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Instrument classifier

Models

An analysis on audio, neural networks and multiclass classification.

Background



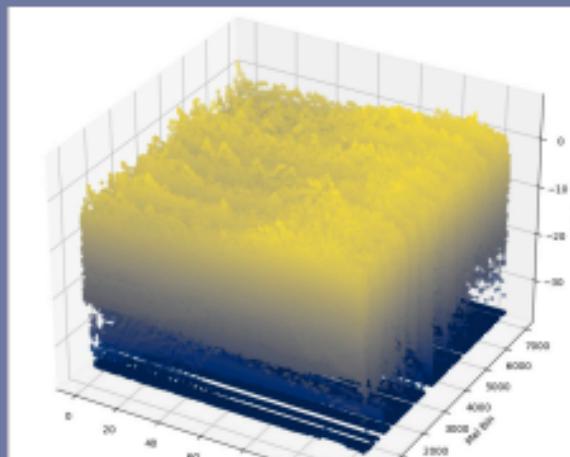
* *Music that is made by producers, musicians and everything in between requires sounds!*

* *Technical terms Review*

* *Goal: create an instrument classifier model that can accurately predict any given audio file and return the correct instrument!*

Goals & Success Criteria / Metrics

*The purpose of this project was to
create an instrument classifier
model that can accurately predict
any given audio file and return the
correct instrument.*



How did you choose?

*Metrics : Accuracy score of
model*

*Contenders: Convolutional
Neural Network, MLP, and
Random forest.*

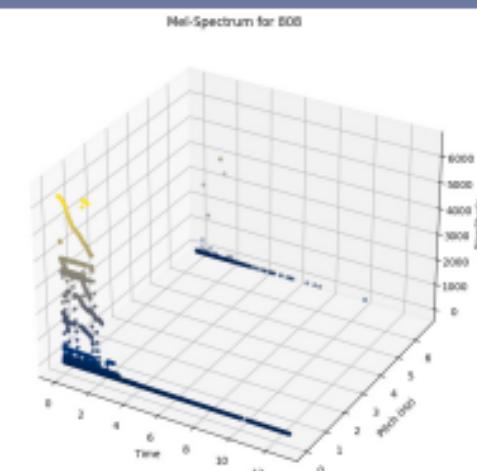
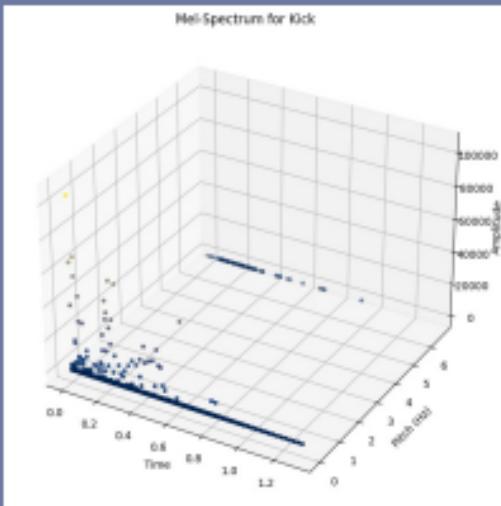
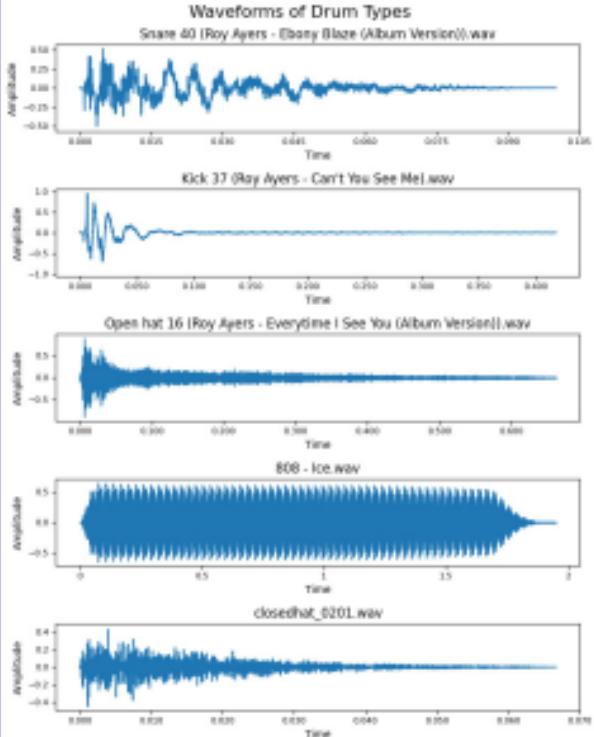
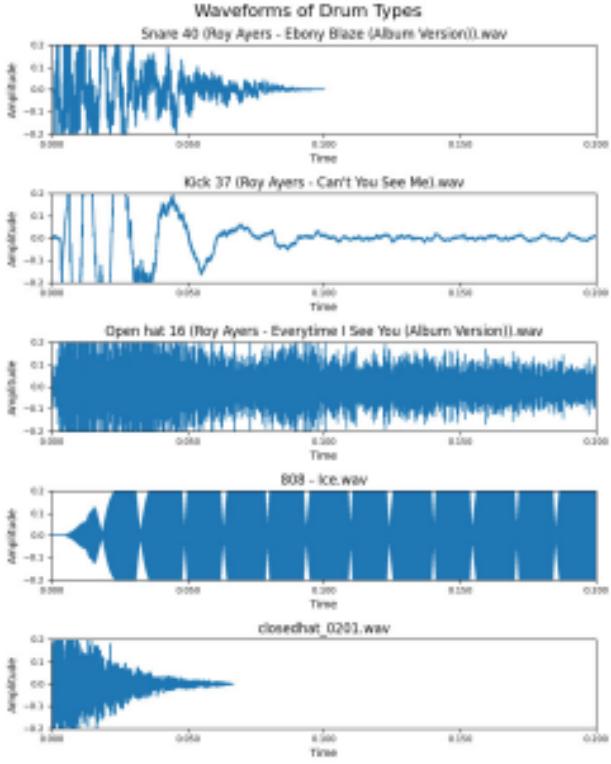
Data and Overall Approach

File_path	File_name	Instrument	Start_time	End_time	Index	Instrument_encoded	Instrument_0	Instrument_1	Instrument_2	Instrument_3	Instrument_4
/content/drive/MyDrive/Drums/Snare 40 (Roy Ayers - Ebony Blaze (Album Version).mp3	Snare 40 (Roy Ayers - Ebony Blaze (Album Version).mp3	Snare	0	0.100196	2	0	1.0	0.0	0.0	0.0	0.0
/content/drive/MyDrive/Drums/Snare 41 (Roy Ayers - The Old One Two (Move To Love).mp3	Snare 41 (Roy Ayers - The Old One Two (Move To Love).mp3	Snare	0	0.154684	2	0	1.0	0.0	0.0	0.0	0.0
/content/drive/MyDrive/Drums/Snare 42 (Roy Ayers - No Question (Album Version).mp3	Snare 42 (Roy Ayers - No Question (Album Version).mp3	Snare	0	0.189342	2	0	1.0	0.0	0.0	0.0	0.0
/content/drive/MyDrive/Drums/Kick 37 (Roy Ayers - Can't You See Me).mp3	Kick 37 (Roy Ayers - Can't You See Me)	Kick	0	0.417595	0	1	0.0	1.0	0.0	0.0	0.0
/content/drive/MyDrive/Drums/Kick 38 (Roy Ayers - Can't You See Me).mp3	Kick 38 (Roy Ayers - Can't You See Me)	Kick	0	0.258730	0	1	0.0	1.0	0.0	0.0	0.0

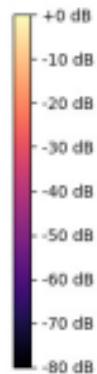
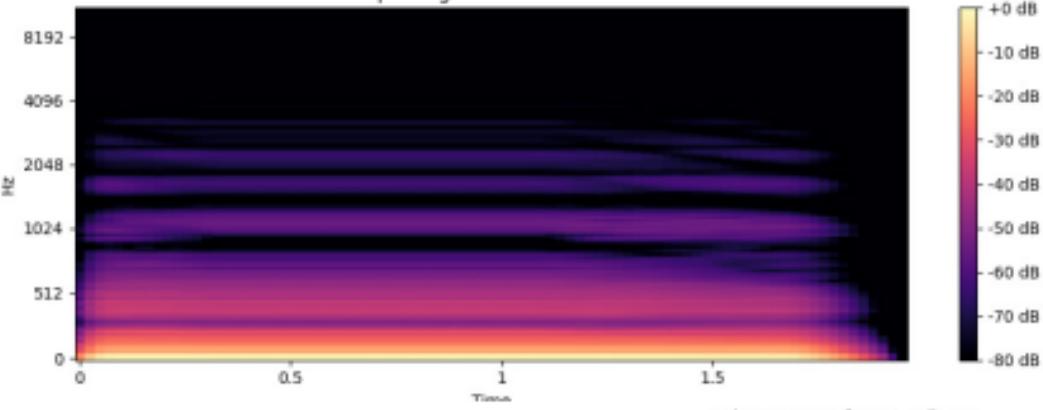
- From own music production library(Reddit, Github, Landr, Splice etc) - 2065.
- Approach: Data science methodology + research

Instruments:
Kick, Snare,
Closed hat,
Open hat, 808

EDA

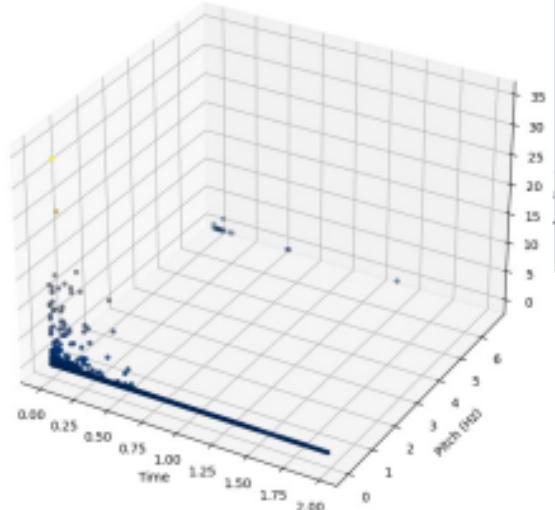


Mel-spectrogram for B08 - Ice.wav

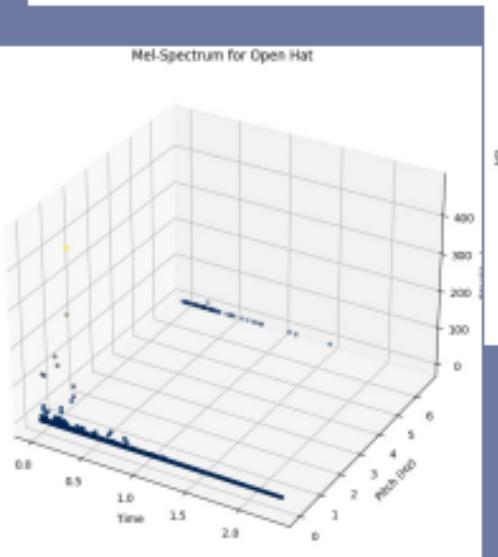


EDA

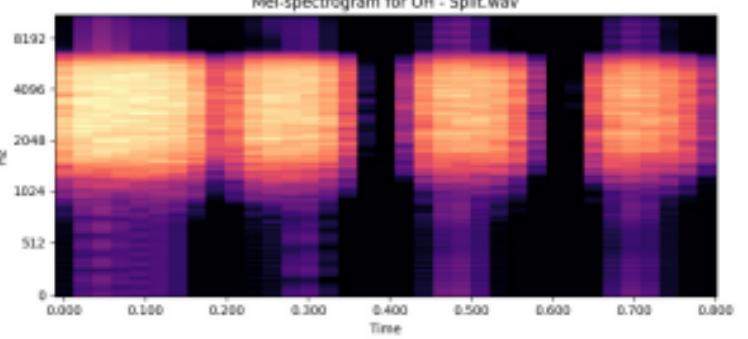
Mel-Spectrum for Closed Hat



Mel-Spectrum for Open Hat



Mel-spectrogram for OH - Split.wav



Model & Findings & Risks/Limitations

Basic description of model:

MLP (Multilayer Perceptron) is a artificial neural network that has foundational architecture in deep learning and is used for various machine learning tasks, including classification(Perplexity AI, 2024).

CNN (Convolutional Neural Network) is a deep learning model designed for processing data with a grid-like structure, such as images.

CNN:

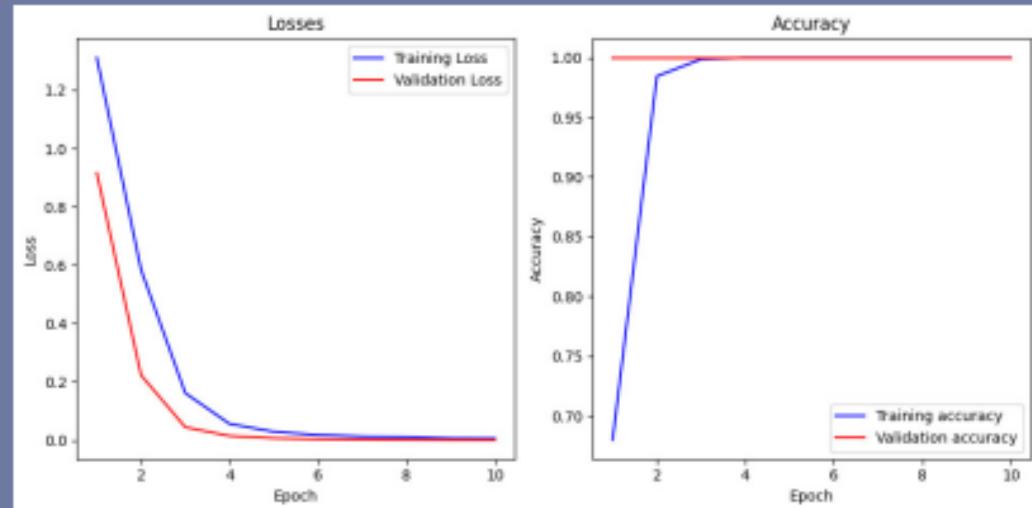
Loss: 0.006

MLP:

Loss: 5.5457e-04

Random forest:

accuracy score: 1.0

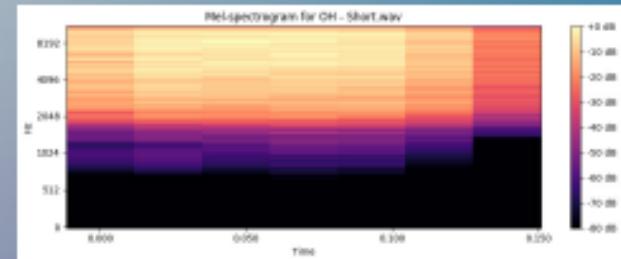
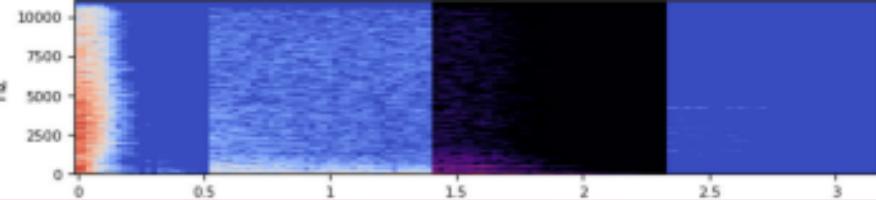


Conclusions

IMPACT + NEXT STEPS

- *The best model is MLP (technically) but based on EDA, CNN would be best for application use.*
- *Impact: Organization and time efficiency.*
- *Next steps: Use CNN with EDA imaging and get the app ! (IN PROGRESS)*

<https://instrumentclassifier.streamlit.app/>



Thank you! Questions?

