CNN on Mnist Dataset

In [229…
```
from __future__ import print_function
import keras
from keras.datasets import mnist
from keras.models import Sequential
from keras.layers import Dense, Dropout, Flatten
from keras.layers import Conv2D, MaxPooling2D
from keras import backend as K
import tensorflow as tf
from tensorflow.keras import utils
from tensorflow.keras.datasets import mnist
import seaborn as sns
from tensorflow.keras.initializers import RandomNormal
from tensorflow.python.keras import Input, Model
from tensorflow.keras.layers import Dense, Activation
from tensorflow.python.keras.layers import Dense, BatchNormalization
from tensorflow.keras.models import Sequential
%matplotlib notebook
%matplotlib inline
import matplotlib.pyplot as plt
import numpy as np
import time
from keras.utils.np_utils import to_categorical



from tensorflow.keras import utils as np_utils
```

1.Data Loading

In [155…
```
(X_train, y_train), (X_test, y_test) = mnist.load_data()
```

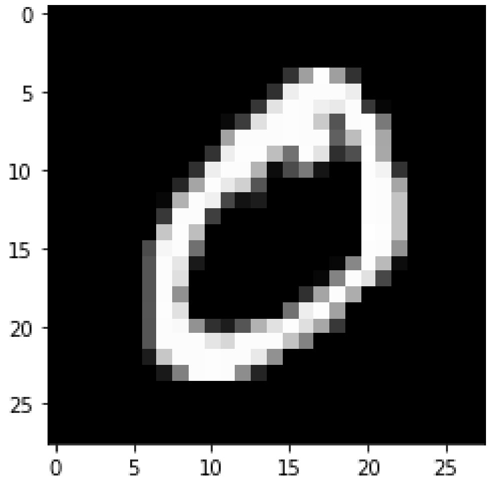
In [156…
```
# data is in 3d format
X_train.shape
```

Out[156… (60000, 28, 28)

In [157…
```
print("Number of training examples :", X_train.shape[0], "and each image is of shape (%d, %d)"%(X_train.shape[1], X_t
print("Number of training examples :", X_test.shape[0], "and each image is of shape (%d, %d)"%(X_test.shape[1], X_tes
```

```
Number of training examples : 60000 and each image is of shape (28, 28)
Number of training examples : 10000 and each image is of shape (28, 28)
```

In [158…
```
sample = 1
image = X_train[sample]


# plot the sample
fig = plt.figure
plt.imshow(image, cmap='gray')
plt.show()
```



In [159…
```
img_rows, img_cols = 28, 28

# the data, split between train and test sets
(x_train, y_train), (x_test, y_test) = mnist.load_data()

if K.image_data_format() == 'channels_first':
    x_train = x_train.reshape(x_train.shape[0], 1, img_rows, img_cols)
    x_test = x_test.reshape(x_test.shape[0], 1, img_rows, img_cols)
    input_shape = (1, img_rows, img_cols)
```

```
else:
    x_train = x_train.reshape(x_train.shape[0], img_rows, img_cols, 1)
    x_test = x_test.reshape(x_test.shape[0], img_rows, img_cols, 1)
    input_shape = (img_rows, img_cols, 1)
```

In [160…

```
x_train = x_train.astype('float32')
x_test = x_test.astype('float32')
x_train /= 255
x_test /= 255
print('x_train shape:', x_train.shape)
print(x_train.shape[0], 'train samples')
print(x_test.shape[0], 'test samples')

# convert class vectors to binary class matrices
y_train = keras.utils.np_utils.to_categorical(y_train, num_classes)

y_test = keras.utils.np_utils.to_categorical(y_test, num_classes)
```

```
x_train shape: (60000, 28, 28, 1)
60000 train samples
10000 test samples
```

In [161…

```
x_train.shape
```

Out[161…

```
(60000, 28, 28, 1)
```

2.Architecture 1

In [162…

```
batch_size = 128
num_classes = 10
epochs = 12
```

In [178…

```
model1 = Sequential()

model1.add(Conv2D(20, kernel_size=(3, 3),activation='relu',input_shape=input_shape))

model1.add(Conv2D(filters=10, kernel_size = (3,3), activation="relu"))
model1.add(Conv2D(filters=20, kernel_size = (2,2), activation="relu"))

model1.add(MaxPooling2D(pool_size=(2,2)))
```

```
model1.add(Dropout(0.5))
model1.add(BatchNormalization())

model1.add(Conv2D(filters=5, kernel_size = (3,3), activation="relu"))
model1.add(Conv2D(filters=10, kernel_size = (2,2), activation="relu"))
model1.add(Dropout(0.5))
model1.add(Flatten())

model1.add(Dense(100,activation="relu"))

model1.add(Dense(10,activation="softmax"))

model1.compile(loss="categorical_crossentropy", optimizer="adam", metrics=["accuracy"])

model1.summary()
```

```
Model: "sequential_6"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
conv2d_23 (Conv2D)           (None, 26, 26, 20)        200       
_________________________________________________________________
conv2d_24 (Conv2D)           (None, 24, 24, 10)        1810      
_________________________________________________________________
conv2d_25 (Conv2D)           (None, 23, 23, 20)        820       
_________________________________________________________________
max_pooling2d_5 (MaxPooling2 (None, 11, 11, 20)        0         
_________________________________________________________________
dropout (Dropout)            (None, 11, 11, 20)        0         
_________________________________________________________________
module_wrapper_12 (ModuleWra (None, 11, 11, 20)        80        
_________________________________________________________________
conv2d_26 (Conv2D)           (None, 9, 9, 5)           905       
_________________________________________________________________
conv2d_27 (Conv2D)           (None, 8, 8, 10)          210       
_________________________________________________________________
dropout_1 (Dropout)          (None, 8, 8, 10)          0         
_________________________________________________________________
flatten_4 (Flatten)          (None, 640)               0         
_________________________________________________________________
module_wrapper_13 (ModuleWra (None, 100)               64100     
_________________________________________________________________
module_wrapper_14 (ModuleWra (None, 10)                1010      
=================================================================
Total params: 69,135
Trainable params: 69,095
Non-trainable params: 40
_________________________________________________________________
```

In [171…

```
tf.config.run_functions_eagerly(True)
```

In [179…

```
history = model1.fit(x_train, y_train, batch_size=batch_size, epochs=epochs, verbose=1, validation_data=(x_test, y_te
```

```
/usr/local/lib/python3.7/dist-packages/tensorflow/python/data/ops/dataset_ops.py:4212: UserWarning: Even though the `
tf.config.experimental_run_functions_eagerly` option is set, this option does not apply to tf.data functions. To forc
e eager execution of tf.data functions, please use `tf.data.experimental.enable_debug_mode()`.
  "Even though the `tf.config.experimental_run_functions_eagerly` "
Epoch 1/12
469/469 [==============================] - 101s 214ms/step - loss: 0.4657 - accuracy: 0.8501 - val_loss: 0.1199 - val
_accuracy: 0.9760
Epoch 2/12
469/469 [==============================] - 101s 215ms/step - loss: 0.1425 - accuracy: 0.9562 - val_loss: 0.0548 - val
_accuracy: 0.9831
Epoch 3/12
469/469 [==============================] - 100s 213ms/step - loss: 0.1075 - accuracy: 0.9667 - val_loss: 0.0448 - val
_accuracy: 0.9852
Epoch 4/12
469/469 [==============================] - 100s 213ms/step - loss: 0.0947 - accuracy: 0.9705 - val_loss: 0.0472 - val
_accuracy: 0.9849
Epoch 5/12
469/469 [==============================] - 100s 214ms/step - loss: 0.0836 - accuracy: 0.9741 - val_loss: 0.0350 - val
_accuracy: 0.9888
Epoch 6/12
469/469 [==============================] - 101s 216ms/step - loss: 0.0752 - accuracy: 0.9765 - val_loss: 0.0392 - val
_accuracy: 0.9874
Epoch 7/12
469/469 [==============================] - 100s 214ms/step - loss: 0.0682 - accuracy: 0.9790 - val_loss: 0.0323 - val
_accuracy: 0.9894
Epoch 8/12
469/469 [==============================] - 99s 211ms/step - loss: 0.0624 - accuracy: 0.9803 - val_loss: 0.0307 - val_
accuracy: 0.9908
Epoch 9/12
469/469 [==============================] - 99s 212ms/step - loss: 0.0602 - accuracy: 0.9805 - val_loss: 0.0302 - val_
accuracy: 0.9906
Epoch 10/12
469/469 [==============================] - 100s 213ms/step - loss: 0.0537 - accuracy: 0.9824 - val_loss: 0.0325 - val
_accuracy: 0.9897
Epoch 11/12
```

```
469/469 [==============================] - 100s 214ms/step - loss: 0.0551 - accuracy: 0.9822 - val_loss: 0.0290 - val
_accuracy: 0.9908
Epoch 12/12
469/469 [==============================] - 101s 215ms/step - loss: 0.0499 - accuracy: 0.9838 - val_loss: 0.0281 - val
_accuracy: 0.9903
```

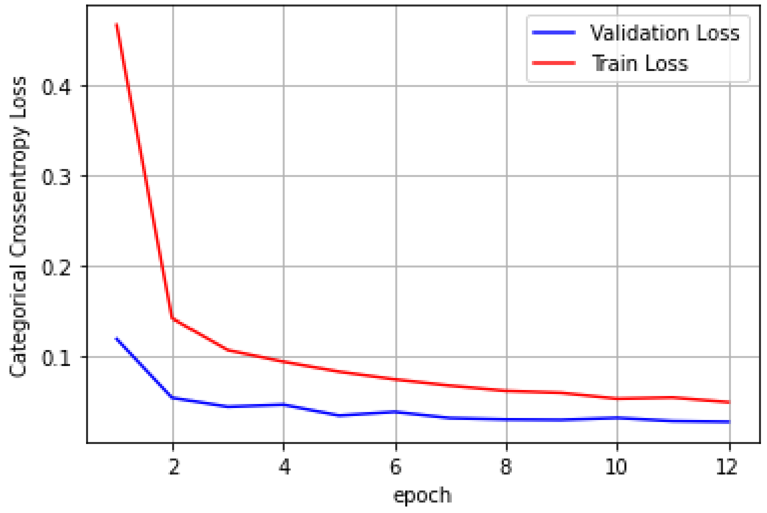
In [181…

```
# https://gist.github.com/greydanus/f6eee59eaf1d90fcb3b534a25362cea4
# https://stackoverflow.com/a/14434334
# this function is used to update the plots for each epoch and error
def plt_dynamic(x, vy, ty, ax, colors=['b']):
    ax.plot(x, vy, 'b', label="Validation Loss")
    ax.plot(x, ty, 'r', label="Train Loss")
    plt.legend()
    plt.grid()
    fig.canvas.draw()
```

In [182…

```
score = model1.evaluate(x_test, y_test, verbose=0)
print('Test score:', score[0])
print('Test accuracy:', score[1])
fig,ax = plt.subplots(1,1)
ax.set_xlabel('epoch') ; ax.set_ylabel('Categorical Crossentropy Loss')


# list of epoch numbers
x = list(range(1,epochs+1))

# print(history.history.keys())
# dict_keys(['val_loss', 'val_acc', 'loss', 'acc'])
# history = model_drop.fit(X_train, Y_train, batch_size=batch_size, epochs=nb_epoch, verbose=1, validation_data=(X_te

# we will get val_loss and val_acc only when you pass the paramter validation_data
# val_loss : validation loss
# val_acc : validation accuracy

# loss : training loss
# acc : train accuracy
# for each key in histrory.histrory we will have a list of length equal to number of epochs

vy = history.history['val_loss']
ty = history.history['loss']
plt_dynamic(x, vy, ty, ax)
```

```
/usr/local/lib/python3.7/dist-packages/tensorflow/python/data/ops/dataset_ops.py:4212: UserWarning: Even though the `
tf.config.experimental_run_functions_eagerly` option is set, this option does not apply to tf.data functions. To forc
e eager execution of tf.data functions, please use `tf.data.experimental.enable_debug_mode()`.
  "Even though the `tf.config.experimental_run_functions_eagerly` "
Test score: 0.028133573010563585
Test accuracy: 0.9902999997138977
```



3.Architecture 2

In [183…
```
batch_size = 200
num_classes = 10
epochs = 10
```

In [192…
```
model2 = Sequential()
model2.add(Conv2D(filters=5, kernel_size=3, strides=1, padding='same', activation='relu', input_shape=input_shape))
model2.add(MaxPooling2D(pool_size=2, strides=2, padding='same'))
model1.add(Dropout(0.5))
model2.add(Conv2D(filters=10, kernel_size=3, strides=1, padding='same', activation='relu'))
model2.add(MaxPooling2D(pool_size=2, strides=2, padding='same'))
model2.add(Conv2D(filters=5, kernel_size=3, strides=1, padding='same', activation='relu'))
model2.add(MaxPooling2D(pool_size=2, strides=2, padding='same'))
model1.add(BatchNormalization())
model1.add(Dropout(0.5))
```

```
model2.add(Flatten())
model2.add(Dense(100, activation='relu'))
model2.add(Dense(10, activation='softmax'))
model2.build()
model2.summary()
```

```
Model: "sequential_10"
_________________________________________________________________
Layer (type)                 Output Shape              Param #   
=================================================================
conv2d_37 (Conv2D)           (None, 28, 28, 5)         50        
_________________________________________________________________
max_pooling2d_15 (MaxPooling (None, 14, 14, 5)         0         
_________________________________________________________________
conv2d_38 (Conv2D)           (None, 14, 14, 10)        460       
_________________________________________________________________
max_pooling2d_16 (MaxPooling (None, 7, 7, 10)          0         
_________________________________________________________________
conv2d_39 (Conv2D)           (None, 7, 7, 5)           455       
_________________________________________________________________
max_pooling2d_17 (MaxPooling (None, 4, 4, 5)           0         
_________________________________________________________________
flatten_8 (Flatten)          (None, 80)                0         
_________________________________________________________________
module_wrapper_25 (ModuleWra (None, 100)               8100      
_________________________________________________________________
module_wrapper_26 (ModuleWra (None, 10)                1010      
=================================================================
Total params: 10,075
Trainable params: 10,075
Non-trainable params: 0
_________________________________________________________________
```

In [195…

```
model2.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])
history = model2.fit(x_train, y_train, batch_size=batch_size, epochs=epochs, verbose=1, validation_data=(x_test, y_te
```

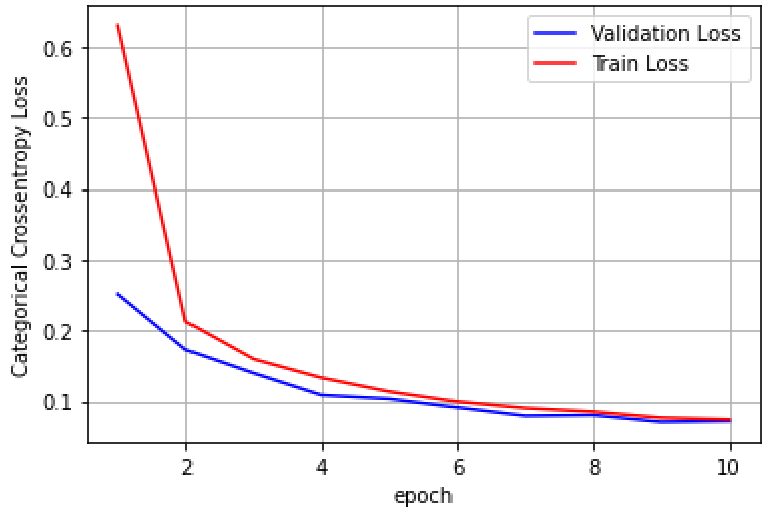
```
Epoch 1/10
  1/300 [..............................] - ETA: 37s - loss: 2.3208 - accuracy: 0.0850
/usr/local/lib/python3.7/dist-packages/tensorflow/python/data/ops/dataset_ops.py:4212: UserWarning: Even though the `
tf.config.experimental_run_functions_eagerly` option is set, this option does not apply to tf.data functions. To forc
e eager execution of tf.data functions, please use `tf.data.experimental.enable_debug_mode()`.
  "Even though the `tf.config.experimental_run_functions_eagerly` "
300/300 [==============================] - 37s 123ms/step - loss: 0.6301 - accuracy: 0.8112 - val_loss: 0.2513 - val_
accuracy: 0.9239
```

```
Epoch 2/10
300/300 [==============================] - 37s 122ms/step - loss: 0.2125 - accuracy: 0.9336 - val_loss: 0.1726 - val_
accuracy: 0.9463
Epoch 3/10
300/300 [==============================] - 37s 122ms/step - loss: 0.1594 - accuracy: 0.9503 - val_loss: 0.1395 - val_
accuracy: 0.9555
Epoch 4/10
300/300 [==============================] - 37s 122ms/step - loss: 0.1330 - accuracy: 0.9586 - val_loss: 0.1085 - val_
accuracy: 0.9659
Epoch 5/10
300/300 [==============================] - 37s 122ms/step - loss: 0.1135 - accuracy: 0.9641 - val_loss: 0.1032 - val_
accuracy: 0.9677
Epoch 6/10
300/300 [==============================] - 36s 120ms/step - loss: 0.0992 - accuracy: 0.9687 - val_loss: 0.0909 - val_
accuracy: 0.9718
Epoch 7/10
300/300 [==============================] - 36s 121ms/step - loss: 0.0900 - accuracy: 0.9717 - val_loss: 0.0791 - val_
accuracy: 0.9735
Epoch 8/10
300/300 [==============================] - 36s 121ms/step - loss: 0.0850 - accuracy: 0.9734 - val_loss: 0.0802 - val_
accuracy: 0.9743
Epoch 9/10
300/300 [==============================] - 37s 123ms/step - loss: 0.0764 - accuracy: 0.9761 - val_loss: 0.0706 - val_
accuracy: 0.9766
Epoch 10/10
300/300 [==============================] - 37s 124ms/step - loss: 0.0740 - accuracy: 0.9766 - val_loss: 0.0717 - val_
accuracy: 0.9751
```

In [196…

```python
score = model2.evaluate(x_test, y_test, verbose=0)
print('Test score:', score[0])
print('Test accuracy:', score[1])

fig,ax = plt.subplots(1,1)
ax.set_xlabel('epoch') ; ax.set_ylabel('Categorical Crossentropy Loss')


# list of epoch numbers
x = list(range(1,epochs+1))

# print(history.history.keys())
# dict_keys(['val_loss', 'val_acc', 'loss', 'acc'])
# history = model_drop.fit(X_train, Y_train, batch_size=batch_size, epochs=nb_epoch, verbose=1, validation_data=(X_te

# we will get val_loss and val_acc only when you pass the paramter validation_data
# val_loss : validation loss
# val_acc : validation accuracy

# loss : training loss
# acc : train accuracy
# for each key in histrory.histrory we will have a list of length equal to number of epochs

vy = history.history['val_loss']
ty = history.history['loss']
plt_dynamic(x, vy, ty, ax)
```

```
/usr/local/lib/python3.7/dist-packages/tensorflow/python/data/ops/dataset_ops.py:4212: UserWarning: Even though the `
tf.config.experimental_run_functions_eagerly` option is set, this option does not apply to tf.data functions. To forc
e eager execution of tf.data functions, please use `tf.data.experimental.enable_debug_mode()`.
  "Even though the `tf.config.experimental_run_functions_eagerly` "
Test score: 0.07172030955553055
Test accuracy: 0.9750999808311462
```



4.Architecture 3

In [221…
```
batch_size = 200
num_classes = 10
epochs = 15
```

```
In [222…
model3 = Sequential()
model3.add(Conv2D(filters=5, kernel_size=3, strides=2, padding='same', activation='relu', input_shape=input_shape))
model3.add(MaxPooling2D(pool_size=2, strides=2, padding='same'))
model3.add(Dropout(0.5))
model3.add(Conv2D(filters=10, kernel_size=3, strides=2, padding='same', activation='relu'))
model3.add(MaxPooling2D(pool_size=2, strides=2, padding='same'))
model3.add(Dropout(0.5))
model3.add(Conv2D(filters=5, kernel_size=3, strides=2, padding='same', activation='relu'))
model3.add(MaxPooling2D(pool_size=2, strides=2, padding='same'))
model3.add(BatchNormalization())
model3.add(Dropout(0.5))

model3.add(Flatten())
model3.add(BatchNormalization())
model3.add(Dropout(0.5))
model3.add(Dense(100, activation='relu'))
model3.add(Dense(10, activation='softmax'))
model3.build()
model3.summary()
```

```
Model: "sequential_34"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_61 (Conv2D)           (None, 14, 14, 5)         50
_________________________________________________________________
max_pooling2d_36 (MaxPooling (None, 7, 7, 5)           0
_________________________________________________________________
dropout_24 (Dropout)         (None, 7, 7, 5)           0
_________________________________________________________________
conv2d_62 (Conv2D)           (None, 4, 4, 10)          460
_________________________________________________________________
max_pooling2d_37 (MaxPooling (None, 2, 2, 10)          0
_________________________________________________________________
dropout_25 (Dropout)         (None, 2, 2, 10)          0
_________________________________________________________________
conv2d_63 (Conv2D)           (None, 1, 1, 5)           455
_________________________________________________________________
max_pooling2d_38 (MaxPooling (None, 1, 1, 5)           0
_________________________________________________________________
module_wrapper_43 (ModuleWra (None, 1, 1, 5)           20
_________________________________________________________________
dropout_26 (Dropout)         (None, 1, 1, 5)           0
_________________________________________________________________
```

```
flatten_12 (Flatten)         (None, 5)                 0

_________________________________________________________________
module_wrapper_44 (ModuleWra (None, 5)                 20

_________________________________________________________________
dropout_27 (Dropout)         (None, 5)                 0

_________________________________________________________________
module_wrapper_45 (ModuleWra (None, 100)               600

_________________________________________________________________
module_wrapper_46 (ModuleWra (None, 10)                1010
=================================================================
Total params: 2,615
Trainable params: 2,595
Non-trainable params: 20

_________________________________________________________________
```

In [223…

```
model3.compile(optimizer='adam', loss='categorical_crossentropy', metrics=['accuracy'])
history = model3.fit(x_train, y_train, batch_size=batch_size, epochs=epochs, verbose=1, validation_data=(x_test, y_te
```

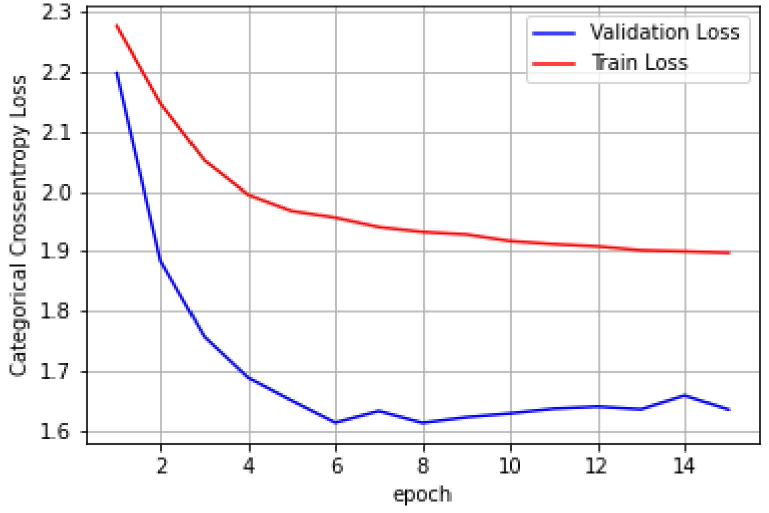
```
Epoch 1/15
  2/300 [..............................] - ETA: 14s - loss: 2.4454 - accuracy: 0.0950
/usr/local/lib/python3.7/dist-packages/tensorflow/python/data/ops/dataset_ops.py:4212: UserWarning: Even though the `
tf.config.experimental_run_functions_eagerly` option is set, this option does not apply to tf.data functions. To forc
e eager execution of tf.data functions, please use `tf.data.experimental.enable_debug_mode()`.
  "Even though the `tf.config.experimental_run_functions_eagerly` "
300/300 [==============================] - 18s 59ms/step - loss: 2.2762 - accuracy: 0.1394 - val_loss: 2.1980 - val_a
ccuracy: 0.2962
Epoch 2/15
300/300 [==============================] - 17s 57ms/step - loss: 2.1475 - accuracy: 0.1764 - val_loss: 1.8840 - val_a
ccuracy: 0.3405
Epoch 3/15
300/300 [==============================] - 17s 57ms/step - loss: 2.0519 - accuracy: 0.1965 - val_loss: 1.7574 - val_a
ccuracy: 0.4054
Epoch 4/15
300/300 [==============================] - 18s 58ms/step - loss: 1.9945 - accuracy: 0.2059 - val_loss: 1.6889 - val_a
ccuracy: 0.3725
Epoch 5/15
300/300 [==============================] - 18s 58ms/step - loss: 1.9674 - accuracy: 0.2121 - val_loss: 1.6504 - val_a
ccuracy: 0.3524
Epoch 6/15
300/300 [==============================] - 18s 59ms/step - loss: 1.9563 - accuracy: 0.2162 - val_loss: 1.6133 - val_a
ccuracy: 0.3571
Epoch 7/15
300/300 [==============================] - 17s 57ms/step - loss: 1.9405 - accuracy: 0.2233 - val_loss: 1.6329 - val_a
ccuracy: 0.4147
Epoch 8/15
```

```
300/300 [==============================] - 17s 57ms/step - loss: 1.9323 - accuracy: 0.2284 - val_loss: 1.6129 - val_a
ccuracy: 0.4404
Epoch 9/15
300/300 [==============================] - 17s 56ms/step - loss: 1.9281 - accuracy: 0.2334 - val_loss: 1.6224 - val_a
ccuracy: 0.4171
Epoch 10/15
300/300 [==============================] - 17s 57ms/step - loss: 1.9171 - accuracy: 0.2400 - val_loss: 1.6288 - val_a
ccuracy: 0.3966
Epoch 11/15
300/300 [==============================] - 17s 57ms/step - loss: 1.9119 - accuracy: 0.2434 - val_loss: 1.6366 - val_a
ccuracy: 0.3338
Epoch 12/15
300/300 [==============================] - 17s 57ms/step - loss: 1.9082 - accuracy: 0.2454 - val_loss: 1.6403 - val_a
ccuracy: 0.3305
Epoch 13/15
300/300 [==============================] - 17s 57ms/step - loss: 1.9016 - accuracy: 0.2457 - val_loss: 1.6356 - val_a
ccuracy: 0.3324
Epoch 14/15
300/300 [==============================] - 17s 58ms/step - loss: 1.8997 - accuracy: 0.2497 - val_loss: 1.6589 - val_a
ccuracy: 0.2780
Epoch 15/15
300/300 [==============================] - 17s 57ms/step - loss: 1.8973 - accuracy: 0.2526 - val_loss: 1.6352 - val_a
ccuracy: 0.3115
```

In [225…

```
score = model3.evaluate(x_test, y_test, verbose=0)
print('Test score:', score[0])
print('Test accuracy:', score[1])

fig,ax = plt.subplots(1,1)
ax.set_xlabel('epoch') ; ax.set_ylabel('Categorical Crossentropy Loss')


# list of epoch numbers
x = list(range(1,epochs+1))

# print(history.history.keys())
# dict_keys(['val_loss', 'val_acc', 'loss', 'acc'])
# history = model_drop.fit(X_train, Y_train, batch_size=batch_size, epochs=nb_epoch, verbose=1, validation_data=(X_te

# we will get val_loss and val_acc only when you pass the paramter validation_data
# val_loss : validation loss
# val_acc : validation accuracy
# loss : training loss
# acc : train accuracy
# for each key in histrory.histrory we will have a list of length equal to number of epochs

vy = history.history['val_loss']
ty = history.history['loss']
plt_dynamic(x, vy, ty, ax)
```

```
/usr/local/lib/python3.7/dist-packages/tensorflow/python/data/ops/dataset_ops.py:4212: UserWarning: Even though the `
tf.config.experimental_run_functions_eagerly` option is set, this option does not apply to tf.data functions. To forc
e eager execution of tf.data functions, please use `tf.data.experimental.enable_debug_mode()`.
  "Even though the `tf.config.experimental_run_functions_eagerly` "
Test score: 1.6351990699768066
Test accuracy: 0.31150001287460327
```



5.Observation Table

In [230…

```
from prettytable import PrettyTable
x = PrettyTable()

x = PrettyTable()
x.field_names=["Architecture Number", "epochs","Test Score", "Test Accuracy" ]

x.add_row(["Architecture 1", "12", "0.028","99" ])
```

```
x.add_row(["Architecture 2", "10", "0.071","97" ])

x.add_row(["Architecture 3", "15", "1.63","31" ])


print(x)
```

```
+---------------------+--------+------------+---------------+
| Architecture Number | epochs | Test Score | Test Accuracy |
+---------------------+--------+------------+---------------+
|    Architecture 1   |   12   |   0.028    |       99      |
|    Architecture 2   |   10   |   0.071    |       97      |
|    Architecture 3   |   15   |    1.63    |       31      |
+---------------------+--------+------------+---------------+
```

6.Observations:

1.First two architecture gives good accuracy score.

2.Third architecture gives poor prformance