50 Epochs result:

WARNING:tensorflow:From /tensorflow-1.15.0/python3.6/tensorflow\_core/python/ops/math\_grad.py:1424: where (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 /usr/local/lib/python3.6/dist-packages/keras/backend/tensorflow\_backend.py:1033: The name tf.assign\_add is deprecated. Please use tf.compat.v1.assign\_add instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tensorflow\_backend.py:1020: The name tf.assign is deprecated. Please use tf.compat.v1.assign instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tensorflow\_backend.py:3005: The name tf.Session is deprecated. Please use tf.compat.v1.Session instead.

Train on 87393 samples, validate on 21849 samples

Epoch 1/50

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tensorflow\_backend.py:190: The name tf.get\_default\_session is deprecated. Please use tf.compat.v1.get\_default\_session instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tensorflow\_backend.py:197: The name tf.ConfigProto is deprecated. Please use tf.compat.v1.ConfigProto instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tensorflow\_backend.py:207: The name tf.global\_variables is deprecated. Please use tf.compat.v1.global\_variables instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tensorflow\_backend.py:216: The name tf.is\_variable\_initialized is deprecated. Please use tf.compat.v1.is\_variable\_initialized instead.

WARNING:tensorflow:From /usr/local/lib/python3.6/dist-packages/keras/backend/tensorflow\_backend.py:223: The name tf.variables\_initializer is deprecated. Please use tf.compat.v1.variables\_initializer instead.

87393/87393 [==============================] - 45s 514us/step - loss: 1.1787 - acc: 0.5338 - f1\_m: 0.4308 - precision\_m: 0.6404 - recall\_m: 0.3308 - val\_loss: 1.0635 - val\_acc: 0.5768 - val\_f1\_m: 0.4918 - val\_precision\_m: 0.6872 - val\_recall\_m: 0.3838

Epoch 2/50

87393/87393 [==============================] - 31s 355us/step - loss: 1.0282 - acc: 0.5954 - f1\_m: 0.5373 - precision\_m: 0.6714 - recall\_m: 0.4492 - val\_loss: 1.0021 - val\_acc: 0.6041 - val\_f1\_m: 0.5426 - val\_precision\_m: 0.6784 - val\_recall\_m: 0.4528

Epoch 3/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.9465 - acc: 0.6301 - f1\_m: 0.5921 - precision\_m: 0.6807 - recall\_m: 0.5249 - val\_loss: 0.9715 - val\_acc: 0.6133 - val\_f1\_m: 0.5778 - val\_precision\_m: 0.6655 - val\_recall\_m: 0.5111

Epoch 4/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.8885 - acc: 0.6553 - f1\_m: 0.6301 - precision\_m: 0.6942 - recall\_m: 0.5774 - val\_loss: 0.9672 - val\_acc: 0.6158 - val\_f1\_m: 0.5907 - val\_precision\_m: 0.6544 - val\_recall\_m: 0.5387

Epoch 5/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.8450 - acc: 0.6716 - f1\_m: 0.6547 - precision\_m: 0.7043 - recall\_m: 0.6123 - val\_loss: 0.9604 - val\_acc: 0.6221 - val\_f1\_m: 0.5997 - val\_precision\_m: 0.6552 - val\_recall\_m: 0.5532

Epoch 6/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.8127 - acc: 0.6859 - f1\_m: 0.6724 - precision\_m: 0.7147 - recall\_m: 0.6352 - val\_loss: 0.9853 - val\_acc: 0.6188 - val\_f1\_m: 0.6087 - val\_precision\_m: 0.6428 - val\_recall\_m: 0.5782

Epoch 7/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.7830 - acc: 0.6976 - f1\_m: 0.6867 - precision\_m: 0.7242 - recall\_m: 0.6532 - val\_loss: 0.9784 - val\_acc: 0.6229 - val\_f1\_m: 0.6069 - val\_precision\_m: 0.6484 - val\_recall\_m: 0.5706

Epoch 8/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.7586 - acc: 0.7043 - f1\_m: 0.6949 - precision\_m: 0.7302 - recall\_m: 0.6632 - val\_loss: 1.0111 - val\_acc: 0.6209 - val\_f1\_m: 0.6098 - val\_precision\_m: 0.6412 - val\_recall\_m: 0.5816

Epoch 9/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.7421 - acc: 0.7122 - f1\_m: 0.7042 - precision\_m: 0.7367 - recall\_m: 0.6748 - val\_loss: 1.0416 - val\_acc: 0.6204 - val\_f1\_m: 0.6095 - val\_precision\_m: 0.6388 - val\_recall\_m: 0.5829

Epoch 10/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.7225 - acc: 0.7188 - f1\_m: 0.7113 - precision\_m: 0.7428 - recall\_m: 0.6827 - val\_loss: 1.0670 - val\_acc: 0.6179 - val\_f1\_m: 0.6081 - val\_precision\_m: 0.6330 - val\_recall\_m: 0.5852

Epoch 11/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.7063 - acc: 0.7246 - f1\_m: 0.7175 - precision\_m: 0.7473 - recall\_m: 0.6902 - val\_loss: 1.0567 - val\_acc: 0.6211 - val\_f1\_m: 0.6114 - val\_precision\_m: 0.6390 - val\_recall\_m: 0.5864

Epoch 12/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.6920 - acc: 0.7287 - f1\_m: 0.7219 - precision\_m: 0.7507 - recall\_m: 0.6954 - val\_loss: 1.1335 - val\_acc: 0.6220 - val\_f1\_m: 0.6152 - val\_precision\_m: 0.6366 - val\_recall\_m: 0.5954

Epoch 13/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.6776 - acc: 0.7343 - f1\_m: 0.7274 - precision\_m: 0.7556 - recall\_m: 0.7016 - val\_loss: 1.1155 - val\_acc: 0.6199 - val\_f1\_m: 0.6116 - val\_precision\_m: 0.6379 - val\_recall\_m: 0.5875

Epoch 14/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.6665 - acc: 0.7378 - f1\_m: 0.7328 - precision\_m: 0.7597 - recall\_m: 0.7080 - val\_loss: 1.1665 - val\_acc: 0.6206 - val\_f1\_m: 0.6125 - val\_precision\_m: 0.6348 - val\_recall\_m: 0.5917

Epoch 15/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.6586 - acc: 0.7415 - f1\_m: 0.7360 - precision\_m: 0.7622 - recall\_m: 0.7118 - val\_loss: 1.2016 - val\_acc: 0.6206 - val\_f1\_m: 0.6134 - val\_precision\_m: 0.6332 - val\_recall\_m: 0.5949

Epoch 16/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.6488 - acc: 0.7425 - f1\_m: 0.7378 - precision\_m: 0.7637 - recall\_m: 0.7138 - val\_loss: 1.2008 - val\_acc: 0.6214 - val\_f1\_m: 0.6146 - val\_precision\_m: 0.6358 - val\_recall\_m: 0.5949

Epoch 17/50

87393/87393 [==============================] - 31s 356us/step - loss: 0.6398 - acc: 0.7463 - f1\_m: 0.7421 - precision\_m: 0.7678 - recall\_m: 0.7184 - val\_loss: 1.2304 - val\_acc: 0.6182 - val\_f1\_m: 0.6114 - val\_precision\_m: 0.6333 - val\_recall\_m: 0.5911

Epoch 18/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.6326 - acc: 0.7464 - f1\_m: 0.7421 - precision\_m: 0.7671 - recall\_m: 0.7189 - val\_loss: 1.3474 - val\_acc: 0.6225 - val\_f1\_m: 0.6167 - val\_precision\_m: 0.6337 - val\_recall\_m: 0.6008

Epoch 19/50

87393/87393 [==============================] - 31s 357us/step - loss: 0.6252 - acc: 0.7491 - f1\_m: 0.7443 - precision\_m: 0.7692 - recall\_m: 0.7212 - val\_loss: 1.3529 - val\_acc: 0.6188 - val\_f1\_m: 0.6144 - val\_precision\_m: 0.6324 - val\_recall\_m: 0.5976

Epoch 20/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.6186 - acc: 0.7515 - f1\_m: 0.7474 - precision\_m: 0.7726 - recall\_m: 0.7240 - val\_loss: 1.2643 - val\_acc: 0.6204 - val\_f1\_m: 0.6133 - val\_precision\_m: 0.6351 - val\_recall\_m: 0.5932

Epoch 21/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.6141 - acc: 0.7537 - f1\_m: 0.7490 - precision\_m: 0.7735 - recall\_m: 0.7263 - val\_loss: 1.2720 - val\_acc: 0.6182 - val\_f1\_m: 0.6117 - val\_precision\_m: 0.6343 - val\_recall\_m: 0.5907

Epoch 22/50

87393/87393 [==============================] - 31s 356us/step - loss: 0.6051 - acc: 0.7562 - f1\_m: 0.7514 - precision\_m: 0.7753 - recall\_m: 0.7291 - val\_loss: 1.4067 - val\_acc: 0.6166 - val\_f1\_m: 0.6102 - val\_precision\_m: 0.6293 - val\_recall\_m: 0.5925

Epoch 23/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.6006 - acc: 0.7559 - f1\_m: 0.7519 - precision\_m: 0.7765 - recall\_m: 0.7291 - val\_loss: 1.3166 - val\_acc: 0.6160 - val\_f1\_m: 0.6101 - val\_precision\_m: 0.6323 - val\_recall\_m: 0.5896

Epoch 24/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.5972 - acc: 0.7573 - f1\_m: 0.7541 - precision\_m: 0.7779 - recall\_m: 0.7319 - val\_loss: 1.3477 - val\_acc: 0.6173 - val\_f1\_m: 0.6098 - val\_precision\_m: 0.6317 - val\_recall\_m: 0.5895

Epoch 25/50

87393/87393 [==============================] - 31s 356us/step - loss: 0.5912 - acc: 0.7603 - f1\_m: 0.7558 - precision\_m: 0.7804 - recall\_m: 0.7329 - val\_loss: 1.5099 - val\_acc: 0.6184 - val\_f1\_m: 0.6129 - val\_precision\_m: 0.6298 - val\_recall\_m: 0.5969

Epoch 26/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.5871 - acc: 0.7593 - f1\_m: 0.7555 - precision\_m: 0.7797 - recall\_m: 0.7329 - val\_loss: 1.4922 - val\_acc: 0.6165 - val\_f1\_m: 0.6095 - val\_precision\_m: 0.6284 - val\_recall\_m: 0.5918

Epoch 27/50

87393/87393 [==============================] - 31s 355us/step - loss: 0.5809 - acc: 0.7623 - f1\_m: 0.7584 - precision\_m: 0.7820 - recall\_m: 0.7363 - val\_loss: 1.3126 - val\_acc: 0.6144 - val\_f1\_m: 0.6066 - val\_precision\_m: 0.6308 - val\_recall\_m: 0.5844

Epoch 28/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.5796 - acc: 0.7637 - f1\_m: 0.7598 - precision\_m: 0.7838 - recall\_m: 0.7375 - val\_loss: 1.4542 - val\_acc: 0.6144 - val\_f1\_m: 0.6087 - val\_precision\_m: 0.6281 - val\_recall\_m: 0.5905

Epoch 29/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.5759 - acc: 0.7653 - f1\_m: 0.7614 - precision\_m: 0.7848 - recall\_m: 0.7395 - val\_loss: 1.5526 - val\_acc: 0.6164 - val\_f1\_m: 0.6099 - val\_precision\_m: 0.6277 - val\_recall\_m: 0.5931

Epoch 30/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5709 - acc: 0.7668 - f1\_m: 0.7629 - precision\_m: 0.7861 - recall\_m: 0.7412 - val\_loss: 1.6335 - val\_acc: 0.6177 - val\_f1\_m: 0.6125 - val\_precision\_m: 0.6278 - val\_recall\_m: 0.5981

Epoch 31/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.5664 - acc: 0.7672 - f1\_m: 0.7642 - precision\_m: 0.7876 - recall\_m: 0.7424 - val\_loss: 1.6001 - val\_acc: 0.6165 - val\_f1\_m: 0.6095 - val\_precision\_m: 0.6284 - val\_recall\_m: 0.5918

Epoch 32/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.5640 - acc: 0.7663 - f1\_m: 0.7629 - precision\_m: 0.7873 - recall\_m: 0.7402 - val\_loss: 1.5578 - val\_acc: 0.6158 - val\_f1\_m: 0.6084 - val\_precision\_m: 0.6281 - val\_recall\_m: 0.5901

Epoch 33/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5633 - acc: 0.7669 - f1\_m: 0.7638 - precision\_m: 0.7873 - recall\_m: 0.7419 - val\_loss: 1.4602 - val\_acc: 0.6164 - val\_f1\_m: 0.6097 - val\_precision\_m: 0.6320 - val\_recall\_m: 0.5892

Epoch 34/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5588 - acc: 0.7677 - f1\_m: 0.7640 - precision\_m: 0.7875 - recall\_m: 0.7421 - val\_loss: 1.5976 - val\_acc: 0.6152 - val\_f1\_m: 0.6092 - val\_precision\_m: 0.6269 - val\_recall\_m: 0.5926

Epoch 35/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5597 - acc: 0.7671 - f1\_m: 0.7637 - precision\_m: 0.7869 - recall\_m: 0.7420 - val\_loss: 1.6220 - val\_acc: 0.6156 - val\_f1\_m: 0.6101 - val\_precision\_m: 0.6283 - val\_recall\_m: 0.5930

Epoch 36/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5563 - acc: 0.7682 - f1\_m: 0.7656 - precision\_m: 0.7893 - recall\_m: 0.7435 - val\_loss: 1.7622 - val\_acc: 0.6160 - val\_f1\_m: 0.6104 - val\_precision\_m: 0.6272 - val\_recall\_m: 0.5945

Epoch 37/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5518 - acc: 0.7710 - f1\_m: 0.7674 - precision\_m: 0.7907 - recall\_m: 0.7456 - val\_loss: 1.6313 - val\_acc: 0.6159 - val\_f1\_m: 0.6097 - val\_precision\_m: 0.6276 - val\_recall\_m: 0.5928

Epoch 38/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5511 - acc: 0.7718 - f1\_m: 0.7685 - precision\_m: 0.7910 - recall\_m: 0.7475 - val\_loss: 1.4936 - val\_acc: 0.6170 - val\_f1\_m: 0.6106 - val\_precision\_m: 0.6296 - val\_recall\_m: 0.5928

Epoch 39/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.5502 - acc: 0.7709 - f1\_m: 0.7675 - precision\_m: 0.7900 - recall\_m: 0.7465 - val\_loss: 1.5411 - val\_acc: 0.6149 - val\_f1\_m: 0.6074 - val\_precision\_m: 0.6274 - val\_recall\_m: 0.5888

Epoch 40/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5474 - acc: 0.7709 - f1\_m: 0.7672 - precision\_m: 0.7905 - recall\_m: 0.7454 - val\_loss: 1.8178 - val\_acc: 0.6164 - val\_f1\_m: 0.6105 - val\_precision\_m: 0.6260 - val\_recall\_m: 0.5958

Epoch 41/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5438 - acc: 0.7719 - f1\_m: 0.7688 - precision\_m: 0.7912 - recall\_m: 0.7478 - val\_loss: 1.7556 - val\_acc: 0.6158 - val\_f1\_m: 0.6092 - val\_precision\_m: 0.6270 - val\_recall\_m: 0.5925

Epoch 42/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5450 - acc: 0.7723 - f1\_m: 0.7693 - precision\_m: 0.7925 - recall\_m: 0.7476 - val\_loss: 1.7329 - val\_acc: 0.6153 - val\_f1\_m: 0.6070 - val\_precision\_m: 0.6270 - val\_recall\_m: 0.5884

Epoch 43/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5416 - acc: 0.7727 - f1\_m: 0.7692 - precision\_m: 0.7919 - recall\_m: 0.7480 - val\_loss: 1.7657 - val\_acc: 0.6145 - val\_f1\_m: 0.6087 - val\_precision\_m: 0.6254 - val\_recall\_m: 0.5929

Epoch 44/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.5387 - acc: 0.7738 - f1\_m: 0.7707 - precision\_m: 0.7935 - recall\_m: 0.7494 - val\_loss: 1.5715 - val\_acc: 0.6172 - val\_f1\_m: 0.6085 - val\_precision\_m: 0.6302 - val\_recall\_m: 0.5884

Epoch 45/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5379 - acc: 0.7749 - f1\_m: 0.7711 - precision\_m: 0.7941 - recall\_m: 0.7496 - val\_loss: 1.8915 - val\_acc: 0.6148 - val\_f1\_m: 0.6083 - val\_precision\_m: 0.6251 - val\_recall\_m: 0.5926

Epoch 46/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5361 - acc: 0.7759 - f1\_m: 0.7737 - precision\_m: 0.7968 - recall\_m: 0.7521 - val\_loss: 1.5471 - val\_acc: 0.6159 - val\_f1\_m: 0.6095 - val\_precision\_m: 0.6289 - val\_recall\_m: 0.5914

Epoch 47/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5369 - acc: 0.7745 - f1\_m: 0.7712 - precision\_m: 0.7939 - recall\_m: 0.7498 - val\_loss: 1.8445 - val\_acc: 0.6142 - val\_f1\_m: 0.6071 - val\_precision\_m: 0.6238 - val\_recall\_m: 0.5914

Epoch 48/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.5345 - acc: 0.7754 - f1\_m: 0.7727 - precision\_m: 0.7953 - recall\_m: 0.7515 - val\_loss: 1.9260 - val\_acc: 0.6171 - val\_f1\_m: 0.6095 - val\_precision\_m: 0.6261 - val\_recall\_m: 0.5938

Epoch 49/50

87393/87393 [==============================] - 31s 354us/step - loss: 0.5326 - acc: 0.7771 - f1\_m: 0.7741 - precision\_m: 0.7968 - recall\_m: 0.7529 - val\_loss: 1.8899 - val\_acc: 0.6139 - val\_f1\_m: 0.6072 - val\_precision\_m: 0.6238 - val\_recall\_m: 0.5916

Epoch 50/50

87393/87393 [==============================] - 31s 353us/step - loss: 0.5311 - acc: 0.7770 - f1\_m: 0.7741 - precision\_m: 0.7972 - recall\_m: 0.7524 - val\_loss: 1.9064 - val\_acc: 0.6147 - val\_f1\_m: 0.6081 - val\_precision\_m: 0.6257 - val\_recall\_m: 0.5916

Test Results:

['loss', 'acc', 'f1\_m', 'precision\_m', 'recall\_m']

46818/46818 [==============================] - 7s 159us/step

[1.8871438319936984,

0.6146140373360673,

0.6078618270552669,

0.62557203470553,

0.5916100645051049]