查看、准备数据

In [1]:
```
import pandas as pd
import numpy as np
from PIL import Image

MasterFile = pd.read_csv("/clubear/Lecture 2.1 - Linear Regression by TensorFlow/data/faces/FaceScore.csv")
```

In [2]:
```
MasterFile[0:5] #查看data
```

Out[2]:
```
     Filename    Rating
0    ftw1.jpg    4.083333
1    ftw10.jpg   3.666667
2    ftw100.jpg  1.916667
3    ftw101.jpg  2.416667
4    ftw102.jpg  3.166667
```

准备数据，将其转化为非线性回归问题

In [50]:
```
FileNames=MasterFile['Filename']
N=len(FileNames)
IMSIZE=128
X=np.zeros([N,IMSIZE,IMSIZE,3])
for i in range(N):
    MyFile=FileNames[i]
    Im=Image.open('/clubear/Lecture 2.1 - Linear Regression by TensorFlow/data/faces/images/'+MyFile)
    Im=Im.resize([IMSIZE,IMSIZE])
    Im=np.array(Im)/255
    X[i,]=Im

#创建一个X画布，将图片以array的形式一个个粘贴到X上
```

In [35]:

```
list_y = [] #创建一个空的list
for i in range(N):
    MyFile = FileNames[i] #提取Filenames
    if MyFile[0] == "f":
        list_y.append(0)
    elif MyFile[0] == "m":
        list_y.append(1)
#如果filename 第一个字母是f，添加0在list里；反之则添加1 （用0和1表示性别)
Y = np.asarray(list_y)
Y
```

Out[35]:

```
array([0, 0, 0, ..., 1, 1, 1])
```

数据切分

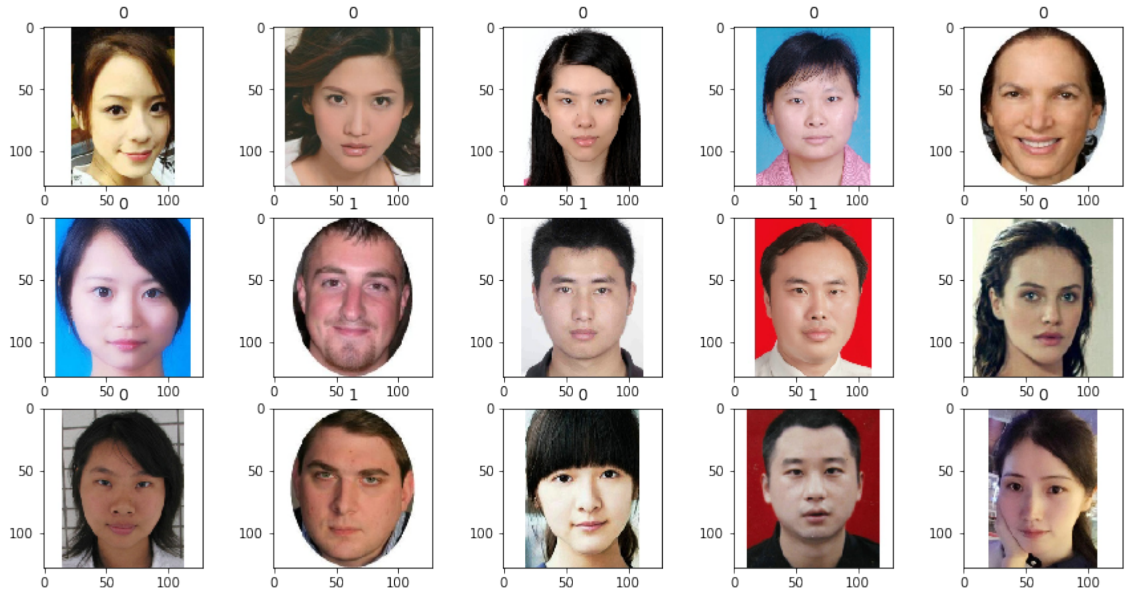
In [55]:

```
from sklearn.model_selection import train_test_split
X0,X1,Y0,Y1=train_test_split(X,Y,test_size=0.3,random_state=233)
#固定seed为233, train: test = 7:3
```

数据展示

In [58]:
```
from matplotlib import pyplot as plt
plt.figure()
fig,ax=plt.subplots(3,5)
fig.set_figheight(7.5)
fig.set_figwidth(15)
ax=ax.flatten()
for i in range(15):
    ax[i].imshow(X0[i,:,:,:])
    ax[i].set_title(Y0[i])
#查看数据是否consistent ie 0和1的添加是否对应
```

```
<Figure size 432x288 with 0 Axes>
```



产生One-Hot型因变量

In [62]:
```
from keras.utils import to_categorical
YY0 = to_categorical(Y0)
YY1 = to_categorical(Y1)
YY1

#因为TensorFlow只能阅读One-Hot的变量，将0和1变成[1, 0]和[0, 1]
```

Out[62]:
```
array([[0., 1.],
       [1., 0.],
       [0., 1.],
       ...,
       [1., 0.],
       [1., 0.],
       [0., 1.]], dtype=float32)
```

逻辑回归模型搭建

In [64]:

```
from keras.layers import  Dense, Flatten, Input, Activation
from keras import Model


input_layer = Input([IMSIZE,IMSIZE,3])
x= input_layer
x = Flatten()(x)
X = Dense(7)(x) #自己设定的一个全连接层，想要模拟五官（5） + 头发长度+ 脸型 7个判定性别的要素
x = Dense(2)(x) #ouput为2的全连接层，最后只允许给出0或1
x = Activation("softmax")(x)
output_layer = x
model = Model(input_layer, output_layer)
```

In [65]:

```
model.summary()
```

```
Model: "model_1"
________________________________________________________________
__
Layer (type)                 Output Shape              Param #
================================================================
==
input_1 (InputLayer)         (None, 128, 128, 3)       0
________________________________________________________________
__
flatten_1 (Flatten)          (None, 49152)             0
________________________________________________________________
__
dense_2 (Dense)              (None, 2)                 98306
________________________________________________________________
__
activation_1 (Activation)    (None, 2)                 0
================================================================
==
Total params: 98,306
Trainable params: 98,306
Non-trainable params: 0
________________________________________________________________
__
```

只有Dense_2有参数，（1281283 =）49152 * 2 （因为每一个Flatten中的nodes都和Dense_2的两个nodes有连接）= 98304 + 2个截距项 共98306个参数。

In [67]:

```
from keras.optimizers import Adam
model.compile(optimizer = Adam(0.05),
             loss = "categorical_crossentropy",
             metrics = ["accuracy"])
```

In [90]:

```
model.fit(X0,YY0, validation_data = (X1,YY1),
         batch_size = 200,
          epochs = 20)
 #因为有3850个sample在train data里，batch_size不宜很多
#尝试了epochs = 10，发现accuracy还有向上升的空间，于是将epochs定为20
```

```
Train on 3850 samples, validate on 1650 samples
Epoch 1/20
3850/3850 [==============================] - 2s 400us/step - lo
ss: 11.2074 - accuracy: 0.8101 - val_loss: 16.2442 - val_accura
cy: 0.7582
Epoch 2/20
3850/3850 [==============================] - 2s 410us/step - lo
ss: 16.3872 - accuracy: 0.7803 - val_loss: 33.4855 - val_accura
cy: 0.6685
Epoch 3/20
3850/3850 [==============================] - 2s 408us/step - lo
ss: 19.4982 - accuracy: 0.7670 - val_loss: 13.9466 - val_accura
cy: 0.8248
Epoch 4/20
3850/3850 [==============================] - 2s 409us/step - lo
ss: 10.4418 - accuracy: 0.8343 - val_loss: 6.3400 - val_accurac
y: 0.8655
Epoch 5/20
3850/3850 [==============================] - 2s 401us/step - lo
ss: 30.6433 - accuracy: 0.7081 - val_loss: 40.9868 - val_accura
cy: 0.6709
Epoch 6/20
3850/3850 [==============================] - 2s 409us/step - lo
ss: 28.1004 - accuracy: 0.7634 - val_loss: 36.3656 - val_accura
cy: 0.7061
Epoch 7/20
3850/3850 [==============================] - 2s 411us/step - lo
ss: 25.0565 - accuracy: 0.7665 - val_loss: 75.7643 - val_accura
cy: 0.5697
Epoch 8/20
3850/3850 [==============================] - 2s 394us/step - lo
ss: 40.7963 - accuracy: 0.7335 - val_loss: 13.6794 - val_accura
cy: 0.8606
Epoch 9/20
3850/3850 [==============================] - 2s 404us/step - lo
ss: 18.5976 - accuracy: 0.8164 - val_loss: 37.2331 - val_accura
cy: 0.7012
Epoch 10/20
3850/3850 [==============================] - 2s 412us/step - lo
ss: 11.9671 - accuracy: 0.8369 - val_loss: 12.6555 - val_accura
cy: 0.8388
Epoch 11/20
3850/3850 [==============================] - 2s 395us/step - lo
ss: 14.9966 - accuracy: 0.8070 - val_loss: 9.2533 - val_accurac
y: 0.8679
Epoch 12/20
3850/3850 [==============================] - 2s 390us/step - lo
ss: 7.9723 - accuracy: 0.8623 - val_loss: 12.2479 - val_accurac
```

```
y: 0.8248
Epoch 13/20
3850/3850 [==============================] - 2s 402us/step - lo
ss: 16.2413 - accuracy: 0.7956 - val_loss: 69.8715 - val_accura
cy: 0.5909
Epoch 14/20
3850/3850 [==============================] - 2s 394us/step - lo
ss: 29.9312 - accuracy: 0.7457 - val_loss: 24.1563 - val_accura
cy: 0.7709
Epoch 15/20
3850/3850 [==============================] - 2s 396us/step - lo
ss: 18.2574 - accuracy: 0.8153 - val_loss: 11.4510 - val_accura
cy: 0.8509
Epoch 16/20
3850/3850 [==============================] - 2s 412us/step - lo
ss: 21.0821 - accuracy: 0.7974 - val_loss: 11.0242 - val_accura
cy: 0.8600
Epoch 17/20
3850/3850 [==============================] - 1s 389us/step - lo
ss: 9.7962 - accuracy: 0.8579 - val_loss: 16.3255 - val_accurac
y: 0.7945
Epoch 18/20
3850/3850 [==============================] - 2s 401us/step - lo
ss: 10.1043 - accuracy: 0.8473 - val_loss: 8.3455 - val_accurac
y: 0.8691
Epoch 19/20
3850/3850 [==============================] - 2s 407us/step - lo
ss: 10.5789 - accuracy: 0.8384 - val_loss: 9.5249 - val_accurac
y: 0.8564
Epoch 20/20
3850/3850 [==============================] - 2s 402us/step - lo
ss: 11.2477 - accuracy: 0.8460 - val_loss: 8.2041 - val_accurac
y: 0.8721
```

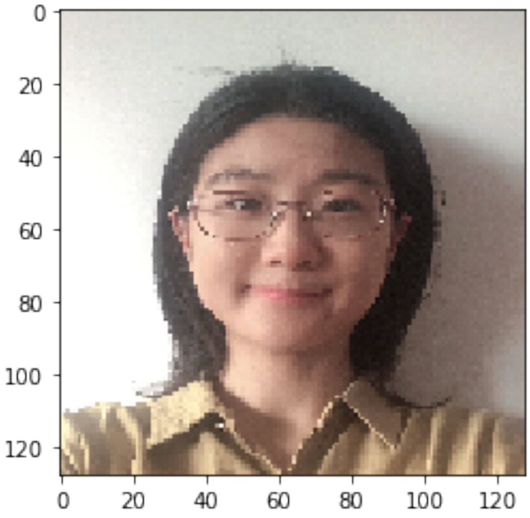
Out[90]:

```
<keras.callbacks.callbacks.History at 0x7f5d60163390>
```

In [91]:

```
#读取我的图像
img1 = Image.open("f1.JPG")
img2 = Image.open("m1.JPG")
img3 = Image.open("f2.jpg")
img4 = Image.open("m2.jpg")
```

In [92]:
```
MyPic1=img1.resize((IMSIZE,IMSIZE))
plt.imshow(MyPic1)
MyPic1=np.array(MyPic1)/255
MyPic1=MyPic1.reshape((1,IMSIZE,IMSIZE,3))
```

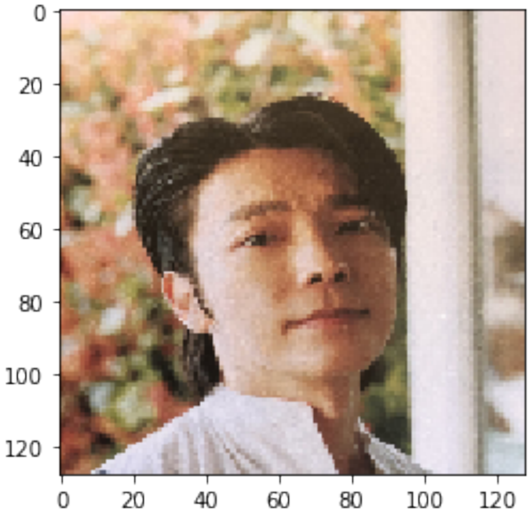


In [93]:
```
model.predict(MyPic1)
```

Out[93]:
```
array([[1.000000e+00, 6.960511e-14]], dtype=float32)
```

可以看到predict的值是【1，0】，代表女性，正确

In [94]:
```
MyPic4=img4.resize((IMSIZE,IMSIZE))
plt.imshow(MyPic4)
MyPic4=np.array(MyPic4)/255
MyPic4=MyPic4.reshape((1,IMSIZE,IMSIZE,3))
```



In [95]:
```
model.predict(MyPic4)
```

Out[95]:
```
array([[1., 0.]], dtype=float32)
```

此判断错误

```
In [ ]:
```