```
C:\Users\wangyisu\PycharmProjects\MolClassifier\venv\Scripts\python.exe "C:\Program Files\JetBrains\PyCharm 2019.1.3\helpers\pydev\pydevconsole.py" --mode=client --port=50682

import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['C:\\Users\\wangyisu\\PycharmProjects\\MolClassifier', 'C:/Users/wangyisu/PycharmProjects/MolClassifier'])

PyDev console: starting.

Python 3.7.3 (default, Apr 24 2019, 15:29:51) [MSC v.1915 64 bit (AMD64)] on win32
>>> runfile('C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas/InceptionV3.py', wdir='C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas')
Using TensorFlow backend.
[[0. 0. 0. ... 1. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 1.]
 ...
 [0. 0. 0. ... 0. 0. 1.]
 [0. 0. 0. ... 1. 0. 0.]
 [0. 0. 0. ... 1. 0. 0.]]
训练数据的维度 (600000, 2, 128)
输入信号的维度： [2, 128]
调制信号种类 ['8PSK', 'AM-DSB', 'BPSK', 'CPFSK', 'GFSK', 'PAM4', 'QAM16', 'QAM64', 'QPSK', 'WBFM']
C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas/InceptionV3.py:53: UserWarning: Update your `Conv2D` call to the Keras 2 API: `Conv2D(50, (1, 1), padding="valid", activation="relu", name="conv11", data_format="channels_first", kernel_initializer="glorot_uniform")`
  data_format="channels_first")(input_x_padding)
2020-03-04 23:43:19.174147: I tensorflow/core/platform/cpu_feature_guard.cc:142] Your CPU supports instructions that this TensorFlow binary was not compiled to use: AVX AVX2
2020-03-04 23:43:19.175417: I tensorflow/stream_executor/platform/default/dso_loader.cc:42] Successfully opened dynamic library nvcuda.dll
2020-03-04 23:43:19.235746: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1640] Found device 0 with properties:
```

```
26 name: GeForce GTX 1660 SUPER major: 7 minor: 5 memoryClockRate(GHz): 1
   .785
27 pciBusID: 0000:01:00.0
28 2020-03-04 23:43:19.236050: I tensorflow/stream_executor/platform/
   default/dlopen_checker_stub.cc:25] GPU libraries are statically linked
   , skip dlopen check.
29 2020-03-04 23:43:19.236593: I tensorflow/core/common_runtime/gpu/
   gpu_device.cc:1763] Adding visible gpu devices: 0
30 2020-03-04 23:43:19.744503: I tensorflow/core/common_runtime/gpu/
   gpu_device.cc:1181] Device interconnect StreamExecutor with strength 1
    edge matrix:
31 2020-03-04 23:43:19.744722: I tensorflow/core/common_runtime/gpu/
   gpu_device.cc:1187]      0
32 2020-03-04 23:43:19.744848: I tensorflow/core/common_runtime/gpu/
   gpu_device.cc:1200] 0:   N
33 2020-03-04 23:43:19.745562: I tensorflow/core/common_runtime/gpu/
   gpu_device.cc:1326] Created TensorFlow device (/job:localhost/replica:
   0/task:0/device:GPU:0 with 4640 MB memory) -> physical GPU (device: 0
   , name: GeForce GTX 1660 SUPER, pci bus id: 0000:01:00.0, compute
   capability: 7.5)
34 C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas/InceptionV3.py
   :58: UserWarning: Update your `Conv2D` call to the Keras 2 API: `
   Conv2D(50, (1, 8), padding="valid", activation="relu", name="conv12",
   data_format="channels_first", kernel_initializer="glorot_uniform")`
35   data_format="channels_first")(layer11)
36 C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas/InceptionV3.py
   :62: UserWarning: Update your `Conv2D` call to the Keras 2 API: `
   Conv2D(50, (1, 1), padding="valid", activation="relu", name="conv21",
   data_format="channels_first", kernel_initializer="glorot_uniform")`
37   data_format="channels_first")(input_x_padding)
38 C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas/InceptionV3.py
   :67: UserWarning: Update your `Conv2D` call to the Keras 2 API: `
   Conv2D(50, (1, 3), padding="valid", activation="relu", name="conv22",
   data_format="channels_first", kernel_initializer="glorot_uniform")`
39   data_format="channels_first")(layer21)
40 C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas/InceptionV3.py
   :71: UserWarning: Update your `Conv2D` call to the Keras 2 API: `
   Conv2D(50, (1, 1), padding="valid", activation="relu", name="conv31",
   data_format="channels_first", kernel_initializer="glorot_uniform")`
41   data_format="channels_first")(input_x_padding)
```

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42 C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas/InceptionV3.py
   :76: UserWarning: Update your `Dense` call to the Keras 2 API: `Dense(
   256, activation="relu", name="dense1", kernel_initializer="he_normal
   ")`
43   layer_dense1 = Dense(256, activation='relu', init='he_normal', name
   ="dense1")(layer_Flatten)
44 C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas/InceptionV3.py
   :78: UserWarning: Update your `Dense` call to the Keras 2 API: `Dense(
   10, name="dense2", kernel_initializer="he_normal")`
45   layer_dense2 = Dense(len(classes), init='he_normal', name="dense2")(
   layer_dropout)
46 Model: "model_1"
47 _________________________________________________________________
   _____________________________
48 Layer (type)                 Output Shape         Param #
   Connected to
49 =================================================================
   ============================
50 input_1 (InputLayer)         (None, 1, 2, 128)    0

51 _________________________________________________________________
   _____________________________
52 zero_padding2d_1 (ZeroPadding2D (None, 1, 2, 132)    0
   input_1[0][0]
53 _________________________________________________________________
   _____________________________
54 conv11 (Conv2D)              (None, 50, 2, 132)   100
   zero_padding2d_1[0][0]
55 _________________________________________________________________
   _____________________________
56 conv21 (Conv2D)              (None, 50, 2, 132)   100
   zero_padding2d_1[0][0]
57 _________________________________________________________________
   _____________________________
58 dropout_1 (Dropout)          (None, 50, 2, 132)   0
   conv11[0][0]
59 _________________________________________________________________
   _____________________________
60 dropout_3 (Dropout)          (None, 50, 2, 132)   0
   conv21[0][0]
```

```
61 ____________________________________________________________________________
   ____________________________________
62 zero_padding2d_2 (ZeroPadding2D (None, 50, 2, 136)   0
   dropout_1[0][0]
63 ____________________________________________________________________________
   ____________________________________
64 zero_padding2d_3 (ZeroPadding2D (None, 50, 2, 136)   0
   dropout_3[0][0]
65 ____________________________________________________________________________
   ____________________________________
66 conv12 (Conv2D)                 (None, 50, 2, 129)   20050
   zero_padding2d_2[0][0]
67 ____________________________________________________________________________
   ____________________________________
68 conv22 (Conv2D)                 (None, 50, 2, 134)   7550
   zero_padding2d_3[0][0]
69 ____________________________________________________________________________
   ____________________________________
70 conv31 (Conv2D)                 (None, 50, 2, 132)   100
   zero_padding2d_1[0][0]
71 ____________________________________________________________________________
   ____________________________________
72 dropout_2 (Dropout)             (None, 50, 2, 129)   0
   conv12[0][0]
73 ____________________________________________________________________________
   ____________________________________
74 dropout_4 (Dropout)             (None, 50, 2, 134)   0
   conv22[0][0]
75 ____________________________________________________________________________
   ____________________________________
76 dropout_5 (Dropout)             (None, 50, 2, 132)   0
   conv31[0][0]
77 ____________________________________________________________________________
   ____________________________________
78 concatenate_1 (Concatenate)     (None, 50, 2, 395)   0
   dropout_2[0][0]
79
   dropout_4[0][0]
80
   dropout_5[0][0]
```

```
81 ____________________________________________________________________
   ____________________________
82 flatten_1 (Flatten)             (None, 39500)         0
   concatenate_1[0][0]
83 ____________________________________________________________________
   ____________________________
84 dense1 (Dense)                  (None, 256)           10112256
   flatten_1[0][0]
85 ____________________________________________________________________
   ____________________________
86 dropout_6 (Dropout)             (None, 256)           0
   dense1[0][0]
87 ____________________________________________________________________
   ____________________________
88 dense2 (Dense)                  (None, 10)            2570
   dropout_6[0][0]
89 ____________________________________________________________________
   ____________________________
90 activation_1 (Activation)       (None, 10)            0
   dense2[0][0]
91 ____________________________________________________________________
   ____________________________
92 reshape_1 (Reshape)             (None, 10)            0
   activation_1[0][0]
93 ====================================================================
   ============================
94 Total params: 10,142,726
95 Trainable params: 10,142,726
96 Non-trainable params: 0
97 ____________________________________________________________________
   ____________________________
98 C:/Users/wangyisu/PycharmProjects/MolClassifier/MolClas/InceptionV3.
   py:102: UserWarning: The `nb_epoch` argument in `fit` has been
   renamed `epochs`.
99   keras.callbacks.EarlyStopping(monitor='val_loss', patience=5,
   verbose=0, mode='auto')
100 WARNING:tensorflow:From C:\Users\wangyisu\AppData\Local\Continuum\
   anaconda3\lib\site-packages\tensorflow\python\ops\math_grad.py:1250:
   add_dispatch_support.<locals>.wrapper (from tensorflow.python.ops.
   array_ops) is deprecated and will be removed in a future version.
```

```
Instructions for updating:
Use tf.where in 2.0, which has the same broadcast rule as np.where
WARNING:tensorflow:From C:\Users\wangyisu\AppData\Local\Continuum\
    anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:422:
    The name tf.global_variables is deprecated. Please use tf.compat.v1.
    global_variables instead.

Train on 600000 samples, validate on 600000 samples
Epoch 1/100
 - 57s - loss: 1.8184 - val_loss: 1.5465
Epoch 2/100
 - 55s - loss: 1.5283 - val_loss: 1.3710
Epoch 3/100
 - 55s - loss: 1.4243 - val_loss: 1.2984
Epoch 4/100
 - 55s - loss: 1.3779 - val_loss: 1.2600
Epoch 5/100
 - 55s - loss: 1.3451 - val_loss: 1.2543
Epoch 6/100
 - 55s - loss: 1.3205 - val_loss: 1.2395
Epoch 7/100
 - 55s - loss: 1.3034 - val_loss: 1.1985
Epoch 8/100
 - 55s - loss: 1.2884 - val_loss: 1.2032
Epoch 9/100
 - 55s - loss: 1.2791 - val_loss: 1.2190
Epoch 10/100
 - 55s - loss: 1.2674 - val_loss: 1.1792
Epoch 11/100
 - 55s - loss: 1.2575 - val_loss: 1.1797
Epoch 12/100
 - 55s - loss: 1.2496 - val_loss: 1.1942
Epoch 13/100
 - 55s - loss: 1.2440 - val_loss: 1.1916
Epoch 14/100
 - 55s - loss: 1.2379 - val_loss: 1.1663
Epoch 15/100
 - 55s - loss: 1.2324 - val_loss: 1.1575
Epoch 16/100
 - 55s - loss: 1.2272 - val_loss: 1.1739
```

```
138 Epoch 17/100
139  - 55s - loss: 1.2217 - val_loss: 1.1579
140 Epoch 18/100
141  - 55s - loss: 1.2188 - val_loss: 1.1753
142 Epoch 19/100
143  - 55s - loss: 1.2130 - val_loss: 1.1631
144 Epoch 20/100
145  - 55s - loss: 1.2112 - val_loss: 1.1430
146 Epoch 21/100
147  - 55s - loss: 1.2057 - val_loss: 1.1431
148 Epoch 22/100
149  - 55s - loss: 1.2026 - val_loss: 1.1382
150 Epoch 23/100
151  - 55s - loss: 1.1985 - val_loss: 1.1307
152 Epoch 24/100
153  - 55s - loss: 1.1950 - val_loss: 1.1339
154 Epoch 25/100
155  - 56s - loss: 1.1919 - val_loss: 1.1378
156 Epoch 26/100
157  - 56s - loss: 1.1885 - val_loss: 1.1417
158 Epoch 27/100
159  - 57s - loss: 1.1885 - val_loss: 1.1294
160 Epoch 28/100
161  - 57s - loss: 1.1840 - val_loss: 1.1348
162 Epoch 29/100
163  - 58s - loss: 1.1813 - val_loss: 1.1382
164 Epoch 30/100
165  - 58s - loss: 1.1780 - val_loss: 1.1285
166 Epoch 31/100
167  - 57s - loss: 1.1739 - val_loss: 1.1235
168 Epoch 32/100
169  - 57s - loss: 1.1711 - val_loss: 1.1258
170 Epoch 33/100
171  - 57s - loss: 1.1693 - val_loss: 1.1329
172 Epoch 34/100
173  - 57s - loss: 1.1673 - val_loss: 1.1223
174 Epoch 35/100
175  - 58s - loss: 1.1681 - val_loss: 1.1225
176 Epoch 36/100
177  - 57s - loss: 1.1641 - val_loss: 1.1453
```

```
178 Epoch 37/100
179  - 55s - loss: 1.1627 - val_loss: 1.1237
180 Epoch 38/100
181  - 56s - loss: 1.1595 - val_loss: 1.1240
182 Epoch 39/100
183  - 58s - loss: 1.1576 - val_loss: 1.1184
184 Epoch 40/100
185  - 56s - loss: 1.1561 - val_loss: 1.1257
186 Epoch 41/100
187  - 56s - loss: 1.1553 - val_loss: 1.1239
188 Epoch 42/100
189  - 57s - loss: 1.1531 - val_loss: 1.1211
190 Epoch 43/100
191  - 57s - loss: 1.1514 - val_loss: 1.1254
192 Epoch 44/100
193  - 57s - loss: 1.1494 - val_loss: 1.1251
194 Overall Accuracy:  0.1036336918041547
195 Overall Accuracy:  0.10356808766537486
196 Overall Accuracy:  0.11384010397573899
197 Overall Accuracy:  0.1245688644811305
198 Overall Accuracy:  0.15543021160136172
199 Overall Accuracy:  0.21776208401345815
200 Overall Accuracy:  0.32860982975475395
201 Overall Accuracy:  0.46511006446871767
202 Overall Accuracy:  0.5842273605650696
203 Overall Accuracy:  0.6706418330430122
204 Overall Accuracy:  0.730083593513949
205 Overall Accuracy:  0.7652796271637816
206 Overall Accuracy:  0.7857071597219912
207 Overall Accuracy:  0.7927754763877382
208 Overall Accuracy:  0.7962956816144986
209 Overall Accuracy:  0.7973395410708347
210 Overall Accuracy:  0.802509819585913
211 Overall Accuracy:  0.7946259744567922
212 Overall Accuracy:  0.7990459352169997
213 Overall Accuracy:  0.80013375689684
214 {-20: 0.1036336918041547, -18: 0.10356808766537486, -16: 0.
    11384010397573899, -14: 0.1245688644811305, -12: 0.15543021160136172
    , -10: 0.21776208401345815, -8: 0.32860982975475395, -6: 0.
    46511006446871767, -4: 0.5842273605650696, -2: 0.6706418330430122, 0
```

```
214 : 0.730083593513949, 2: 0.7652796271637816, 4: 0.7857071597219912, 6
    : 0.7927754763877382, 8: 0.7962956816144986, 10: 0.7973395410708347,
    12: 0.802509819585913, 14: 0.7946259744567922, 16: 0.7990459352169997
    , 18: 0.80013375689684}
215 {-20: 0.1036336918041547, -18: 0.10356808766537486, -16: 0.
    11384010397573899, -14: 0.1245688644811305, -12: 0.15543021160136172
    , -10: 0.21776208401345815, -8: 0.32860982975475395, -6: 0.
    46511006446871767, -4: 0.5842273605650696, -2: 0.6706418330430122, 0
    : 0.730083593513949, 2: 0.7652796271637816, 4: 0.7857071597219912, 6
    : 0.7927754763877382, 8: 0.7962956816144986, 10: 0.7973395410708347,
    12: 0.802509819585913, 14: 0.7946259744567922, 16: 0.7990459352169997
    , 18: 0.80013375689684}
216
```