```
import tensorflow as tf #Derin Ağ için tensorflow u import ettik
from tensorflow.keras.preprocessing.image import ImageDataGenerator #rescale edip oranlamak ve test değerlerini a
base_dir = 'C:/Users/s7522/Desktop/UrbanSound8K/spectograms/' #spectogramların olduğu path i aldık.

train_datagen = ImageDataGenerator(rescale = 1./255, validation_split = 0.1) #Her bir görseli 255 e bölerek numpy
test_datagen = ImageDataGenerator(rescale = 1./255, validation_split = 0.1)

train_datagen = train_datagen.flow_from_directory(base_dir, target_size = (100,100), subset = "training", batch_s
test_datagen = test_datagen.flow_from_directory(base_dir, target_size = (100,100), subset = "validation", batch_s

Found 7861 images belonging to 10 classes.
Found 871 images belonging to 10 classes.
```

```
In [3]:
         for _ in range(5):
             img, label = test_datagen.next() #test_datagen de iki tane çıktı vardır image ve label
             print(img.shape) #Gelen resimlerin shape ini gördük.
             plt.imshow(img[0])
             print(img[0]) #img ve label gördük
             print(label[0])
             plt.show()
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```
In [4]:
         import numpy as np
         import pylab as pl
         from keras import backend as K
         import matplotlib.pyplot as plt
         from keras.utils import np utils
         from keras.models import Sequential
         from keras.layers.convolutional import Conv2D, MaxPooling2D
         from keras.layers.core import Dense,Dropout,Activation,Flatten
         from tensorflow.keras import layers,activations
In [5]:
         model = Sequential() #Sequential modeli oluşturduk.(Boş)
         model.add(layers.Conv2D(filters = 4, activation = 'relu', kernel size = (5,5), input_shape = (100,100,3))) #0luşa
         model.add(layers.MaxPooling2D(2,2)) #Üstteki işlemden sonra pooling yaptık.Filtreleri arttırarak bağlantıları güç
         model.add(layers.Conv2D(filters = 8, activation = 'elu', kernel size = (3,3)))
         model.add(layers.MaxPooling2D(2,2))
         model.add(layers.Conv2D(filters = 16, activation = 'elu', kernel_size = (2,2)))
         model.add(layers.MaxPooling2D(2,2))
         model.add(layers.Conv2D(filters = 32, activation = 'elu', kernel size = (2,2)))
         model.add(layers.Flatten()) #CNN in son aşaması olarak düzleştirme yaptık.
         model.add(layers.Dense(50, activation="relu")) #0luşan ağları dense yaptık ve son outputta 10 adet sınıf istediği
         model.add(layers.Dense(100, activation="relu"))
         model.add(layers.Dense(100, activation="relu"))
         model.add(layers.Dense(50, activation="relu"))
         model.add(layers.Dense(10, activation="softmax"))
```

In [6]: model.summary() #Oluşan modelin özetini çıkardık.

Model: "sequential"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 96, 96, 4)	304
<pre>max_pooling2d (MaxPooling2D)</pre>	(None, 48, 48, 4)	0
conv2d_1 (Conv2D)	(None, 46, 46, 8)	296
<pre>max_pooling2d_1 (MaxPooling 2D)</pre>	(None, 23, 23, 8)	0
conv2d_2 (Conv2D)	(None, 22, 22, 16)	528
<pre>max_pooling2d_2 (MaxPooling 2D)</pre>	(None, 11, 11, 16)	0
conv2d_3 (Conv2D)	(None, 10, 10, 32)	2080
flatten (Flatten)	(None, 3200)	0
dense (Dense)	(None, 50)	160050
dense_1 (Dense)	(None, 100)	5100
dense_2 (Dense)	(None, 100)	10100

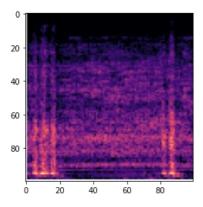
```
dense 4 (Dense)
                              (None, 10)
                                                  510
       Total params: 184,018
       Trainable params: 184,018
       Non-trainable params: 0
In [7]:
       #Model Eğitimi
In [8]:
        import tensorflow as tf
        optimizer = tf.keras.optimizers.Adamax(learning rate = 0.001) #Optimizer seçtik ve learning rate değeri belirledi
       loss = tf.keras.losses.CategoricalCrossentropy()
In [9]:
       model.compile(optimizer = optimizer, loss = loss, metrics = [ "mse", "accuracy"], run eagerly=True) #compiler etti
In [10]:
        result = model.fit(train_datagen, epochs= 5, verbose = 1, validation_data = test_datagen) #Modeli test ettik
       Epoch 1/5
       loss: 1.2512 - val mse: 0.0587 - val accuracy: 0.5476
       Fnoch 2/5
       3931/3931 [==================== ] - 133s 34ms/step - loss: 0.9482 - mse: 0.0439 - accuracy: 0.6776 - val
        loss: 1.2788 - val mse: 0.0596 - val accuracy: 0.5522
       Epoch 3/5
       loss: 1.1812 - val mse: 0.0515 - val accuracy: 0.6039
       Epoch 4/5
       loss: 1.4011 - val mse: 0.0568 - val accuracy: 0.5913
       Epoch 5/5
       loss: 1.4353 - val mse: 0.0576 - val accuracy: 0.5924
In [11]:
       model.evaluate(test_datagen) # Loss mse ve accuracy değerlerini kısa bir testte gördük
       [1.435295820236206, 0.0576358400285244, 0.5924224853515625]
Out[11]:
In [12]:
        print(test_datagen.class_indices) #Baştaki pathtten 100 tane resim seçip sınıf değerlerine göre sonuç vermesini i
        for i in range(100):
           img,label = test datagen.next()
           a = model.predict(img)
           np.argmax(a[0])
           plt.imshow(img[0])
           if np.argmax(a[0]) == 0:
              print("air_conditioner")
           if np.argmax(a[0]) == 1:
              print("car horn")
           if np.argmax(a[0]) == 2:
              print("children_playing")
           if np.argmax(a[0]) == 3:
              print("dog_bark")
           if np.argmax(a[0]) == 4:
              print('drilling')
           if np.argmax(a[0]) == 5:
              print("engine_idling")
           if np.argmax(a[0]) == 6:
              print("gun shot")
           if np.argmax(a[0]) == 7:
              print("jackhammer")
           if np.argmax(a[0]) == 8:
              print("siren")
           if np.argmax(a[0]) == 9:
             print("street_music")
           plt.show()
       {'0': 0, '1': 1, '2': 2, '3': 3, '4': 4, '5': 5, '6': 6, '7': 7, '8': 8, '9': 9}
       1/1 [======= ] - 0s 48ms/step
```

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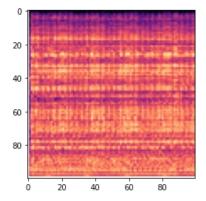
(None, 50)

dense_3 (Dense)

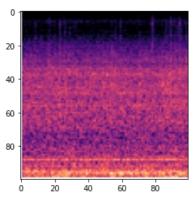
drilling



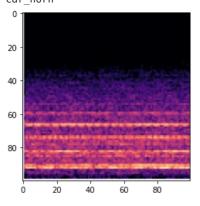
1/1 [======] - 0s 31ms/step jackhammer



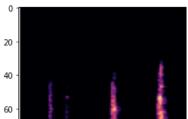
1/1 [======] - 0s 31ms/step engine_idling

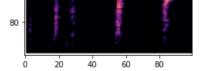


1/1 [=====] - 0s 31ms/step car_horn

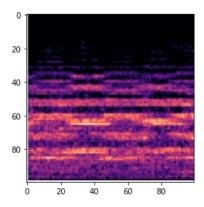


1/1 [======] - 0s 29ms/step dog_bark

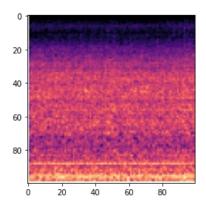




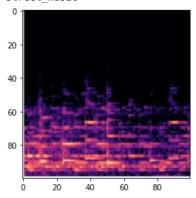
1/1 [======] - 0s 29ms/step street_music



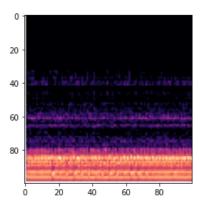
1/1 [======] - 0s 31ms/step engine_idling



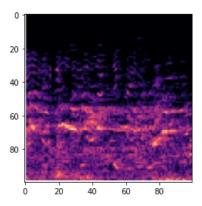
1/1 [======] - 0s 30ms/step street_music



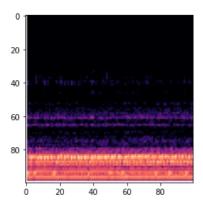
1/1 [======] - 0s 30ms/step street_music



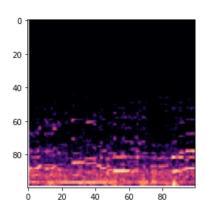
1/1 [======] - 0s 30ms/step siren



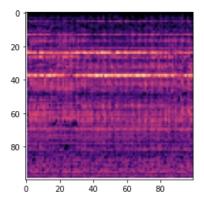
1/1 [======] - 0s 30ms/step street_music



1/1 [======] - 0s 33ms/step street_music

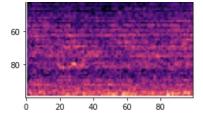


1/1 [=====] - 0s 29ms/step jackhammer

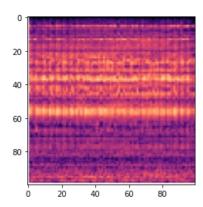


1/1 [======] - 0s 29ms/step siren

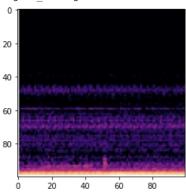




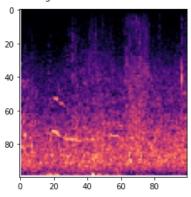
1/1 [======] - 0s 31ms/step jackhammer



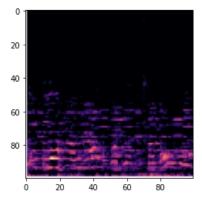
1/1 [======] - 0s 30ms/step engine_idling

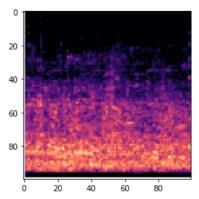


1/1 [======] - 0s 29ms/step drilling

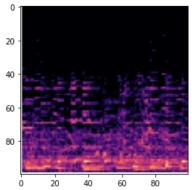


1/1 [======] - 0s 29ms/step street_music

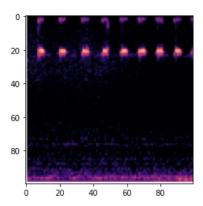




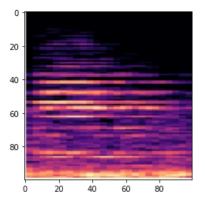
1/1 [======] - 0s 29ms/step street_music

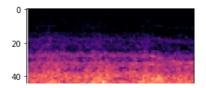


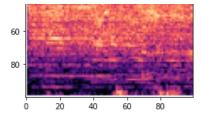
1/1 [======] - 0s 32ms/step siren

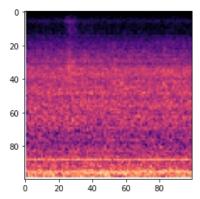


1/1 [======] - 0s 30ms/step car_horn

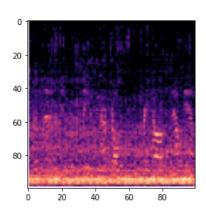


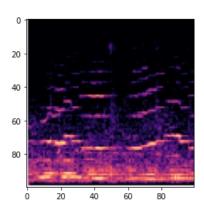




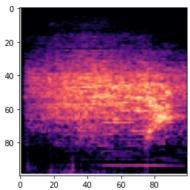


1/1 [======] - 0s 33ms/step siren

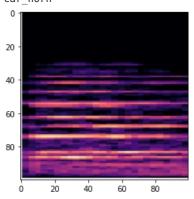




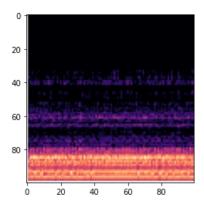
1/1 [======] - 0s 32ms/step drilling



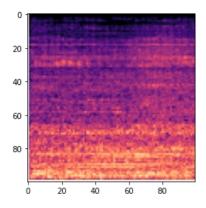
1/1 [======] - 0s 29ms/step car_horn



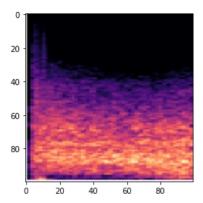
1/1 [======] - 0s 31ms/step engine_idling



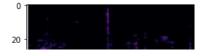
1/1 [======] - 0s 30ms/step jackhammer

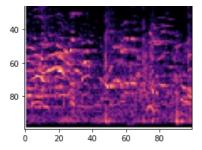


1/1 [======] - 0s 33ms/step gun_shot

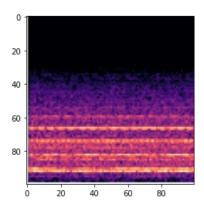


1/1 [======] - 0s 32ms/step children_playing

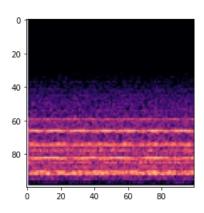


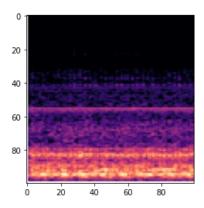


1/1 [======] - 0s 31ms/step car_horn

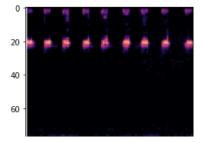


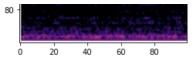
1/1 [======] - 0s 30ms/step car_horn



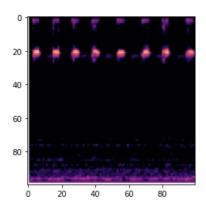


1/1 [======] - 0s 29ms/step siren

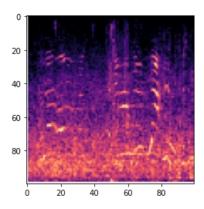




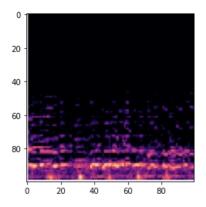
1/1 [======] - 0s 31ms/step siren



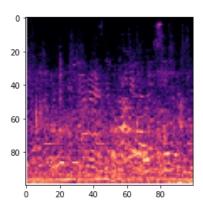
1/1 [======] - 0s 30ms/step children_playing



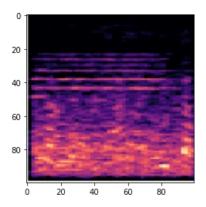
1/1 [======] - 0s 32ms/step street_music



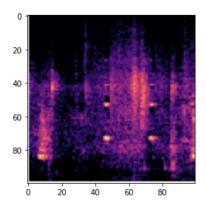
 $1/1 \ [=======] \ - \ 0s \ 29ms/step \\ street_music$



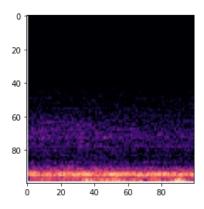
1/1 [======] - 0s 26ms/step



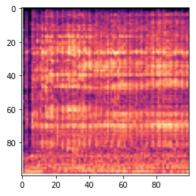
1/1 [======] - 0s 25ms/step dog_bark



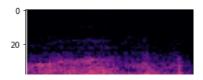
1/1 [======] - 0s 22ms/step siren

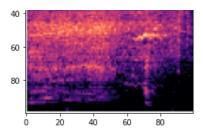


1/1 [======] - 0s 23ms/step drilling

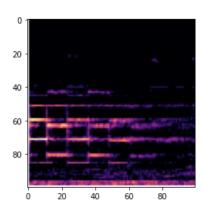


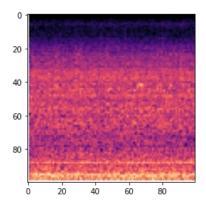
1/1 [======] - 0s 24ms/step drilling



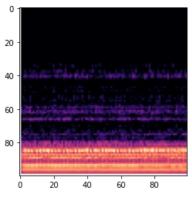


1/1 [======] - 0s 22ms/step siren

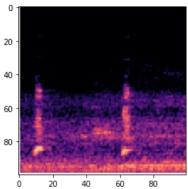




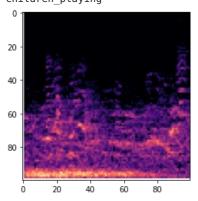
1/1 [======] - 0s 25ms/step car_horn



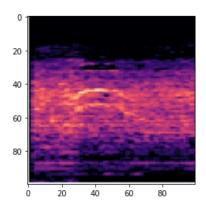
1/1 [======] - 0s 23ms/step dog_bark



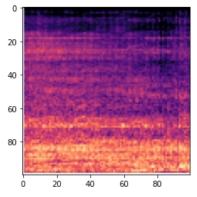
1/1 [======] - 0s 25ms/step children_playing



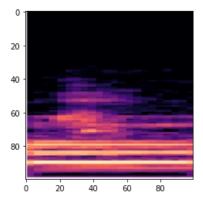
1/1 [======] - 0s 24ms/step children_playing



1/1 [======] - 0s 24ms/step air_conditioner

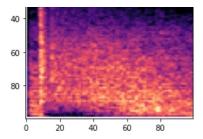


1/1 [======] - 0s 26ms/step jackhammer

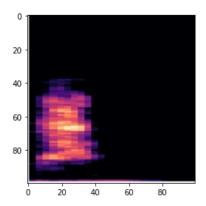


1/1 [======] - 0s 25ms/step gun_shot

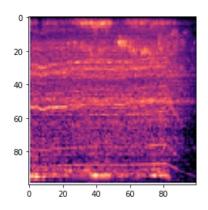




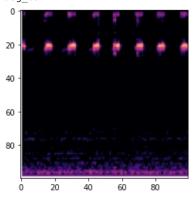
1/1 [======] - 0s 22ms/step dog_bark



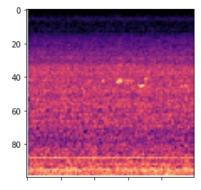
1/1 [======] - 0s 24ms/step drilling



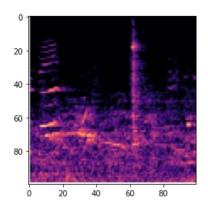
1/1 [======] - θ s 23ms/step θ g_bark



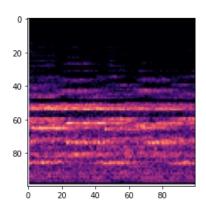
1/1 [======] - 0s 23ms/step engine_idling



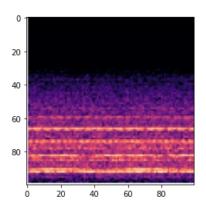
```
0 20 40 60 80
1/1 [======] - 0s 24ms/step
dog_bark
```



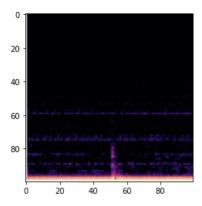
1/1 [======] - 0s 22ms/step siren



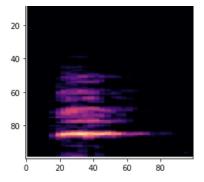
1/1 [======] - 0s 24ms/step car_horn



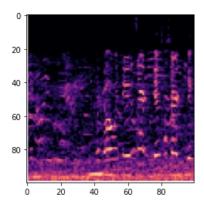
1/1 [======] - 0s 26ms/step children_playing



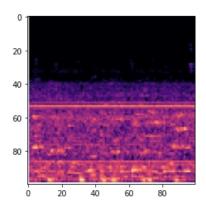
1/1 [======] - θ s 22ms/step θ g_bark



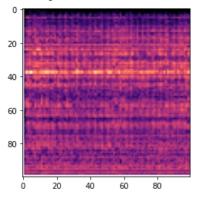
1/1 [======] - 0s 22ms/step children_playing



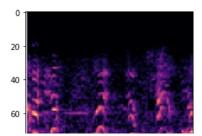
1/1 [======] - 0s 23ms/step air_conditioner

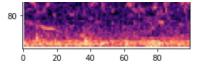


1/1 [======] - 0s 22ms/step drilling

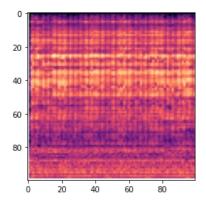


1/1 [======] - 0s 24ms/step children_playing

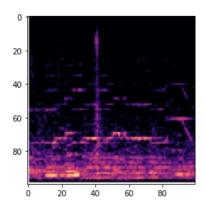




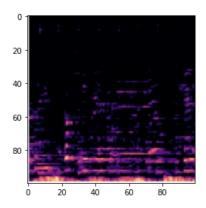
1/1 [======] - 0s 23ms/step jackhammer



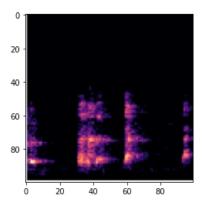
1/1 [======] - 0s 22ms/step children_playing



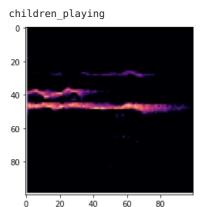
 $1/1 \ [======] \ - \ 0s \ 25ms/step \\ street_music$



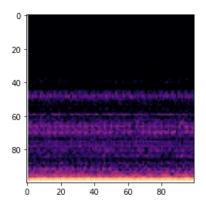
1/1 [======] - 0s 23ms/step dog_bark



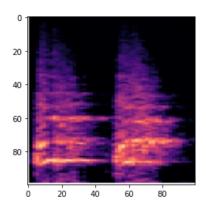
1/1 [======] - 0s 24ms/step



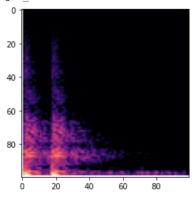
1/1 [======] - 0s 25ms/step children_playing



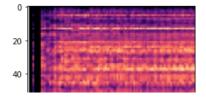
1/1 [======] - 0s 22ms/step dog_bark

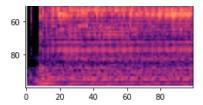


1/1 [======] - 0s 22ms/step gun_shot

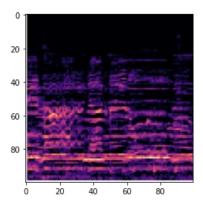


1/1 [======] - 0s 24ms/step jackhammer

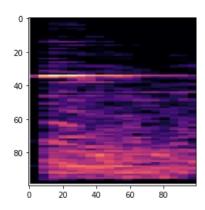




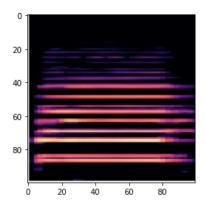
1/1 [======] - 0s 23ms/step street_music



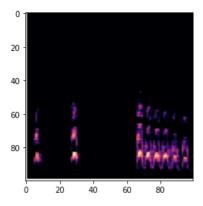
1/1 [======] - 0s 24ms/step car_horn

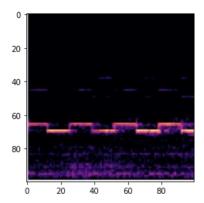


1/1 [======] - 0s 22ms/step car_horn

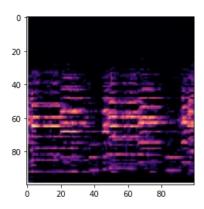


1/1 [======] - 0s 23ms/step dog_bark

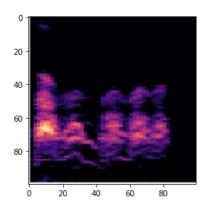




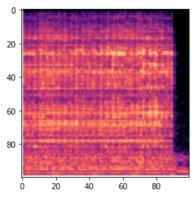
1/1 [======] - 0s 22ms/step siren



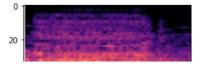
1/1 [======] - 0s 23ms/step dog_bark

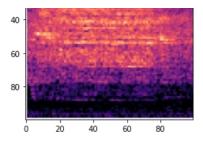


1/1 [======] - 0s 22ms/step jackhammer

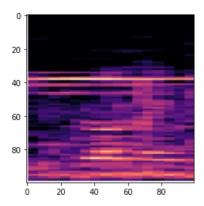


1/1 [======] - 0s 23ms/step drilling

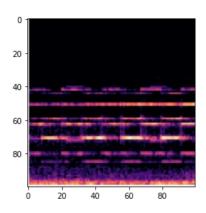




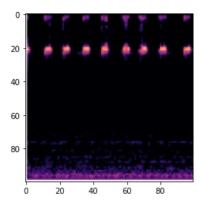
1/1 [======] - 0s 23ms/step car_horn



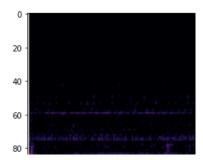
1/1 [======] - 0s 22ms/step siren

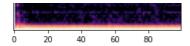


1/1 [======] - 0s 29ms/step siren

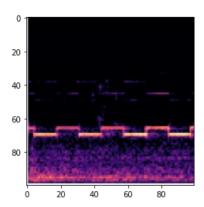


1/1 [======] - 0s 28ms/step air_conditioner

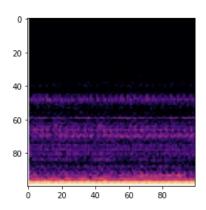




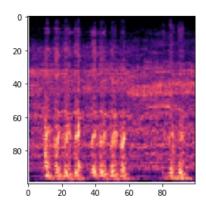
1/1 [======] - 0s 26ms/step siren



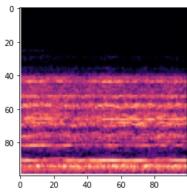
1/1 [======] - 0s 28ms/step children_playing



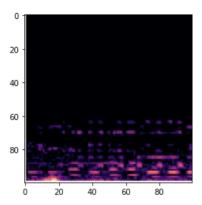
1/1 [======] - 0s 29ms/step drilling



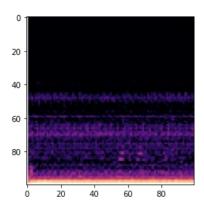
1/1 [======] - 0s 22ms/step siren



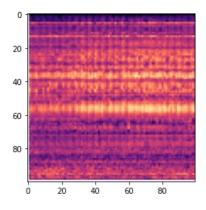
1/1 [======] - 0s 23ms/step street_music



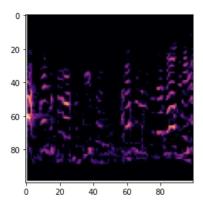
1/1 [======] - 0s 25ms/step engine_idling



1/1 [=====] - 0s 21ms/step jackhammer

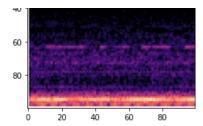


1/1 [======] - 0s 24ms/step children_playing

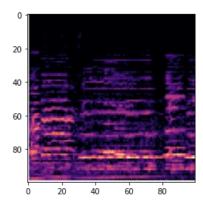


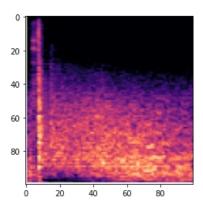
1/1 [======] - 0s 24ms/step siren





 $1/1 \ [======]$ - 0s 22ms/step street_music





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