Over Fitting

Accuracy eval

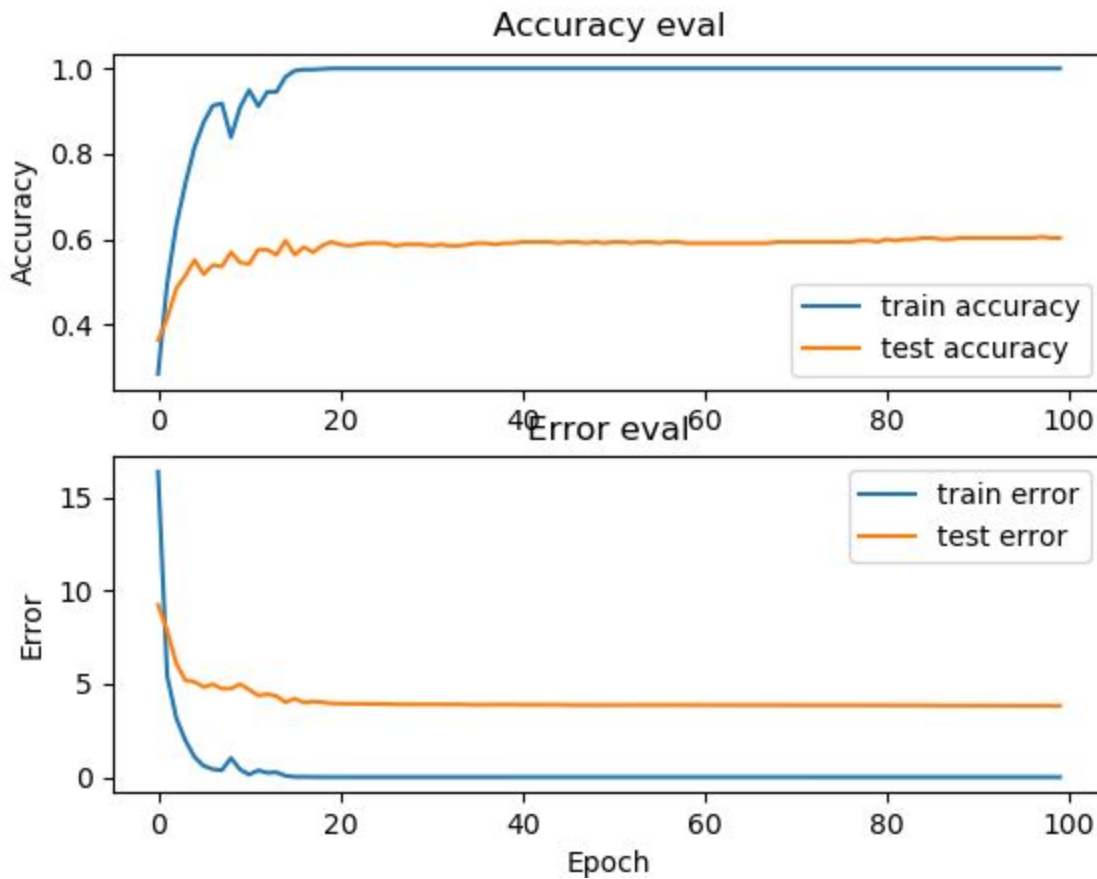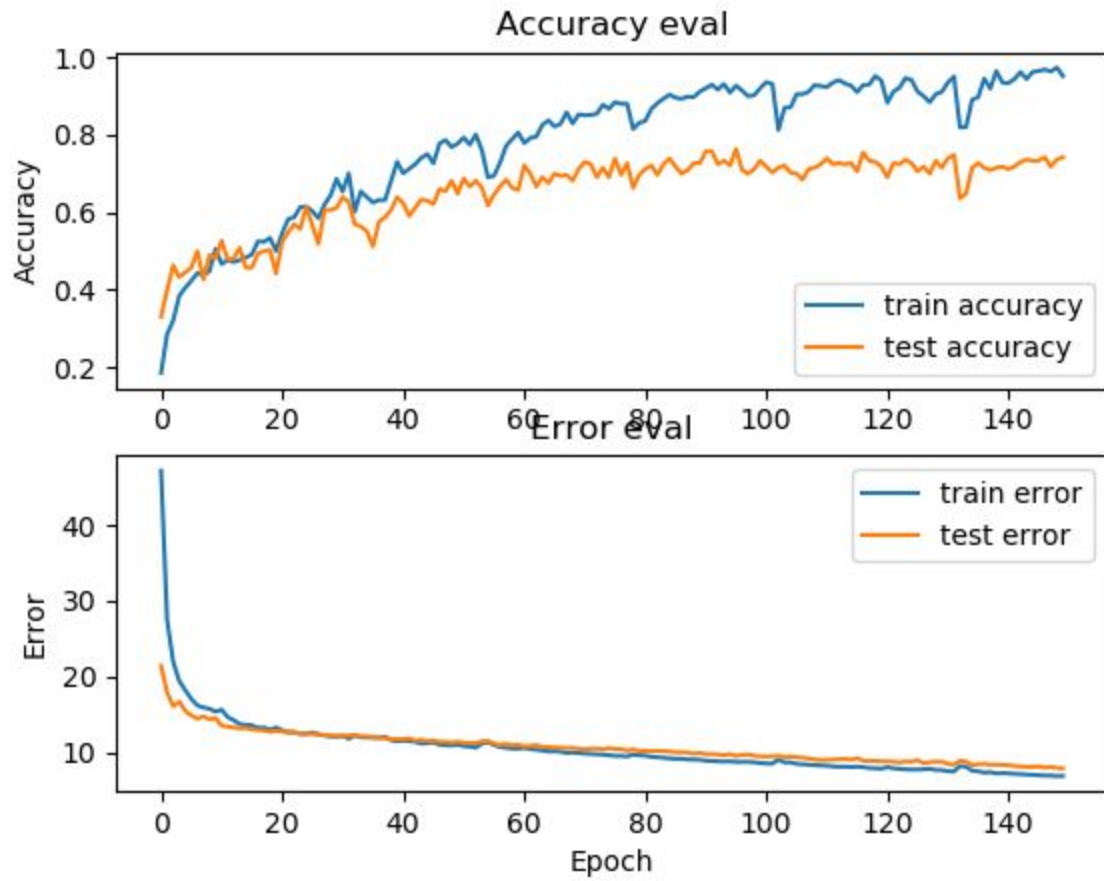Error eval

model = keras. Sequential([

```
  # imput layer
  keras.layers.Flatten(input_shape = ( inputs.shape[1], inputs.shape[2])  ),
  # 1st hidden layer
  keras.layers.Dense(512,activation = "relu",kernel_regularizer=keras.regularizers.l2(0.001)),
  keras.layers.Dropout(0.3),
  # 2nd hidden layer
  keras.layers.Dense(256, activation="relu",kernel_regularizer=keras.regularizers.l2(0.001)),
  keras.layers.Dropout(0.3),
  # 3 rd hidden layer
  keras.layers.Dense(64, activation="relu",kernel_regularizer=keras.regularizers.l2(0.001)),
  keras.layers.Dropout(0.3),
  # output layer
  keras.layers.Dense(10, activation = "softmax")

])
```

Accuracy eval / Error eval

We can see that we can drop after 20-30 epoch

```
Start
Model: "sequential"

_____
Layer (type)                 Output Shape              Param #
=================================================================
flatten (Flatten)            (None, 1690)              0
_____
dense (Dense)                (None, 512)               865792
_____
dropout (Dropout)            (None, 512)               0
_____
dense_1 (Dense)              (None, 256)               131328
_____
dropout_1 (Dropout)          (None, 256)               0
_____
dense_2 (Dense)              (None, 64)                16448
_____
dropout_2 (Dropout)          (None, 64)                0
_____
dense_3 (Dense)              (None, 10)                650
=================================================================
Total params: 1,014,218
Trainable params: 1,014,218
Non-trainable params: 0
_____
Train on 769 samples, validate on 330 samples
Epoch 1/150
```

32/769 [>.............................] - ETA: 0s - loss: 5.4217 - accuracy: 1.0000
192/769 [======>.......................] - ETA: 0s - loss: 5.4529 - accuracy: 0.9844
352/769 [============>.................] - ETA: 0s - loss: 5.4704 - accuracy: 0.9801
512/769 [==================>...........] - ETA: 0s - loss: 5.4683 - accuracy: 0.9785
672/769 [=========================>....] - ETA: 0s - loss: 5.4580 - accuracy: 0.9807
769/769 [==============================] - 0s 470us/sample - loss: 5.4492 - accuracy: 0.9831 - val_loss: 6.5054 - val_accuracy: 0.7424
Epoch 49/50

 32/769 [>.............................] - ETA: 0s - loss: 5.3820 - accuracy: 1.0000
192/769 [======>.......................] - ETA: 0s - loss: 5.4034 - accuracy: 0.9896
352/769 [============>.................] - ETA: 0s - loss: 5.4118 - accuracy: 0.9801
512/769 [==================>...........] - ETA: 0s - loss: 5.4066 - accuracy: 0.9824
672/769 [=========================>....] - ETA: 0s - loss: 5.4171 - accuracy: 0.9747

```
769/769 [==============================] - 0s 466us/sample - loss: 5.4142 - accuracy: 0.9753 - val_loss: 6.5510 - val_accuracy: 0.7364
Epoch 50/50

 32/769 [>.............................] - ETA: 0s - loss: 5.3584 - accuracy: 1.0000
192/769 [======>.......................] - ETA: 0s - loss: 5.4102 - accuracy: 0.9792
352/769 [============>.................] - ETA: 0s - loss: 5.4092 - accuracy: 0.9744
512/769 [==================>...........] - ETA: 0s - loss: 5.4060 - accuracy: 0.9727
672/769 [=========================>....] - ETA: 0s - loss: 5.4017 - accuracy: 0.9747
769/769 [==============================] - 0s 446us/sample - loss: 5.4016 - accuracy: 0.9727 - val_loss: 6.4690 - val_accuracy: 0.7394
```