In [15]:
```
#!pip install tensorflow
```

In [16]:
```
import tensorflow as tf
```

In [17]:
```
from matplotlib import pyplot as plt
```

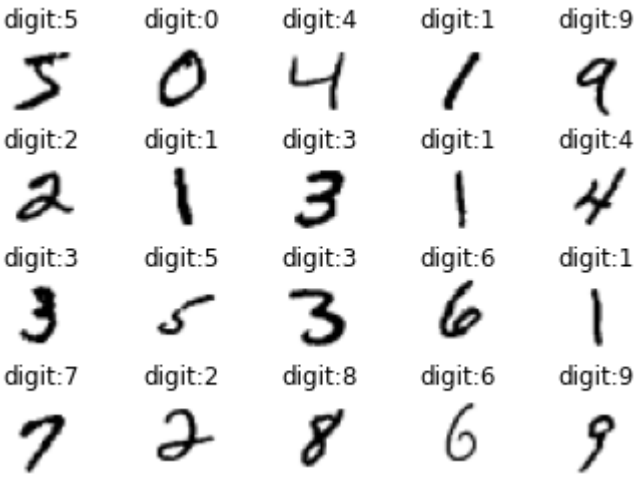
In [18]:
```
import numpy as np
```

In [19]:
```
from keras.datasets import mnist
```

In [20]:
```
objects=mnist
```

In [21]:
```
(train_img,train_lab),(test_img,test_lab)=objects.load_data()
```

In [22]:
```
for i in range (20) :
    plt.subplot(4,5,i+1)
    plt.imshow(train_img[i],cmap='gray_r')
    plt.title('digit:{}'.format(train_lab[i]))
    plt.subplots_adjust(hspace=0.5)
    plt.axis('off')
```



In [23]:
```
from keras.models import Sequential
```

In [24]:
```
from keras.layers import Flatten,Dense
```

In [25]:
```
model=Sequential()
input_layer=Flatten(input_shape=(28,28))
model.add(input_layer)
```

In [26]:
```
hidden_layer1=Dense(512,activation='relu')
model.add(hidden_layer1)
hidden_layer2=Dense(512,activation='relu')
model.add(hidden_layer2)
output_layer=Dense(10,activation='softmax')
model.add(output_layer)
```

In [27]:
```
model.compile(optimizer ='adam',loss='sparse_categorical_crossentropy', metrics= [
```

In [28]:
```
model.fit(train_img,train_lab,epochs=15)
```

```
Epoch 1/15
1875/1875 [==============================] - 36s 18ms/step - loss: 1.5027 - accura
cy: 0.9051
Epoch 2/15
1875/1875 [==============================] - 34s 18ms/step - loss: 0.1977 - accura
cy: 0.9495
Epoch 3/15
1875/1875 [==============================] - 35s 19ms/step - loss: 0.1857 - accura
cy: 0.9502
Epoch 4/15
1875/1875 [==============================] - 34s 18ms/step - loss: 0.1594 - accura
cy: 0.9582
Epoch 5/15
1875/1875 [==============================] - 35s 19ms/step - loss: 0.1510 - accura
cy: 0.9612
Epoch 6/15
1875/1875 [==============================] - 35s 19ms/step - loss: 0.1342 - accura
cy: 0.9656
Epoch 7/15
1875/1875 [==============================] - 35s 19ms/step - loss: 0.1218 - accura
cy: 0.9695
Epoch 8/15
1875/1875 [==============================] - 36s 19ms/step - loss: 0.1069 - accura
cy: 0.9729
Epoch 9/15
1875/1875 [==============================] - 36s 19ms/step - loss: 0.0948 - accura
cy: 0.9747
Epoch 10/15
1875/1875 [==============================] - 36s 19ms/step - loss: 0.0907 - accura
cy: 0.9782
Epoch 11/15
1875/1875 [==============================] - 52s 28ms/step - loss: 0.0828 - accura
cy: 0.9795
Epoch 12/15
1875/1875 [==============================] - 32s 17ms/step - loss: 0.0816 - accura
cy: 0.9804
Epoch 13/15
1875/1875 [==============================] - 33s 18ms/step - loss: 0.0806 - accura
cy: 0.9816
Epoch 14/15
1875/1875 [==============================] - 50s 27ms/step - loss: 0.0715 - accura
cy: 0.9829
Epoch 15/15
1875/1875 [==============================] - 44s 23ms/step - loss: 0.0730 - accura
cy: 0.9836
```

Out[28]:
```
<keras.callbacks.History at 0x25d9916a6a0>
```

In [29]:
```
model.save('project.h5')
```

In [30]:
```
loss_and_acc=model.evaluate(test_img,test_lab,verbose=2)
```

```
313/313 - 3s - loss: 0.1727 - accuracy: 0.9744 - 3s/epoch - 8ms/step
```

In [31]:
```
print('test loss',loss_and_acc[0])
print('test acc',loss_and_acc[1])
```

```
test loss 0.17273661494255066
test acc 0.974399983882904
```

In [ ]: