

Musical Chord Classification

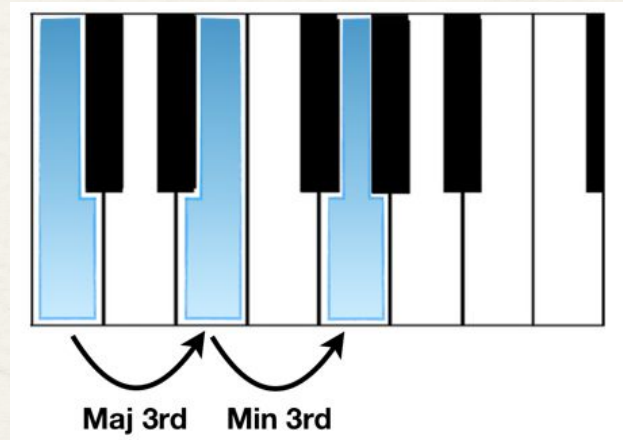
Nikki Wood | Flatiron School



The Problem: Classifying Major and Minor Chords

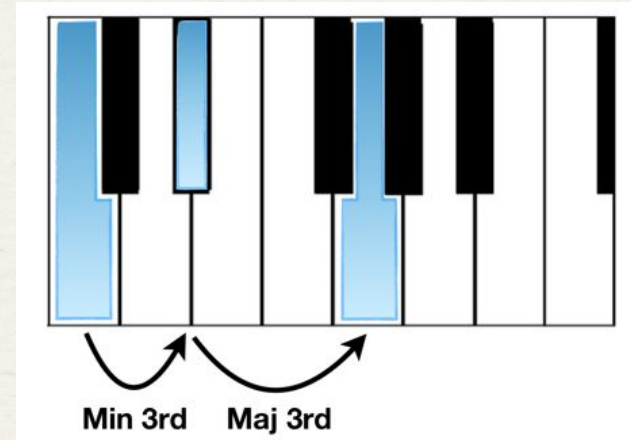
Major

- Happy, bright sound
- Uplifting emotions



Minor

- Sad, darker sound
- Melancholic tone



Dataset: Guitar and Piano Audio Clips

“Musical Instrument Chord Classification”
dataset on kaggle.

- 859 samples
- 502 major
- 357 minor
 - Augmentation: 143 minor samples



Guitar



Piano

Features Extracted from Audio Signals

01

MFCCs

(and other audio features)

02

Harmonics & Intervals

Measure frequency peaks

03

Harmonic Ratios

Used in the final model!

04

Mel-spectrograms

Model learns *visually*

What are Harmonics

In Music

Overtones:

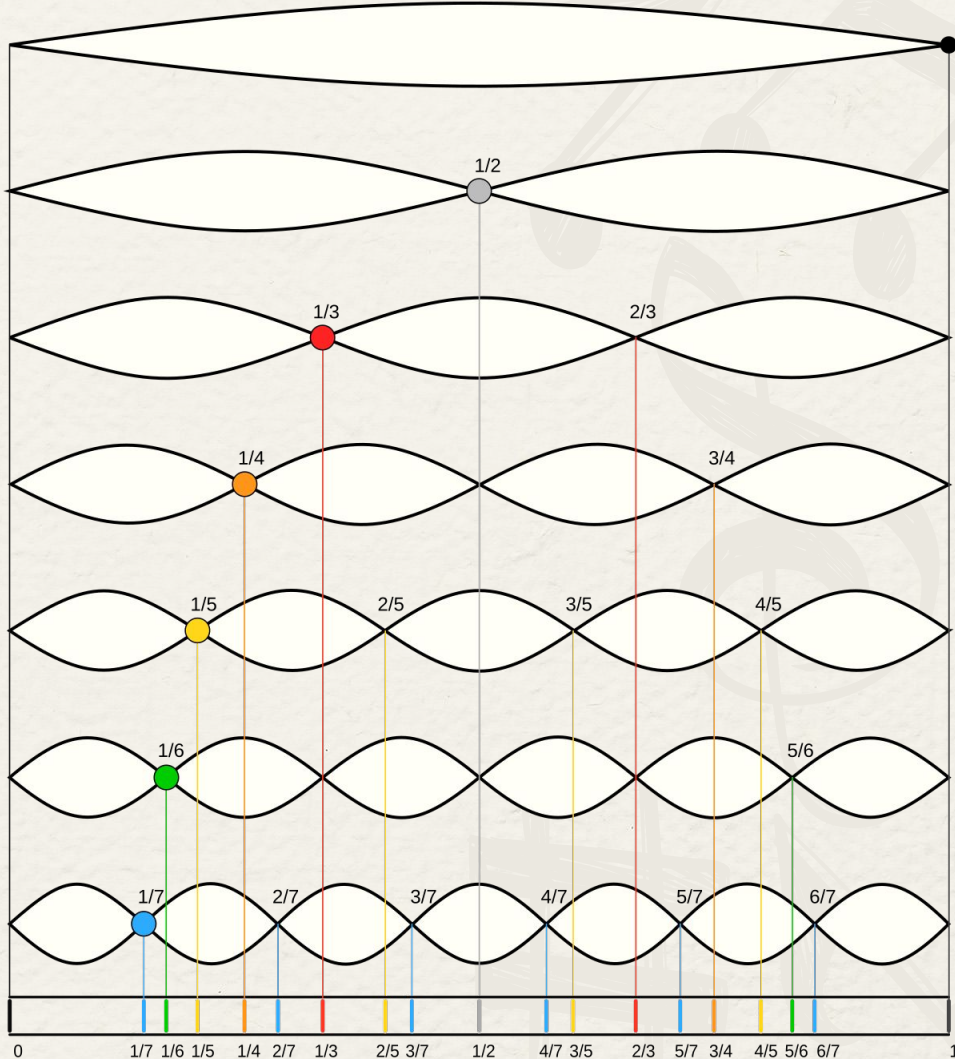
- 440 hz (base note - A4)
- 660 hz (perfect 5th - E5)
- 880 hz (A5)
- 1100 hz (minor 3rd - C6)

These resonating overtones can trick our ears.

Chords:

- Relationships of harmonics (1/3 , 1/5) create a unique sound

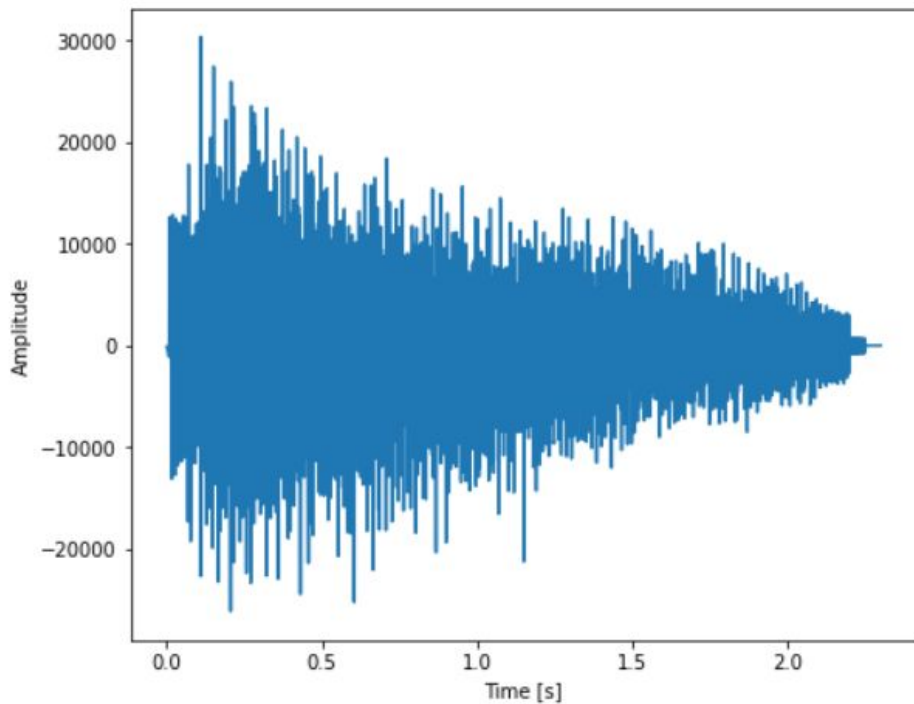
Source: [wikipedia/Harmonic](https://en.wikipedia.org/wiki/Harmonic)



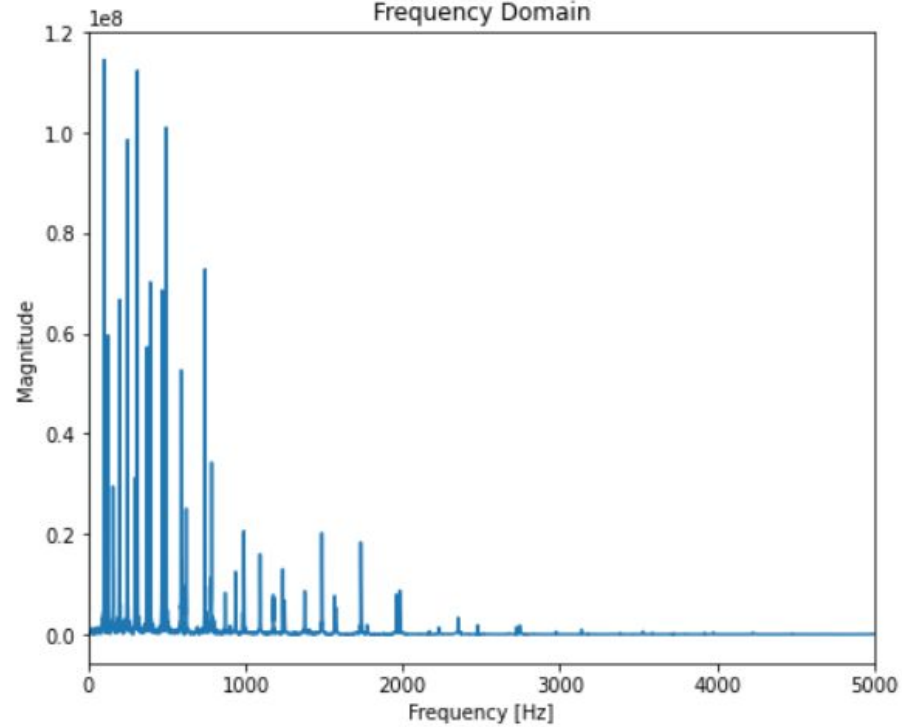
What are Harmonics?

In Audio Signal Processing

Time Domain



Frequency Domain



The background of the slide features a light beige, textured surface with faint, stylized musical notes and a treble clef in a light gray color, scattered across the frame.

20

Ratios identified visually

188

Statistically significant ratios

18

Common ratios

Random Forest Model Performance

Overall

Precision, Recall, F1-score, and Accuracy

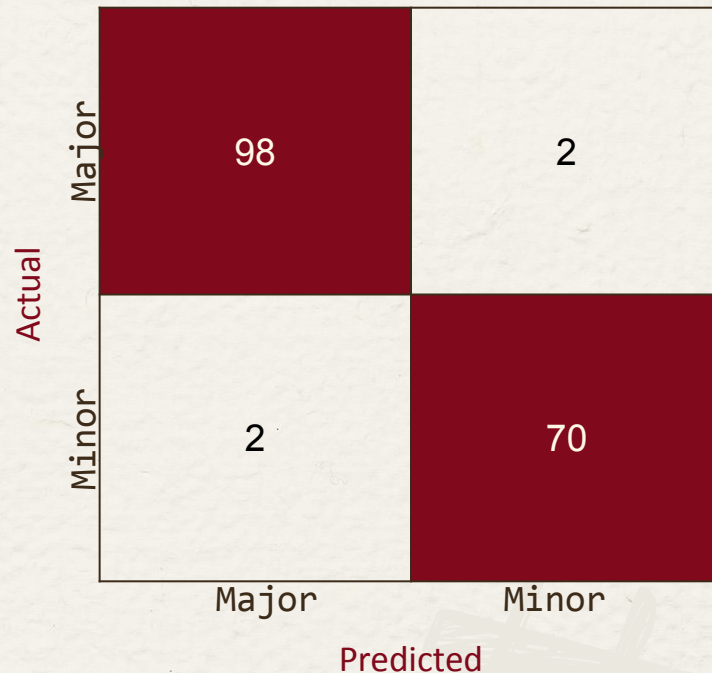
98%

Major chords

98%

Minor Chords

97%



Error Analysis

"Major"	"Major"	"Minor"	"Minor"
			
Minor_355	Minor_249	Major_83	Major_477
(Gm7/D#) tricky overtones	Same tricky overtones!	(D dim7)	(Gm11) Mislabeled data

Thanks

Do you have any questions?
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Shoot me an email!



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