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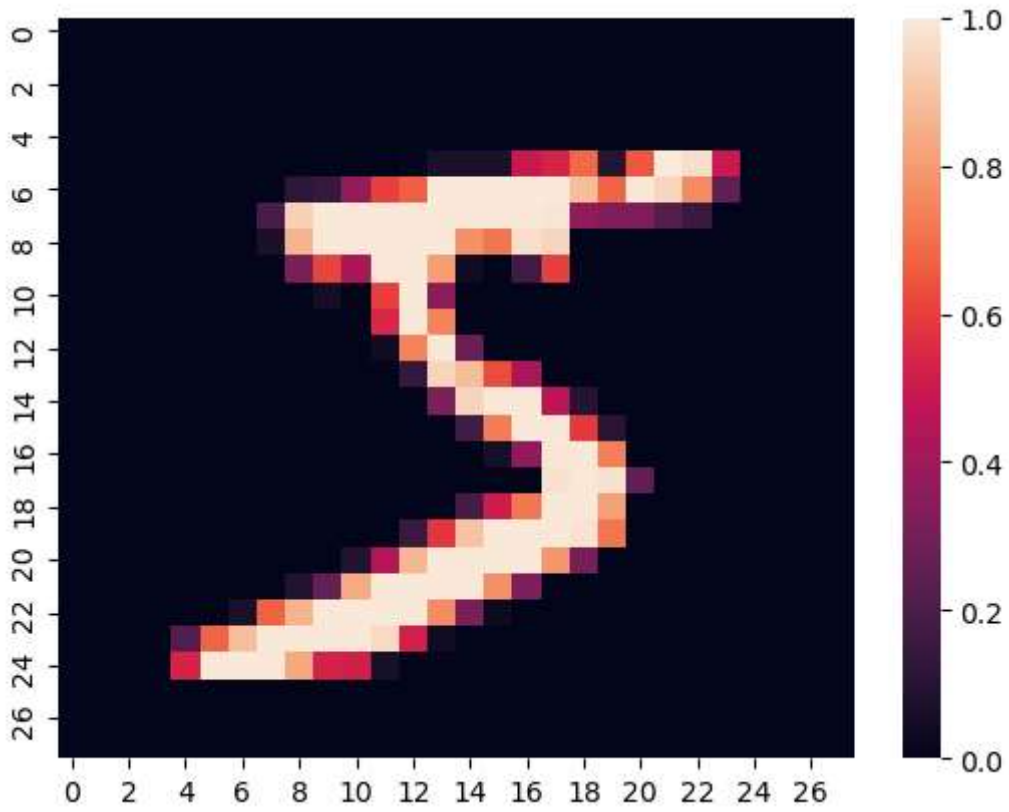
Roll No:-20 Class BE(IT)

In [1]:
```
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import Dropout, Flatten
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
mnist = tf.keras.datasets.mnist
(x_train, y_train) , (x_test, y_test) = mnist.load_data() # Data loading
x_train, x_test = x_train/255.0 , x_test/255.0 #Normalizing the dat
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mni
st.npz
11490434/11490434 [==============================] - 5s 0us/step
```

In [3]:
```
sns.heatmap(x_train[0])
plt.show()
```



In [4]:
```
model = Sequential([
Flatten(input_shape=(28,28)),
Dense(128, activation="relu"),
Dropout(0.2),
```

```
Dense(10)
])
```

In [5]:
```
predictions = model(x_train[:1]).numpy()
predictions
```

Out[5]:
```
array([[-0.15549624,  0.53050435,  0.15746787, -0.0107909 ,  0.17775309,
        -0.15343924,  0.52444154,  0.0394171 , -0.16110222,  0.08558373]],
      dtype=float32)
```

In [6]:
```
tf.nn.softmax(predictions).numpy()
```

Out[6]:
```
array([[0.07483643, 0.14860702, 0.10233675, 0.08648838, 0.10443388,
        0.07499052, 0.14770877, 0.09094165, 0.07441806, 0.09523854]],
      dtype=float32)
```

In [7]:
```
loss_fn = tf.keras.losses.SparseCategoricalCrossentropy(from_logits=True)
```

In [8]:
```
model.compile(optimizer="adam", loss = loss_fn, metrics=["accuracy"])
```

In [9]:
```
model.fit(x_train, y_train, epochs=5)
```

```
Epoch 1/5
1875/1875 [==============================] - 6s 2ms/step - loss: 0.2977 - accuracy:
0.9137
Epoch 2/5
1875/1875 [==============================] - 3s 1ms/step - loss: 0.1422 - accuracy:
0.9587
Epoch 3/5
1875/1875 [==============================] - 3s 2ms/step - loss: 0.1076 - accuracy:
0.9668
Epoch 4/5
1875/1875 [==============================] - 3s 1ms/step - loss: 0.0892 - accuracy:
0.9729
Epoch 5/5
1875/1875 [==============================] - 3s 2ms/step - loss: 0.0737 - accuracy:
0.9770
```

Out[9]:
```
<keras.callbacks.History at 0x271f72ac610>
```

In [10]:
```
model.evaluate(x_test, y_test, verbose=2)
```

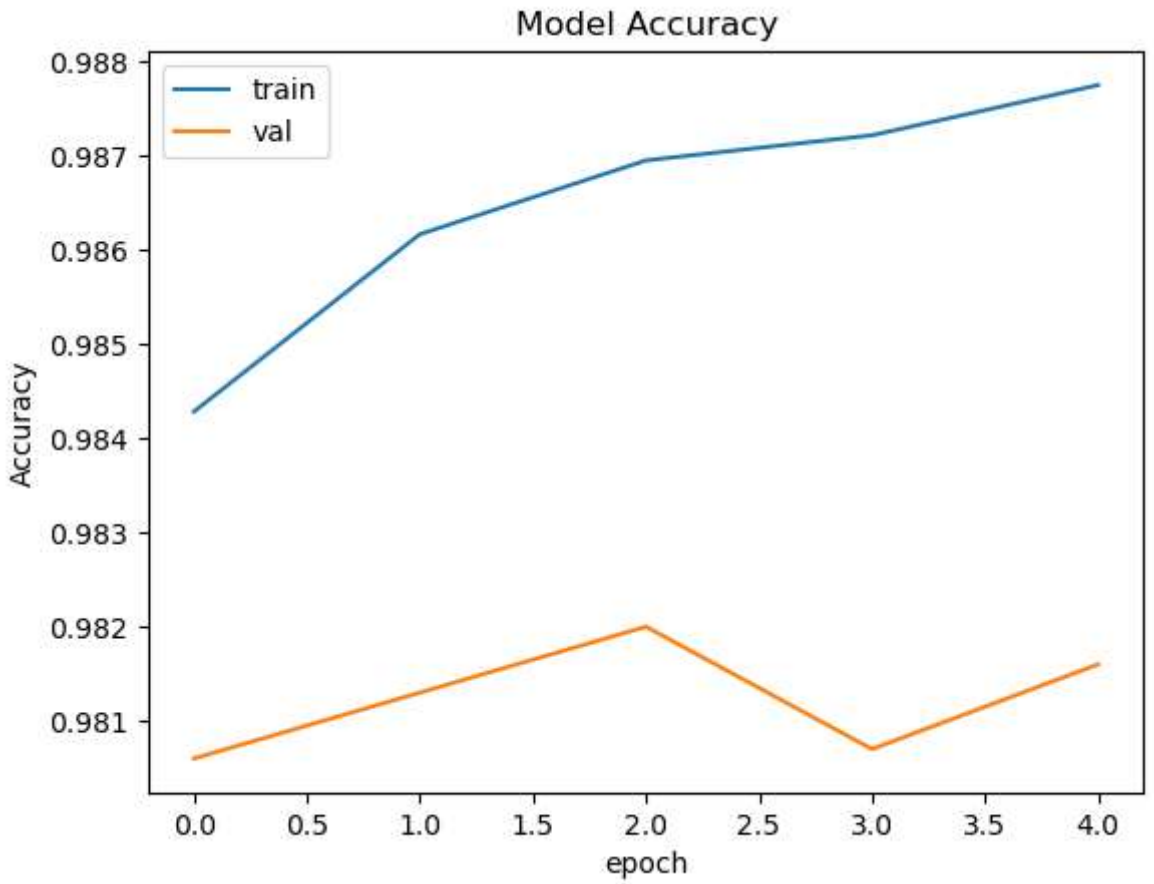
```
313/313 - 0s - loss: 0.0732 - accuracy: 0.9777 - 372ms/epoch - 1ms/step
```

Out[10]:
```
[0.07321574538946152, 0.9776999950408936]
```

In [15]:
```
val = model.fit(x_train, y_train, epochs=5, validation_data=(x_test, y_test),batch_si
```

```
Epoch 1/5
300/300 [==============================] - 1s 3ms/step - loss: 0.0513 - accuracy: 0.9
843 - val_loss: 0.0639 - val_accuracy: 0.9806
Epoch 2/5
300/300 [==============================] - 1s 3ms/step - loss: 0.0460 - accuracy: 0.9
862 - val_loss: 0.0623 - val_accuracy: 0.9813
Epoch 3/5
300/300 [==============================] - 1s 3ms/step - loss: 0.0437 - accuracy: 0.9
869 - val_loss: 0.0602 - val_accuracy: 0.9820
Epoch 4/5
300/300 [==============================] - 1s 3ms/step - loss: 0.0417 - accuracy: 0.9
872 - val_loss: 0.0611 - val_accuracy: 0.9807
Epoch 5/5
300/300 [==============================] - 1s 3ms/step - loss: 0.0395 - accuracy: 0.9
877 - val_loss: 0.0607 - val_accuracy: 0.9816
```

In [16]:
```
plt.title("Model Accuracy")
plt.ylabel("Accuracy")
plt.xlabel("epoch")
3
plt.plot(val.history["accuracy"])
plt.plot(val.history["val_accuracy"])
plt.legend(["train","val"])
plt.show()
```



In [ ]: