Instrument Classification

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Overview

- The Global Smart Home market is growing at a compound annual rate of 25%
- Rise of Smart Musical Assistance: AIVA, Google’s AI Duet, Amper Music…
- Real Time Music Recognition is already here.
- AI is growing as an interactive learning tool

Business Problem

- High Cost of Professional Music Production
- Limited Accessibility to Live Music Collaboration
- Challenge in Musical Practice & Learning

The Solution

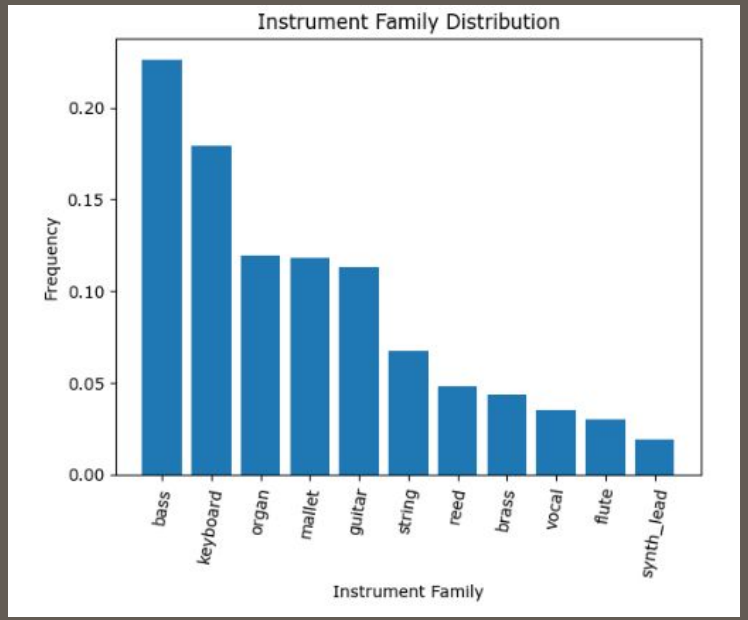
AI powered harmonizer for your Smart Home Devices.

First Step: Instrument Classification Model

The Dataset

- Magenta Project Nsynth Dataset
- 300k+ audio files
- Isolated Instrument recordings

EDA

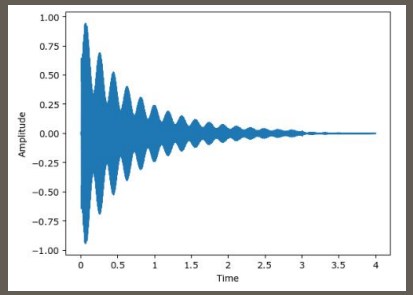


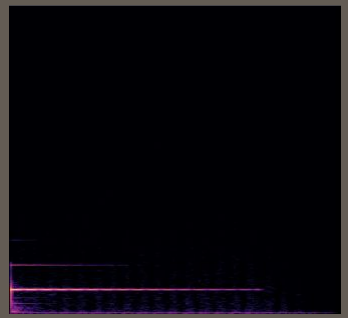

```
[3]: train_df.info()

<class 'pandas.core.frame.DataFrame'>
Index: 289205 entries, guitar_acoustic_001-082-050 to mallet_acoustic_013-058-050
Data columns (total 13 columns):
 #   Column                 Non-Null Count   Dtype
---  ------                 --------------   -----
 0   note                   289205 non-null  object
 1   sample_rate            289205 non-null  object
 2   pitch                  289205 non-null  object
 3   instrument_source      289205 non-null  object
 4   instrument_family_str  289205 non-null  object
 5   instrument_str         289205 non-null  object
 6   note_str               289205 non-null  object
 7   qualities_str          289205 non-null  object
 8   instrument_source_str  289205 non-null  object
 9   velocity               289205 non-null  object
 10  instrument_family      289205 non-null  object
 11  instrument             289205 non-null  object
 12  qualities              289205 non-null  object
dtypes: object(13)
memory usage: 39.0+ MB
```

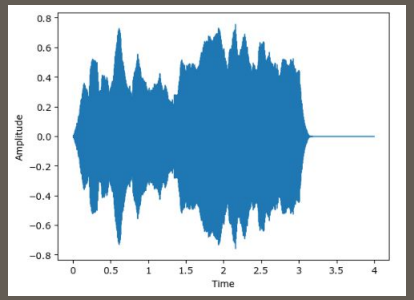
Audio Data

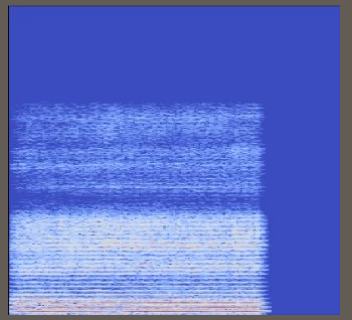
Electronic Keyboard





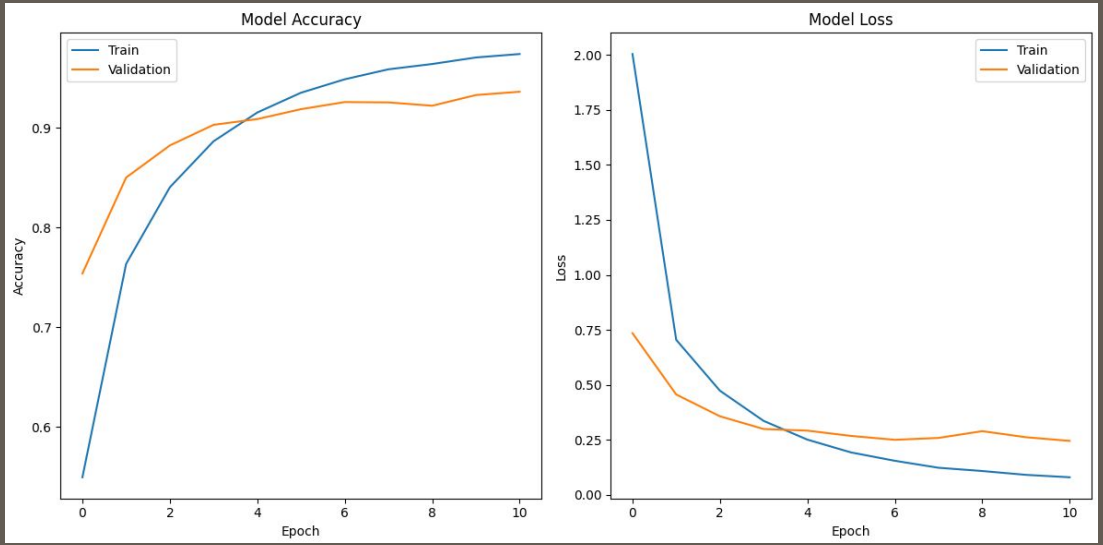
Acoustic Voice





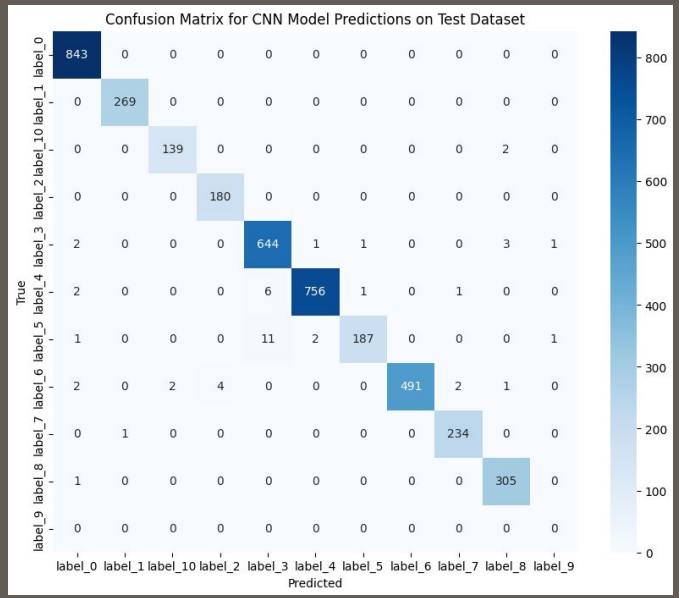
The Model

```
model = Sequential([
    Conv2D(32, (3, 3), activation='relu', input_shape=(image_size[0], image_size[1], 3)),
    MaxPooling2D(2, 2),
    Conv2D(64, (3, 3), activation='relu'),
    MaxPooling2D(2, 2),
    Conv2D(128, (3, 3), activation='relu'),
    MaxPooling2D(2, 2),
    Flatten(),
    Dense(512, activation='relu'),
    Dropout(0.5),
    Dense(num_classes, activation='softmax')
])
```



Results

0.99 Test Accuracy



Next Steps

- Create a Genre Classification Model
- Create a Notes classifier model
- Create Real-Time generative Music to harmonize with the instruments played


Questions?