss: 0.0957
43/59 [===================>.........] - ETA: 3s - loss: 0.0943
44/59 [====================>........] - ETA: 3s - loss: 0.0921
45/59 [====================>........] - ETA: 3s - loss: 0.0909
46/59 [=====================>.......] - ETA: 3s - loss: 0.0890
47/59 [=====================>.......] - ETA: 2s - loss: 0.0902
49/59 [======================>......] - ETA: 2s - loss: 0.0868
50/59 [=======================>.....] - ETA: 2s - loss: 0.0851
51/59 [=======================>.....] - ETA: 1s - loss: 0.0834
52/59 [========================>....] - ETA: 1s - loss: 0.0856
53/59 [========================>....] - ETA: 1s - loss: 0.0931
54/59 [=========================>...] - ETA: 1s - loss: 0.0915
55/59 [=========================>...] - ETA: 0s - loss: 0.0953
56/59 [==========================>..] - ETA: 0s - loss: 0.0972
57/59 [==========================>..] - ETA: 0s - loss: 0.0978
58/59 [===========================>.] - ETA: 0s - loss: 0.1003
59/59 [===========================>.] - ETA: 0s - loss: 0.0994
Epoch 00024: val_loss did not improve

60/59 [============================] - 15s 252ms/step - loss: 0.0989 - val_loss: 0.0
149
Epoch 25/30

 1/59 [..............................] - ETA: 4s - loss: 0.0323
 2/59 [>.............................] - ETA: 4s - loss: 0.0201
 4/59 [=>............................] - ETA: 3s - loss: 0.0584
 5/59 [=>............................] - ETA: 4s - loss: 0.0581
 6/59 [==>...........................] - ETA: 5s - loss: 0.0521
 7/59 [==>...........................] - ETA: 6s - loss: 0.0520
 8/59 [===>..........................] - ETA: 7s - loss: 0.1169
 9/59 [===>..........................] - ETA: 7s - loss: 0.1046
10/59 [====>.........................] - ETA: 8s - loss: 0.1040
11/59 [====>.........................] - ETA: 8s - loss: 0.1077
12/59 [=====>........................] - ETA: 8s - loss: 0.0988
13/59 [=====>........................] - ETA: 8s - loss: 0.0980
14/59 [======>.......................] - ETA: 8s - loss: 0.0928
15/59 [======>.......................] - ETA: 8s - loss: 0.1034
16/59 [=======>......................] - ETA: 8s - loss: 0.0978
17/59 [=======>......................] - ETA: 8s - loss: 0.1040
18/59 [========>.....................] - ETA: 8s - loss: 0.0985
19/59 [========>.....................] - ETA: 8s - loss: 0.0945
20/59 [=========>....................] - ETA: 8s - loss: 0.0970
21/59 [=========>....................] - ETA: 7s - loss: 0.0947
22/59 [==========>...................] - ETA: 7s - loss: 0.0942
23/59 [==========>...................] - ETA: 7s - loss: 0.0999
```

```
24/59 [==========>...................] - ETA: 7s - loss: 0.0962
25/59 [==========>...................] - ETA: 7s - loss: 0.0959
26/59 [===========>..................] - ETA: 7s - loss: 0.0933
27/59 [===========>..................] - ETA: 6s - loss: 0.0906
28/59 [============>.................] - ETA: 6s - loss: 0.0876
29/59 [============>.................] - ETA: 6s - loss: 0.0909
30/59 [=============>................] - ETA: 6s - loss: 0.0879
31/59 [=============>................] - ETA: 6s - loss: 0.0855
32/59 [==============>...............] - ETA: 6s - loss: 0.0829
33/59 [==============>...............] - ETA: 5s - loss: 0.0854
34/59 [===============>..............] - ETA: 5s - loss: 0.0841
35/59 [===============>..............] - ETA: 5s - loss: 0.0823
36/59 [================>.............] - ETA: 5s - loss: 0.0837
37/59 [================>.............] - ETA: 4s - loss: 0.0832
38/59 [=================>............] - ETA: 4s - loss: 0.0817
39/59 [=================>............] - ETA: 4s - loss: 0.0798
40/59 [==================>...........] - ETA: 4s - loss: 0.0781
41/59 [==================>...........] - ETA: 4s - loss: 0.0849
42/59 [===================>..........] - ETA: 3s - loss: 0.0888
43/59 [===================>..........] - ETA: 3s - loss: 0.0871
44/59 [====================>.........] - ETA: 3s - loss: 0.0881
45/59 [====================>.........] - ETA: 3s - loss: 0.0882
46/59 [=====================>........] - ETA: 3s - loss: 0.0889
47/59 [=====================>........] - ETA: 2s - loss: 0.0871
48/59 [======================>.......] - ETA: 2s - loss: 0.0853
49/59 [======================>.......] - ETA: 2s - loss: 0.0836
50/59 [=======================>......] - ETA: 2s - loss: 0.0824
51/59 [=======================>......] - ETA: 1s - loss: 0.0810
52/59 [========================>.....] - ETA: 1s - loss: 0.0803
53/59 [========================>.....] - ETA: 1s - loss: 0.0839
54/59 [=========================>....] - ETA: 1s - loss: 0.0836
55/59 [=========================>....] - ETA: 0s - loss: 0.0822
56/59 [==========================>...] - ETA: 0s - loss: 0.0826
57/59 [==========================>...] - ETA: 0s - loss: 0.0823
58/59 [===========================>..] - ETA: 0s - loss: 0.0822
59/59 [===========================>..] - ETA: 0s - loss: 0.0809
Epoch 00025: val_loss did not improve

60/59 [=============================] - 15s 247ms/step - loss: 0.0798 - val_loss: 0.0
172
Epoch 26/30

 1/59 [..............................] - ETA: 5s - loss: 0.0421
 2/59 [>.............................] - ETA: 4s - loss: 0.0241
 3/59 [>.............................] - ETA: 4s - loss: 0.0339
 4/59 [=>............................] - ETA: 4s - loss: 0.0756
 5/59 [=>............................] - ETA: 6s - loss: 0.0734
 6/59 [==>...........................] - ETA: 7s - loss: 0.0803
 7/59 [==>...........................] - ETA: 7s - loss: 0.0921
 8/59 [===>..........................] - ETA: 8s - loss: 0.0896
 9/59 [===>..........................] - ETA: 8s - loss: 0.1010
```

```
10/59 [====>.........................] - ETA: 8s - loss: 0.0912
11/59 [====>.........................] - ETA: 8s - loss: 0.0854
12/59 [=====>........................] - ETA: 9s - loss: 0.0837
13/59 [=====>........................] - ETA: 9s - loss: 0.0772
14/59 [======>.......................] - ETA: 9s - loss: 0.0719
15/59 [======>.......................] - ETA: 9s - loss: 0.0703
16/59 [=======>......................] - ETA: 8s - loss: 0.0659
17/59 [=======>......................] - ETA: 8s - loss: 0.0629
18/59 [========>.....................] - ETA: 8s - loss: 0.0606
19/59 [========>.....................] - ETA: 8s - loss: 0.0575
20/59 [=========>....................] - ETA: 8s - loss: 0.0583
21/59 [=========>....................] - ETA: 8s - loss: 0.0567
22/59 [==========>...................] - ETA: 8s - loss: 0.0566
23/59 [==========>...................] - ETA: 7s - loss: 0.0632
24/59 [==========>...................] - ETA: 7s - loss: 0.0668
25/59 [==========>...................] - ETA: 7s - loss: 0.0647
26/59 [===========>..................] - ETA: 7s - loss: 0.0664
27/59 [===========>..................] - ETA: 7s - loss: 0.0640
28/59 [============>.................] - ETA: 7s - loss: 0.0671
29/59 [============>.................] - ETA: 6s - loss: 0.0649
30/59 [=============>................] - ETA: 6s - loss: 0.0628
31/59 [=============>................] - ETA: 6s - loss: 0.0645
32/59 [==============>...............] - ETA: 6s - loss: 0.0638
34/59 [===============>..............] - ETA: 5s - loss: 0.0606
35/59 [===============>..............] - ETA: 5s - loss: 0.0588
36/59 [================>.............] - ETA: 5s - loss: 0.0573
37/59 [=================>............] - ETA: 5s - loss: 0.0558
38/59 [=================>............] - ETA: 4s - loss: 0.0644
39/59 [==================>...........] - ETA: 4s - loss: 0.0633
40/59 [==================>...........] - ETA: 4s - loss: 0.0620
41/59 [===================>..........] - ETA: 4s - loss: 0.0611
42/59 [====================>.........] - ETA: 3s - loss: 0.0598
43/59 [====================>.........] - ETA: 3s - loss: 0.0586
44/59 [=====================>........] - ETA: 3s - loss: 0.0578
45/59 [=====================>........] - ETA: 3s - loss: 0.0577
46/59 [======================>.......] - ETA: 3s - loss: 0.0584
47/59 [======================>.......] - ETA: 2s - loss: 0.0579
48/59 [=======================>......] - ETA: 2s - loss: 0.0594
49/59 [=======================>......] - ETA: 2s - loss: 0.0588
50/59 [========================>.....] - ETA: 2s - loss: 0.0591
51/59 [========================>.....] - ETA: 1s - loss: 0.0588
52/59 [=========================>....] - ETA: 1s - loss: 0.0578
53/59 [=========================>....] - ETA: 1s - loss: 0.0569
54/59 [==========================>...] - ETA: 1s - loss: 0.0564
55/59 [==========================>...] - ETA: 0s - loss: 0.0569
56/59 [===========================>..] - ETA: 0s - loss: 0.0594
57/59 [===========================>..] - ETA: 0s - loss: 0.0584
58/59 [============================>.] - ETA: 0s - loss: 0.0583
59/59 [============================>.] - ETA: 0s - loss: 0.0599
Epoch 00026: val_loss did not improve
```

```
60/59 [==============================] - 15s 247ms/step - loss: 0.0629 - val_loss: 0.0
015
Epoch 27/30

 1/59 [..............................] - ETA: 5s - loss: 2.3215e-05
 2/59 [>.............................] - ETA: 4s - loss: 0.0139
 3/59 [>.............................] - ETA: 4s - loss: 0.0109
 4/59 [=>............................] - ETA: 5s - loss: 0.0088
 5/59 [=>............................] - ETA: 7s - loss: 0.0304
 6/59 [==>...........................] - ETA: 7s - loss: 0.0299
 7/59 [==>...........................] - ETA: 8s - loss: 0.0382
 8/59 [===>..........................] - ETA: 8s - loss: 0.0345
 9/59 [===>..........................] - ETA: 9s - loss: 0.0310
10/59 [====>.........................] - ETA: 9s - loss: 0.0285
11/59 [====>.........................] - ETA: 9s - loss: 0.0320
12/59 [=====>........................] - ETA: 9s - loss: 0.0337
13/59 [=====>........................] - ETA: 9s - loss: 0.0312
14/59 [======>.......................] - ETA: 9s - loss: 0.0308
15/59 [======>.......................] - ETA: 9s - loss: 0.0290
16/59 [=======>......................] - ETA: 9s - loss: 0.0273
17/59 [=======>......................] - ETA: 9s - loss: 0.0257
18/59 [========>.....................] - ETA: 8s - loss: 0.0244
19/59 [========>.....................] - ETA: 8s - loss: 0.0264
20/59 [=========>....................] - ETA: 8s - loss: 0.0252
21/59 [=========>....................] - ETA: 8s - loss: 0.0271
22/59 [==========>...................] - ETA: 8s - loss: 0.0354
23/59 [==========>...................] - ETA: 8s - loss: 0.0351
24/59 [===========>..................] - ETA: 7s - loss: 0.0337
25/59 [===========>..................] - ETA: 7s - loss: 0.0324
26/59 [============>.................] - ETA: 7s - loss: 0.0425
27/59 [============>.................] - ETA: 7s - loss: 0.0476
28/59 [=============>................] - ETA: 7s - loss: 0.0462
29/59 [=============>................] - ETA: 6s - loss: 0.0448
30/59 [==============>...............] - ETA: 6s - loss: 0.0435
31/59 [==============>...............] - ETA: 6s - loss: 0.0422
32/59 [===============>..............] - ETA: 6s - loss: 0.0426
33/59 [===============>..............] - ETA: 5s - loss: 0.0419
34/59 [================>.............] - ETA: 5s - loss: 0.0423
35/59 [================>.............] - ETA: 5s - loss: 0.0412
36/59 [=================>............] - ETA: 5s - loss: 0.0412
37/59 [=================>............] - ETA: 5s - loss: 0.0569
38/59 [==================>...........] - ETA: 4s - loss: 0.0682
39/59 [==================>...........] - ETA: 4s - loss: 0.0674
40/59 [===================>..........] - ETA: 4s - loss: 0.0657
41/59 [===================>..........] - ETA: 4s - loss: 0.0664
42/59 [====================>.........] - ETA: 3s - loss: 0.0658
43/59 [====================>.........] - ETA: 3s - loss: 0.0647
44/59 [=====================>........] - ETA: 3s - loss: 0.0665
45/59 [=====================>........] - ETA: 3s - loss: 0.0656
46/59 [======================>.......] - ETA: 3s - loss: 0.0686
47/59 [=======================>......] - ETA: 2s - loss: 0.0672
```

```
48/59 [======================>......] - ETA: 2s - loss: 0.0661
49/59 [======================>......] - ETA: 2s - loss: 0.0649
50/59 [=======================>.....] - ETA: 2s - loss: 0.0636
51/59 [=======================>.....] - ETA: 1s - loss: 0.0625
53/59 [========================>....] - ETA: 1s - loss: 0.0613
54/59 [=========================>...] - ETA: 1s - loss: 0.0605
55/59 [=========================>...] - ETA: 0s - loss: 0.0607
56/59 [==========================>..] - ETA: 0s - loss: 0.0619
57/59 [==========================>..] - ETA: 0s - loss: 0.0610
58/59 [===========================>.] - ETA: 0s - loss: 0.0618
59/59 [===========================>.] - ETA: 0s - loss: 0.0620
Epoch 00027: val_loss did not improve

60/59 [==============================] - 15s 248ms/step - loss: 0.0612 - val_loss: 0.0
198
Epoch 28/30

 1/59 [..............................] - ETA: 4s - loss: 0.0628
 2/59 [>.............................] - ETA: 4s - loss: 0.0320
 3/59 [>.............................] - ETA: 4s - loss: 0.0214
 4/59 [=>............................] - ETA: 5s - loss: 0.0200
 5/59 [=>............................] - ETA: 7s - loss: 0.0192
 6/59 [==>...........................] - ETA: 8s - loss: 0.0165
 7/59 [==>...........................] - ETA: 8s - loss: 0.0174
 8/59 [===>..........................] - ETA: 8s - loss: 0.0159
 9/59 [===>..........................] - ETA: 9s - loss: 0.0244
10/59 [====>.........................] - ETA: 9s - loss: 0.0454
11/59 [====>.........................] - ETA: 9s - loss: 0.0426
12/59 [=====>........................] - ETA: 9s - loss: 0.0395
13/59 [=====>........................] - ETA: 9s - loss: 0.0438
14/59 [======>.......................] - ETA: 9s - loss: 0.0510
15/59 [======>.......................] - ETA: 9s - loss: 0.0501
16/59 [=======>......................] - ETA: 9s - loss: 0.0474
17/59 [=======>......................] - ETA: 8s - loss: 0.0447
18/59 [========>.....................] - ETA: 8s - loss: 0.0428
19/59 [========>.....................] - ETA: 8s - loss: 0.0406
20/59 [=========>....................] - ETA: 8s - loss: 0.0390
21/59 [=========>....................] - ETA: 8s - loss: 0.0389
22/59 [==========>...................] - ETA: 8s - loss: 0.0380
23/59 [==========>...................] - ETA: 8s - loss: 0.0378
24/59 [===========>..................] - ETA: 7s - loss: 0.0397
25/59 [===========>..................] - ETA: 7s - loss: 0.0391
26/59 [============>.................] - ETA: 7s - loss: 0.0432
27/59 [============>.................] - ETA: 7s - loss: 0.0434
28/59 [=============>................] - ETA: 7s - loss: 0.0419
29/59 [=============>................] - ETA: 6s - loss: 0.0409
30/59 [==============>...............] - ETA: 6s - loss: 0.0422
31/59 [==============>...............] - ETA: 6s - loss: 0.0409
32/59 [===============>..............] - ETA: 6s - loss: 0.0396
33/59 [===============>..............] - ETA: 5s - loss: 0.0384
34/59 [================>.............] - ETA: 5s - loss: 0.0399
```

```
35/59 [===============>..............] - ETA: 5s - loss: 0.0412
36/59 [================>.............] - ETA: 5s - loss: 0.0401
37/59 [================>.............] - ETA: 5s - loss: 0.0390
38/59 [=================>............] - ETA: 4s - loss: 0.0380
39/59 [=================>............] - ETA: 4s - loss: 0.0384
40/59 [==================>...........] - ETA: 4s - loss: 0.0374
41/59 [==================>...........] - ETA: 4s - loss: 0.0370
42/59 [===================>..........] - ETA: 3s - loss: 0.0363
43/59 [===================>..........] - ETA: 3s - loss: 0.0362
44/59 [====================>.........] - ETA: 3s - loss: 0.0357
45/59 [=====================>........] - ETA: 3s - loss: 0.0349
46/59 [=====================>........] - ETA: 3s - loss: 0.0342
47/59 [======================>.......] - ETA: 2s - loss: 0.0381
48/59 [======================>.......] - ETA: 2s - loss: 0.0393
49/59 [=======================>......] - ETA: 2s - loss: 0.0386
50/59 [=======================>......] - ETA: 2s - loss: 0.0395
51/59 [========================>.....] - ETA: 1s - loss: 0.0395
52/59 [========================>.....] - ETA: 1s - loss: 0.0388
53/59 [=========================>....] - ETA: 1s - loss: 0.0381
54/59 [=========================>....] - ETA: 1s - loss: 0.0376
55/59 [==========================>...] - ETA: 0s - loss: 0.0369
56/59 [===========================>..] - ETA: 0s - loss: 0.0364
57/59 [===========================>..] - ETA: 0s - loss: 0.0362
59/59 [============================>.] - ETA: 0s - loss: 0.0350
Epoch 00028: val_loss did not improve

60/59 [==============================] - 15s 247ms/step - loss: 0.0355 - val_loss: 0.0
038
Epoch 29/30

 1/59 [..............................] - ETA: 4s - loss: 0.1409
 2/59 [>.............................] - ETA: 4s - loss: 0.1243
 3/59 [>.............................] - ETA: 4s - loss: 0.0882
 4/59 [=>............................] - ETA: 5s - loss: 0.0686
 5/59 [=>............................] - ETA: 6s - loss: 0.0549
 6/59 [==>...........................] - ETA: 7s - loss: 0.0684
 7/59 [==>...........................] - ETA: 8s - loss: 0.1057
 8/59 [===>..........................] - ETA: 8s - loss: 0.1030
10/59 [====>.........................] - ETA: 8s - loss: 0.0995
11/59 [====>.........................] - ETA: 8s - loss: 0.1012
12/59 [=====>........................] - ETA: 8s - loss: 0.0929
13/59 [=====>........................] - ETA: 8s - loss: 0.0952
14/59 [======>.......................] - ETA: 8s - loss: 0.0889
15/59 [======>.......................] - ETA: 8s - loss: 0.0830
16/59 [=======>......................] - ETA: 8s - loss: 0.0867
17/59 [=======>......................] - ETA: 8s - loss: 0.0830
18/59 [========>.....................] - ETA: 8s - loss: 0.0865
19/59 [========>.....................] - ETA: 8s - loss: 0.0820
20/59 [========>.....................] - ETA: 8s - loss: 0.0789
21/59 [=========>....................] - ETA: 7s - loss: 0.0753
22/59 [==========>...................] - ETA: 7s - loss: 0.0720
```

```
23/59 [=========>....................] - ETA: 7s - loss: 0.0688
24/59 [==========>...................] - ETA: 7s - loss: 0.0676
25/59 [==========>...................] - ETA: 7s - loss: 0.0649
26/59 [===========>..................] - ETA: 7s - loss: 0.0655
27/59 [===========>..................] - ETA: 6s - loss: 0.0632
28/59 [============>.................] - ETA: 6s - loss: 0.0621
29/59 [============>.................] - ETA: 6s - loss: 0.0609
30/59 [=============>................] - ETA: 6s - loss: 0.0594
31/59 [=============>................] - ETA: 6s - loss: 0.0577
32/59 [==============>...............] - ETA: 6s - loss: 0.0567
33/59 [==============>...............] - ETA: 5s - loss: 0.0584
34/59 [===============>..............] - ETA: 5s - loss: 0.0581
35/59 [===============>..............] - ETA: 5s - loss: 0.0655
36/59 [================>.............] - ETA: 5s - loss: 0.0637
37/59 [================>.............] - ETA: 4s - loss: 0.0675
38/59 [=================>............] - ETA: 4s - loss: 0.0756
39/59 [=================>............] - ETA: 4s - loss: 0.0743
40/59 [==================>...........] - ETA: 4s - loss: 0.0726
41/59 [==================>...........] - ETA: 4s - loss: 0.0716
42/59 [===================>..........] - ETA: 3s - loss: 0.0703
43/59 [===================>..........] - ETA: 3s - loss: 0.0726
44/59 [====================>.........] - ETA: 3s - loss: 0.0710
45/59 [====================>.........] - ETA: 3s - loss: 0.0695
46/59 [=====================>........] - ETA: 3s - loss: 0.0682
47/59 [=====================>........] - ETA: 2s - loss: 0.0668
48/59 [======================>.......] - ETA: 2s - loss: 0.0665
49/59 [======================>.......] - ETA: 2s - loss: 0.0652
50/59 [=======================>......] - ETA: 2s - loss: 0.0696
51/59 [=======================>......] - ETA: 1s - loss: 0.0714
52/59 [========================>.....] - ETA: 1s - loss: 0.0701
53/59 [========================>.....] - ETA: 1s - loss: 0.0693
54/59 [=========================>....] - ETA: 1s - loss: 0.0777
55/59 [=========================>....] - ETA: 0s - loss: 0.0812
56/59 [==========================>...] - ETA: 0s - loss: 0.0814
57/59 [==========================>...] - ETA: 0s - loss: 0.0800
58/59 [===========================>..] - ETA: 0s - loss: 0.0807
59/59 [===========================>..] - ETA: 0s - loss: 0.0794
Epoch 00029: val_loss did not improve

60/59 [=============================] - 15s 247ms/step - loss: 0.0785 - val_loss: 0.0
077
Epoch 30/30

 1/59 [..............................] - ETA: 5s - loss: 0.0326
 2/59 [>.............................] - ETA: 5s - loss: 0.0187
 3/59 [>.............................] - ETA: 4s - loss: 0.0220
 4/59 [=>............................] - ETA: 5s - loss: 0.0220
 5/59 [=>............................] - ETA: 6s - loss: 0.0182
 6/59 [==>...........................] - ETA: 7s - loss: 0.0153
 7/59 [==>...........................] - ETA: 8s - loss: 0.0166
 8/59 [===>..........................] - ETA: 8s - loss: 0.0147
```

```
 9/59 [===>.........................] - ETA: 9s - loss: 0.0173
10/59 [====>........................] - ETA: 9s - loss: 0.0175
12/59 [=====>.......................] - ETA: 8s - loss: 0.0177
13/59 [=====>.......................] - ETA: 8s - loss: 0.0165
14/59 [======>......................] - ETA: 8s - loss: 0.0155
15/59 [======>......................] - ETA: 8s - loss: 0.0145
16/59 [=======>.....................] - ETA: 8s - loss: 0.0177
17/59 [=======>.....................] - ETA: 8s - loss: 0.0170
18/59 [========>....................] - ETA: 8s - loss: 0.0164
19/59 [========>....................] - ETA: 8s - loss: 0.0157
20/59 [=========>...................] - ETA: 8s - loss: 0.0164
21/59 [=========>...................] - ETA: 7s - loss: 0.0171
22/59 [==========>..................] - ETA: 7s - loss: 0.0271
23/59 [==========>..................] - ETA: 7s - loss: 0.0261
24/59 [===========>.................] - ETA: 7s - loss: 0.0357
25/59 [===========>.................] - ETA: 7s - loss: 0.0343
26/59 [============>................] - ETA: 7s - loss: 0.0331
27/59 [============>................] - ETA: 6s - loss: 0.0319
28/59 [=============>...............] - ETA: 6s - loss: 0.0325
29/59 [=============>...............] - ETA: 6s - loss: 0.0319
30/59 [==============>..............] - ETA: 6s - loss: 0.0364
31/59 [==============>..............] - ETA: 6s - loss: 0.0356
32/59 [===============>.............] - ETA: 6s - loss: 0.0347
33/59 [===============>.............] - ETA: 5s - loss: 0.0381
34/59 [================>............] - ETA: 5s - loss: 0.0454
35/59 [================>............] - ETA: 5s - loss: 0.0449
36/59 [=================>...........] - ETA: 5s - loss: 0.0441
37/59 [=================>...........] - ETA: 4s - loss: 0.0429
38/59 [==================>..........] - ETA: 4s - loss: 0.0592
39/59 [==================>..........] - ETA: 4s - loss: 0.0635
40/59 [===================>.........] - ETA: 4s - loss: 0.0627
41/59 [===================>.........] - ETA: 4s - loss: 0.0623
42/59 [====================>........] - ETA: 3s - loss: 0.0638
43/59 [====================>........] - ETA: 3s - loss: 0.0624
44/59 [=====================>.......] - ETA: 3s - loss: 0.0615
45/59 [=====================>.......] - ETA: 3s - loss: 0.0606
46/59 [======================>......] - ETA: 3s - loss: 0.0593
47/59 [======================>......] - ETA: 2s - loss: 0.0586
48/59 [=======================>.....] - ETA: 2s - loss: 0.0577
49/59 [=======================>.....] - ETA: 2s - loss: 0.0566
50/59 [========================>....] - ETA: 2s - loss: 0.0583
51/59 [========================>....] - ETA: 1s - loss: 0.0599
52/59 [=========================>...] - ETA: 1s - loss: 0.0588
53/59 [=========================>...] - ETA: 1s - loss: 0.0599
54/59 [==========================>..] - ETA: 1s - loss: 0.0591
55/59 [==========================>..] - ETA: 0s - loss: 0.0581
56/59 [===========================>.] - ETA: 0s - loss: 0.0572
57/59 [===========================>.] - ETA: 0s - loss: 0.0590
58/59 [============================>.] - ETA: 0s - loss: 0.0612
59/59 [============================>.] - ETA: 0s - loss: 0.0631
Epoch 00030: val_loss did not improve
```

```
60/59 [==============================] - 15s 247ms/step - loss: 0.0644 - val_loss: 0.0
287
E:\Program\Anaconda3\lib\site-packages\h5py\__init__.py:34: FutureWarning: Conversion
of the second argument of issubdtype from `float` to `np.floating` is deprecated. In f
uture, it will be treated as `np.float64 == np.dtype(float).type`.
  from ._conv import register_converters as _register_converters
Using TensorFlow backend.
validation accuracy: 0.9933333333333333
```

Training on all provided data and save the model

Hide

```
if(run.train_nn){
system.time(system('python ../lib/train.py --hidden_unit 256 --epochs 30 --all_data 1'
))
}
```

Test new data

Hide

```
# resize data
if(run.feature.train){
  system.time(system('python ../lib/preprocessing.py --img_size=224 --train 0 --img_di
r ../data/test/images --lab_dir ../data/test/label.csv'))
}
```

Hide

```
if (run.test){
  system.time(system('python ../lib/test.py --hidden_unit 256 --model_path ../output/k
eras_model/mobilenet_1522197600.hdf5 '))
}
```