

机器学习业务实践之路

课程5：深度学习-TensorFlow实现图像分类

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1. 深度学习简介

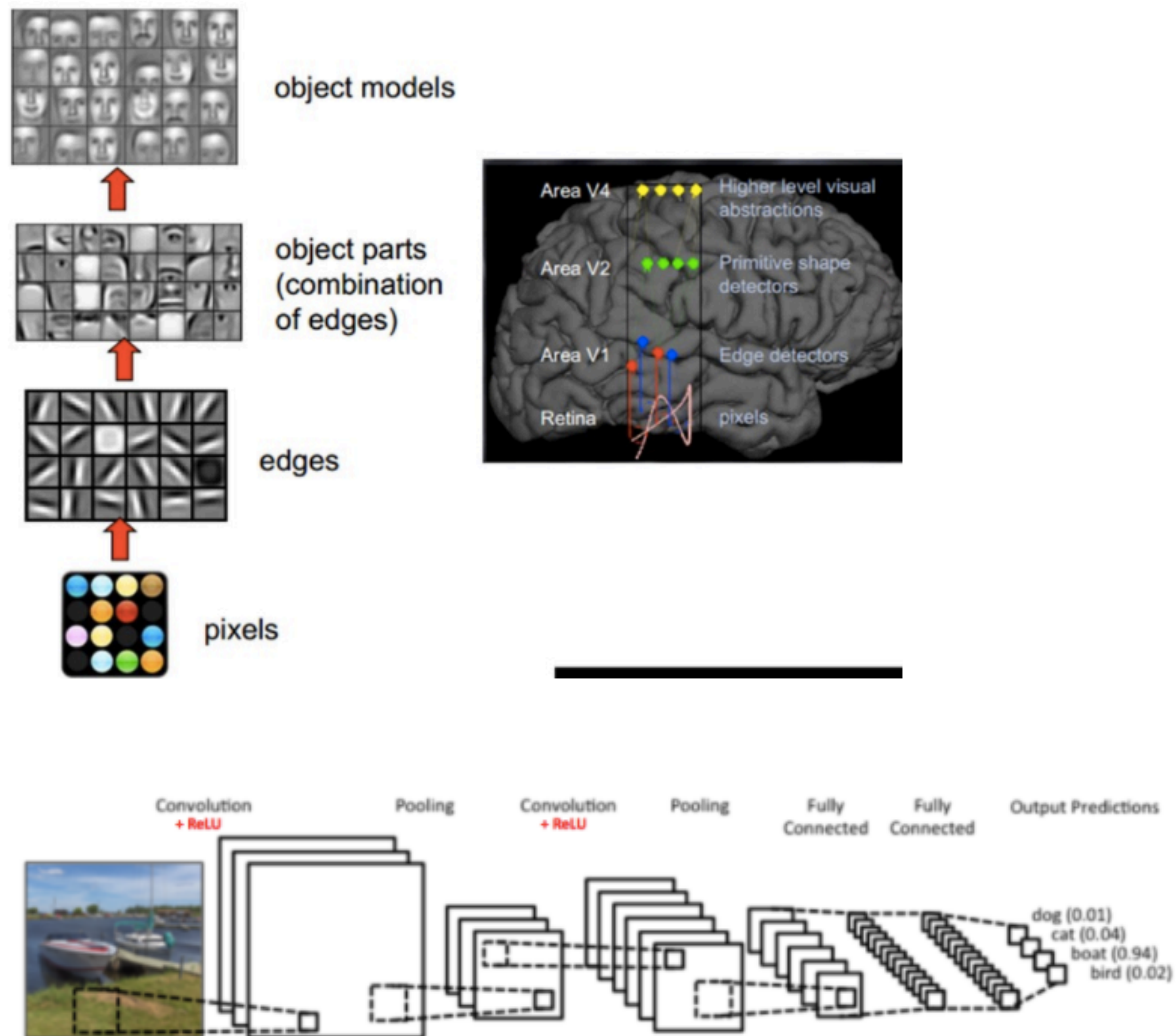
2. 深度学习架构介绍

3. 图片分类案例讲解

4. 基于PAI实现图片分类

什么是深度学习

- 1 基于人工神经网络
模拟人脑学习
- 2 对数据进行分层计算
由低层到高层特征抽象
- 3 主要应用于视觉、语音、行为等领域
人脸识别、语音识别、OCR

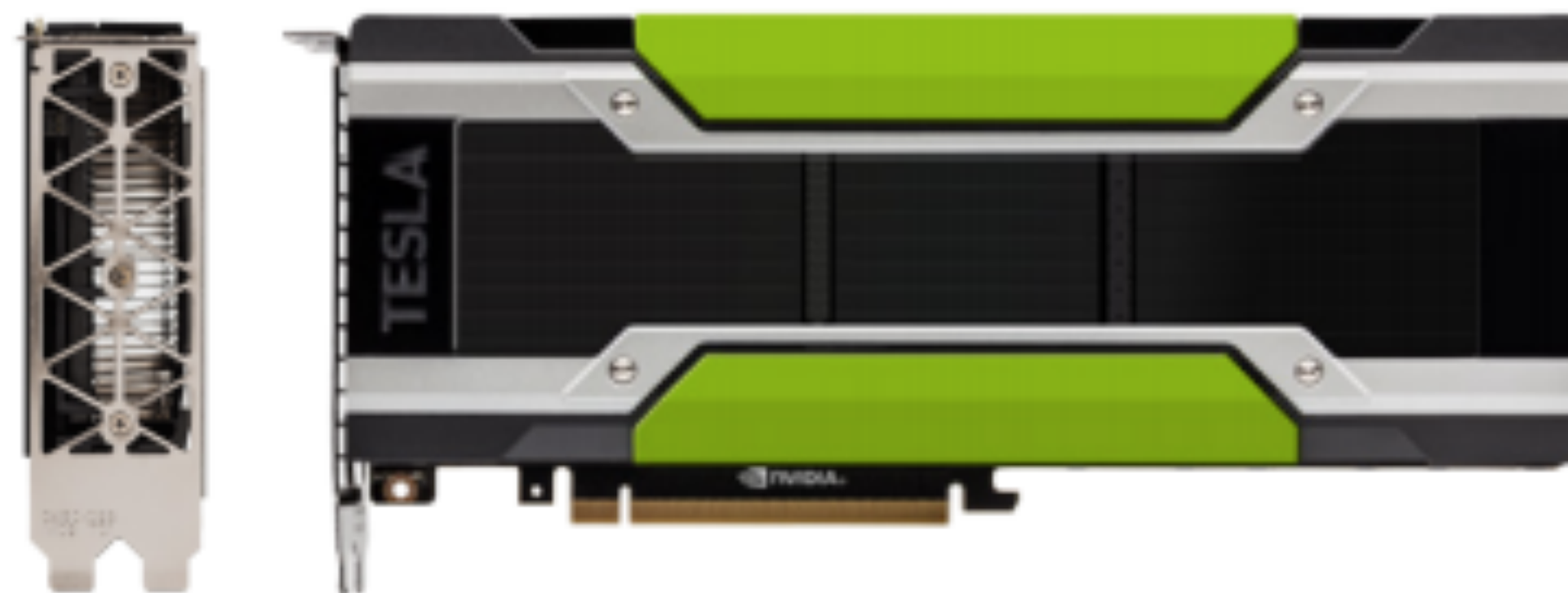


阿里云深度学习支持算法框架

1 TensorFlow

2 Caffe

3 MXNet



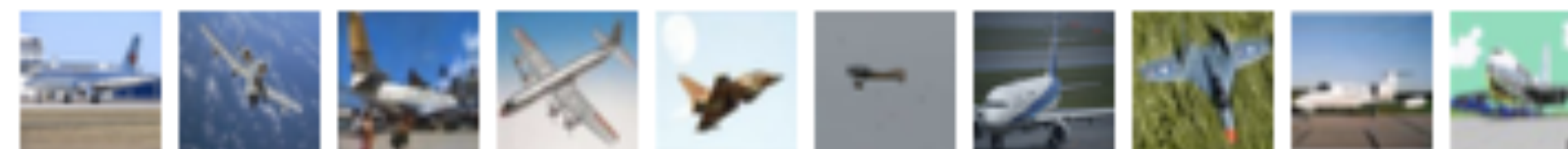
NVIDIA® TESLA® M40
GPU ACCELERATOR

图片分类示例

CIRAR-10，对图片分类识别

- Size 32*32，共计60000张样本
- 10种类型，每类 6000张图片
- 训练集50000，测试集10000
- 使用 TensorFlow

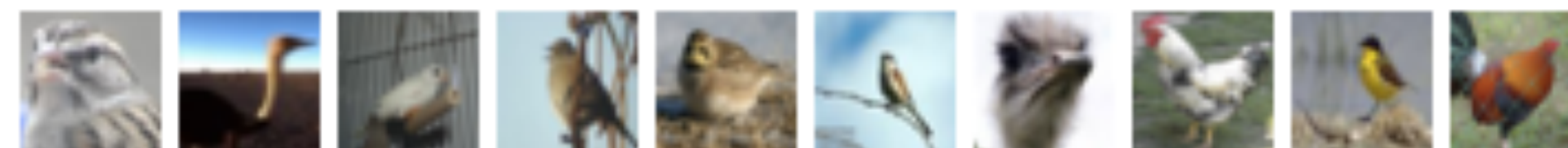
airplane



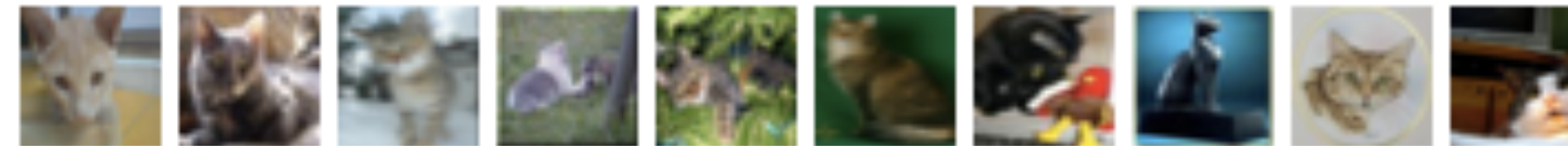
automobile



bird



cat



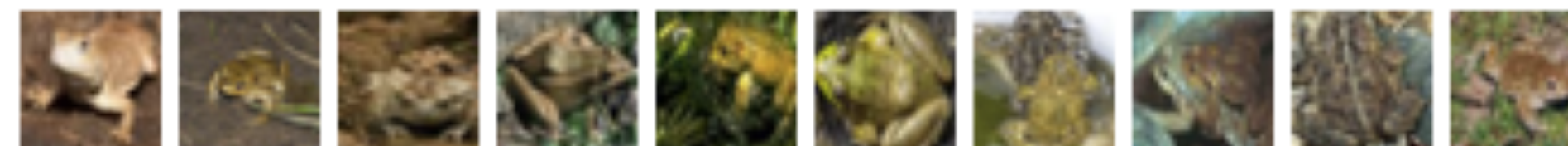
deer



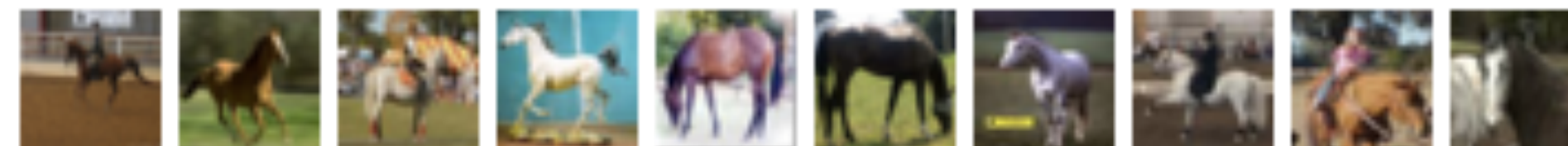
dog



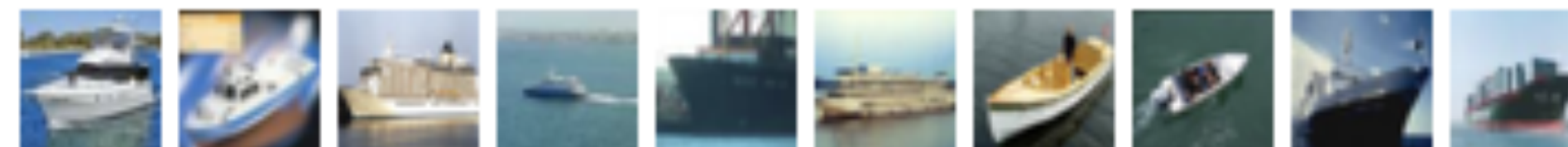
frog



horse



ship



truck



编写代码-训练

```
def main(_):
    dirname = os.path.join(FLAGS.buckets, "")
    (X, Y), (X_test, Y_test) = load_data(dirname)
    print("load data done")

    X, Y = shuffle(X, Y)
    Y = to_categorical(Y, 10)
    Y_test = to_categorical(Y_test, 10)

    # Real-time data preprocessing
    img_prep = ImagePreprocessing()
    img_prep.add_featurewise_zero_center()
    img_prep.add_featurewise_stdnorm()

    # Real-time data augmentation
    img_aug = ImageAugmentation()
    img_aug.add_random_flip_leftright()
    img_aug.add_random_rotation(max_angle=25.)
```

```
# Convolutional network building
network = input_data(shape=[None, 32, 32, 3],
                        data_preprocessing=img_prep,
                        data_augmentation=img_aug)
network = conv_2d(network, 32, 3, activation='relu')
network = max_pool_2d(network, 2)
network = conv_2d(network, 64, 3, activation='relu')
network = conv_2d(network, 64, 3, activation='relu')
network = max_pool_2d(network, 2)
network = fully_connected(network, 512, activation='relu')
network = dropout(network, 0.5)
network = fully_connected(network, 10, activation='softmax')
network = regression(network, optimizer='adam',
                      loss='categorical_crossentropy',
                      learning_rate=0.001)

# Train using classifier
model = tflearn.DNN(network, tensorboard_verbose=0)
model.fit(X, Y, n_epoch=100, shuffle=True, validation_set=(X_test, Y_test),
          show_metric=True, batch_size=96, run_id='cifar10_cnn')
model_path = os.path.join(FLAGS.checkpointDir, "model.tfl")
print(model_path)
model.save(model_path)
```

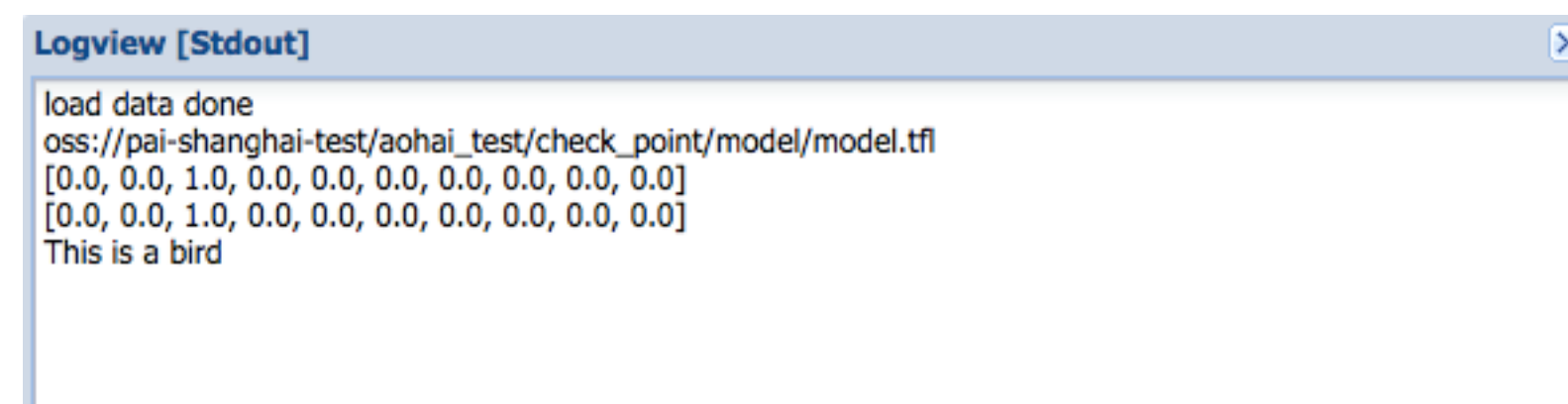
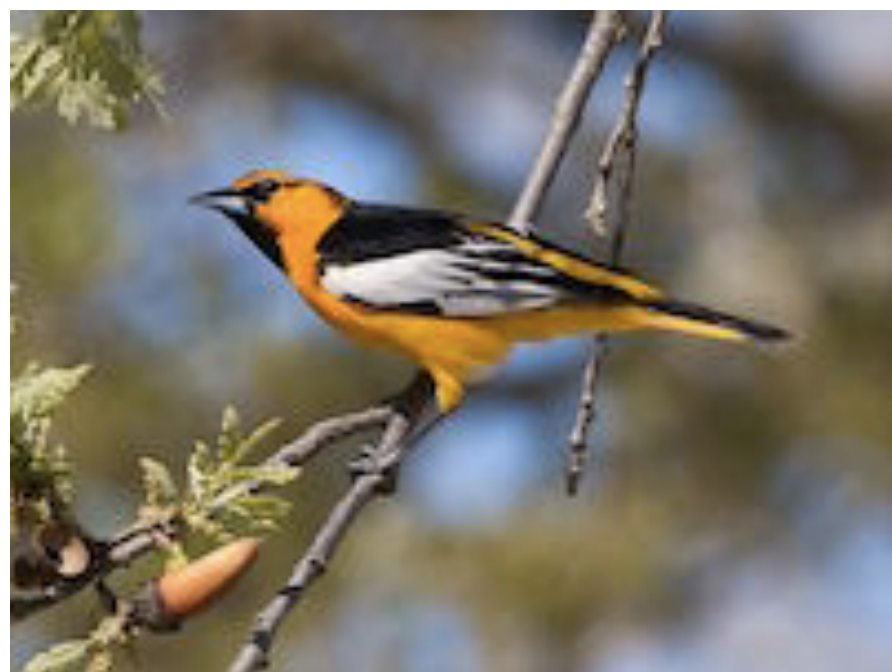

编写代码-预测

```
predict_pic = os.path.join(FLAGS.buckets, "bird_mount_bluebird.jpg")
img_obj = file_io.read_file_to_string(predict_pic)
file_io.write_string_to_file("bird_mount_bluebird.jpg", img_obj)

img = scipy.ndimage.imread("bird_mount_bluebird.jpg", mode="RGB")

# Scale it to 32x32
img = scipy.misc.imresize(img, (32, 32), interp="bicubic").astype(np.float32, casting='unsafe')

# Predict
prediction = model.predict([img])
print (prediction[0])
```



相关资料

推荐学习材料：

- 《机器学习实践》
- 《统计学习方法》
- 吴恩达的机器学习相关课程

推荐实验环境：机器学习PAI <https://data.aliyun.com/product/learn>

案例数据下载：https://help.aliyun.com/document_detail/51800.html

深度学习文档：https://help.aliyun.com/document_detail/49571.html

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