Homework-0 Musical note classification

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Code cloud drive link:

Github link:

How to run the code

Task 1: Visualize a Mel-Spectrogram

You can used the data.py to plot and save the mel-spectrogram. the arguments 'datafolder' is the folder that include wav file.

I used the nsynth-subtrain's wav file to plot the spectrogram.

```
plot_mel_spec(datafolder='E:/Dataset/nsynth-subtrain/audio/')
```

Task 2: Traditional ML Model

Convert data to npy file.

In data.py, used wav2npy() to read all wav files and convert to npy file. the arguments 'datafolder' is the dataset folder.

'datafolder' recommend used the nsynth-subtrain, nsynth-train and nsynth-test path. If save as npy file, data.npy and label.npy will exist in “datafolder”/npy/

E.g. if run wav2npy() and datafolder=“E:/Dataset/nsynth-subtrain”, data.npy will exist in E:/Dataset/nsynth-subtrain/npy/data.npy

```
wav2npy(datafolder='E:/Dataset/nsynth-subtrain', sr=44100,  n_fft=1024, hop_length=1024)
wav2npy(datafolder='E:/Dataset/nsynth-test', sr=44100,  n_fft=1024, hop_length=1024)
```

Training the ML model

Run ML_train.py will evaluate the random forest classification model. Before training ML_model should convert wav file to npy, run data.py will convert to npy.

ML_train.py is used in training ML model. evaluate_model() can evaluate the model after training. training_ML() and train a RandomForest-Classifier.

The arguments 'model_path' is the after training model path; testing_folder is the path of nsynth-test; training_folder is the path of nsynth-subtrain
(need add the /npy/ in path like 'E:/Dataset/nsynth-subtrain/npy/')
training data's shape is (48037, 128, 173)
testing data's shape is (4096, 128, 173)

```

training_ML(training_folder=training_folder, testing_folder=testing_folder)
evaluate_model(model_path=model_path, testing_folder=testing_folder)
```

Task 3: Deep Learning Model

The main.py can training the DL model and evaluate the model.

Run the main.py will evaluate the model.

train_dataset and test_dataset are the dataset, the arguments "datafolder" is the dataset path, "use_log" let Mel-spectrograms with or without taking the log.

```
train_dataset = NsynthDataset(datafolder='E:/Dataset/nsynth-subtrain', n_fft=1024,
win_length=256, hop_length=1024, use_log=True)
test_dataset = NsynthDataset(datafolder='E:/Dataset/nsynth-test', n_fft=1024,
win_length=256, hop_length=1024, use_log=True)
```

This model is after training, the model without taking the log is in "Transformer without taking the log"

```
model = torch.load('./result/DL/Transformer with taking the log/model.pth')
```

Used this code can evaluate the model.

```
trainer = DLModelTraining(model=model, train_dataset=train_dataset,
test_dataset=test_dataset)
trainer.evaluate(save=False)
```