```
!pip install keras-tuner
```

```
Collecting keras-tuner
  Downloading https://files.pythonhosted.org/packages/20/ec/1ef246787174b1e2bb591c95f29d
     |████████████████████████████████| 71kB 8.0MB/s
Requirement already satisfied: packaging in /usr/local/lib/python3.7/dist-packages (from
Requirement already satisfied: future in /usr/local/lib/python3.7/dist-packages (from ke
Requirement already satisfied: numpy in /usr/local/lib/python3.7/dist-packages (from ker
Requirement already satisfied: tabulate in /usr/local/lib/python3.7/dist-packages (from
Collecting terminaltables
  Downloading https://files.pythonhosted.org/packages/9b/c4/4a21174f32f8a7e1104798c445da
Collecting colorama
  Downloading https://files.pythonhosted.org/packages/44/98/5b86278fbbf250d239ae0ecb724f
Requirement already satisfied: tqdm in /usr/local/lib/python3.7/dist-packages (from kera
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Requirement already satisfied: scikit-learn in /usr/local/lib/python3.7/dist-packages (f
Requirement already satisfied: pyparsing>=2.0.2 in /usr/local/lib/python3.7/dist-package
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.7/dist-packa
Requirement already satisfied: idna<3,>=2.5 in /usr/local/lib/python3.7/dist-packages (f
Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in /usr/local/lib
Requirement already satisfied: chardet<4,>=3.0.2 in /usr/local/lib/python3.7/dist-packag
Requirement already satisfied: joblib>=0.11 in /usr/local/lib/python3.7/dist-packages (f
Building wheels for collected packages: keras-tuner, terminaltables
  Building wheel for keras-tuner (setup.py) ... done
  Created wheel for keras-tuner: filename=keras_tuner-1.0.2-cp37-none-any.whl size=78938
  Stored in directory: /root/.cache/pip/wheels/bb/a1/8a/7c3de0efb3707a1701b36ebbfdbc4e67
  Building wheel for terminaltables (setup.py) ... done
  Created wheel for terminaltables: filename=terminaltables-3.1.0-cp37-none-any.whl size
  Stored in directory: /root/.cache/pip/wheels/30/6b/50/6c75775b681fb36cdfac7f19799888ef
Successfully built keras-tuner terminaltables
Installing collected packages: terminaltables, colorama, keras-tuner
Successfully installed colorama-0.4.4 keras-tuner-1.0.2 terminaltables-3.1.0
```

```
import tensorflow as tf
from tensorflow import keras
import numpy as np
```

```
fashion_mnist=keras.datasets.fashion_mnist
```

```
(train_images,train_labels),(test_images,test_labels)=fashion_mnist.load_data
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-
32768/29515 [================================] - 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/train-
26427392/26421880 [==============================] - 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-
8192/5148 [===============================================] - 0s 0us/step
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/t10k-
4423680/4422102 [==============================] - 0s 0us/step
```

```
train_images=train_images/255.0
test_images=test_images/255.0
```

```
train_images[0].shape
```

```
(28, 28)
```

```
train_images=train_images.reshape(len(train_images),28,28,1)
test_images=test_images.reshape(len(test_images),28,28,1)
```

```
def build_model(hp):
   model=keras.Sequential([
      keras.layers.Conv2D(
          filters=hp.Int('conv_1_filter',min_value=32,max_value=128,step=16),
          kernel_size=hp.Choice('conv_1_kernel',values=[3,5]),
          activation='relu',
          input_shape=(28,28,1)
      ),
      keras.layers.Conv2D(
          filters=hp.Int('conv_2_filter',min_value=32,max_value=128,step=16),
          kernel_size=hp.Choice('conv_2_kernel',values=[3,5]),
          activation='relu'

      ),
      keras.layers.Flatten(),
      keras.layers.Dense(
          units=hp.Int('dense_1_units',min_value=32,max_value=128,step=16),
          activation='relu'
      ),
      keras.layers.Dense(10,activation='softmax') #output layer
   ])
   model.compile(optimizer=keras.optimizers.Adam(hp.Choice('learning_rate',va
                 loss='sparse_categorical_crossentropy',
                 metrics=['accuracy'])
   return model
```

```
from kerastuner import RandomSearch
from kerastuner.engine.hyperparameters import HyperParameters
```

```
tuner_search=RandomSearch(build_model,
                          objective='val_accuracy',
                          max_trials=5,directory='output',project_name="Mnist
```

```
1  tuner_search.search(train_images,train_labels,epochs=3,validation_split=0.1)
```

```
Trial 3 Complete [00h 07m 42s]
val_accuracy: 0.9196666479110718

Best val_accuracy So Far: 0.9196666479110718
Total elapsed time: 00h 43m 18s

Search: Running Trial #4

Hyperparameter    |Value             |Best Value So Far
conv_1_filter     |80                |32
conv_1_kernel     |5                 |3
conv_2_filter     |96                |80
conv_2_kernel     |5                 |3
dense_1_units     |80                |48
learning_rate     |0.001             |0.001

Epoch 1/3
 462/1688 [=======>......................] - ETA: 6:45 - loss: 0.5482 - accuracy: 0.8028
```

```
1  model=tuner_search.get_best_models(num_models=1)[0]
```

```
1  model.summary()
```

Executing (45m 51s) ... > sea... > run_... > _build_and_fit... > ... > __c... > _... > __c... > _call... > c... > quick_ex...