Song genre classification via waveform analysis

Presented by Dr. Carl Joseph Siemon

Zipfian Data Science Academy: Team Jancsy

Goal

Given just the waveform data of a song, classify what musical genre the song falls into

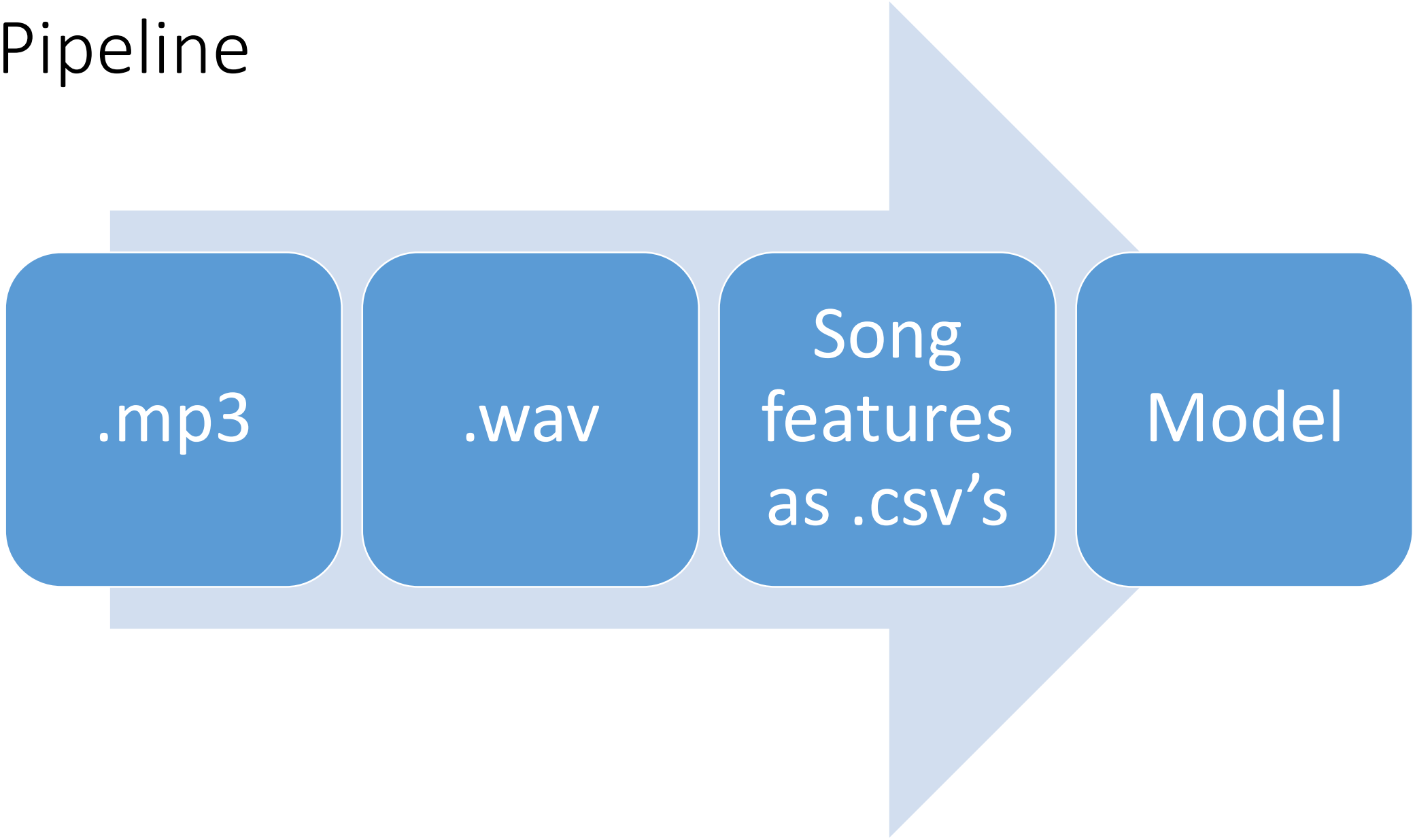
Why?

- Can use this technology to recommend music to listeners based on what they are listening to
- Record labels can choose what songs to release next based on their similarity to what is ‘hot’

Data Source

- 1000 songs total from personal music library
- 200 songs per genre for each of 5 genres: hip-hop (rap), classical, techno, rock, and pop.

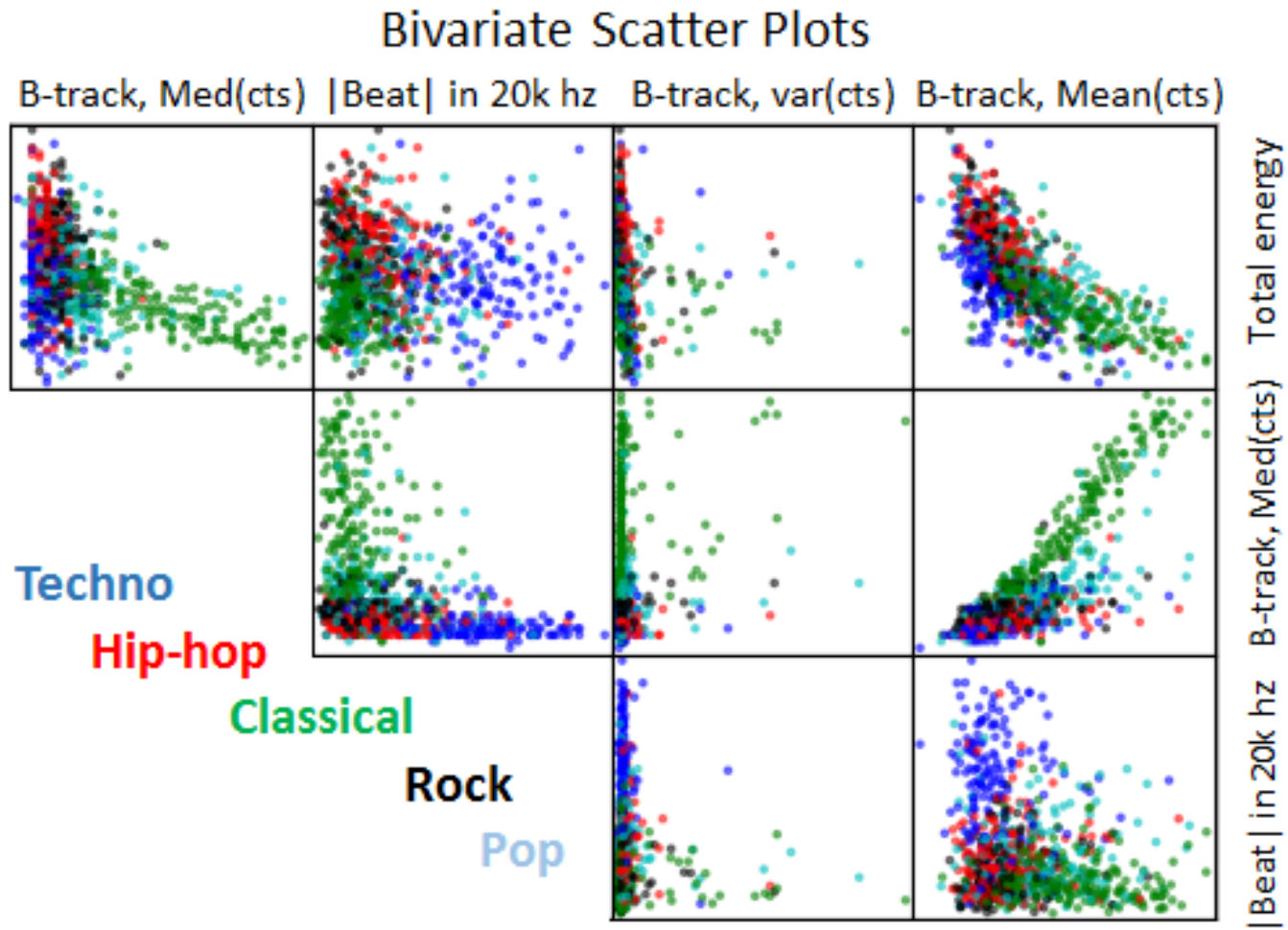
Pipeline

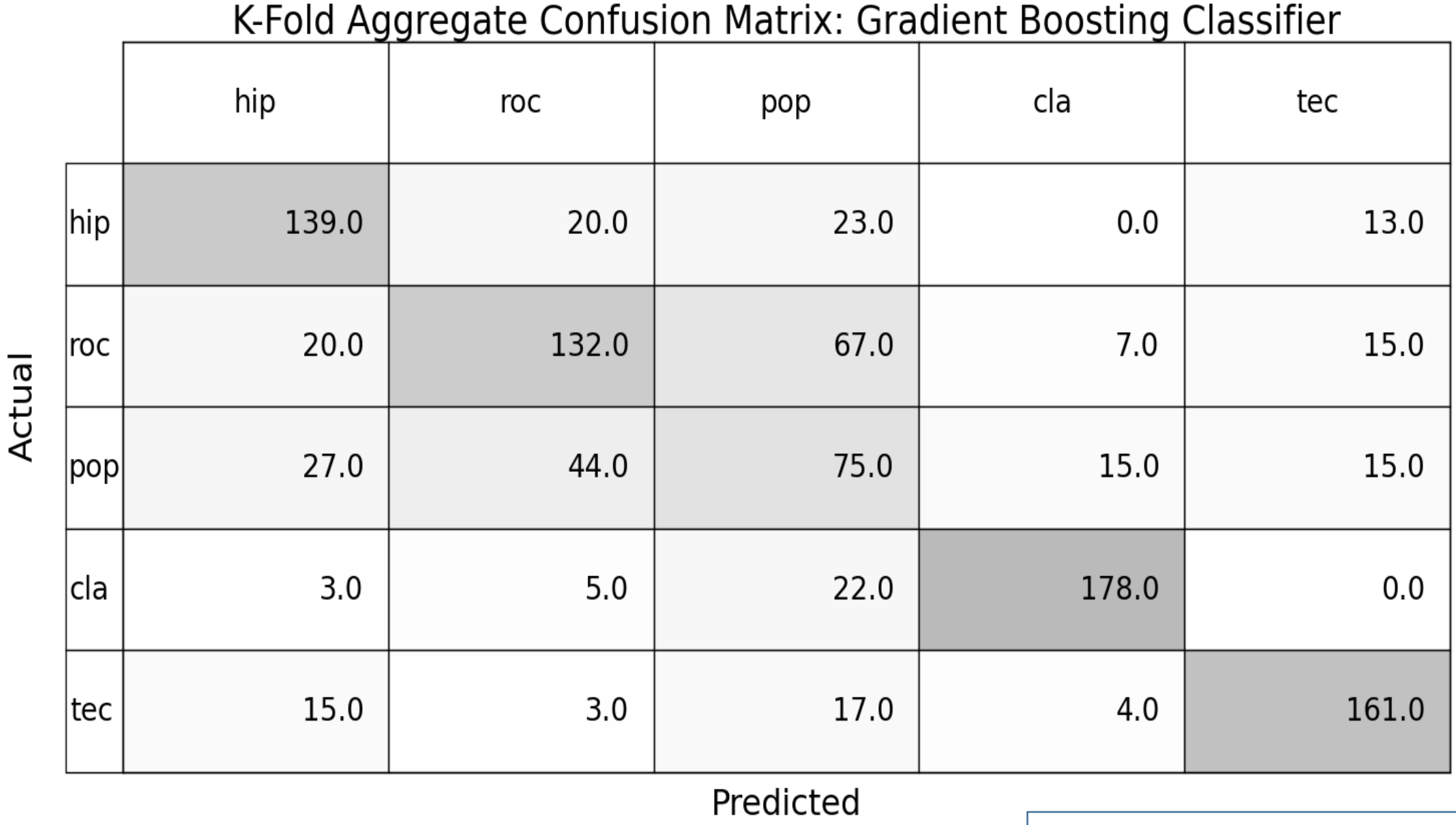


Summary of features

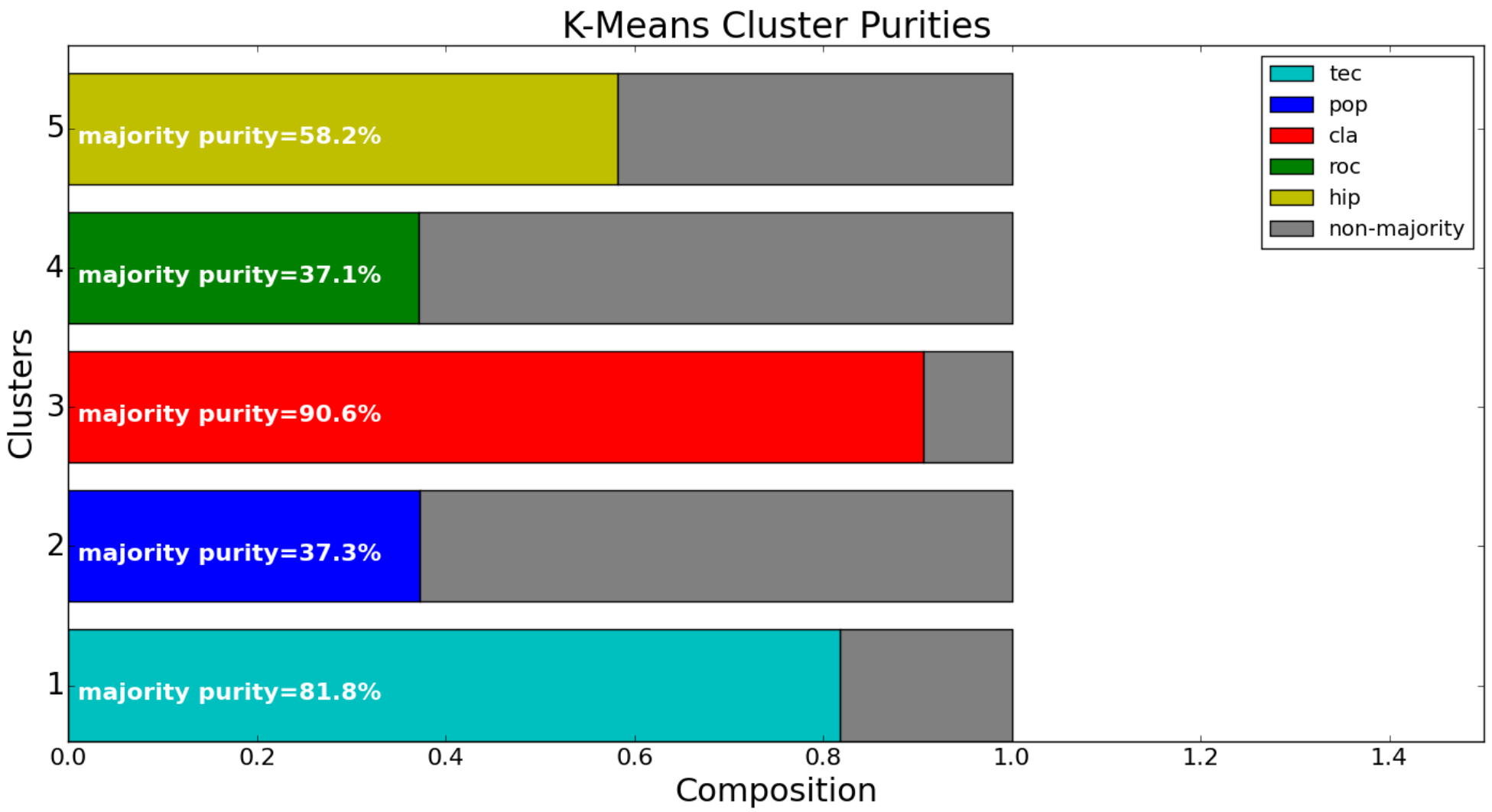
- Engineered nine features from FFT and time domain analysis
  -For example: power, beat, crossing rate

Before modeling, let’s look at a few scatter plots to look for ‘signal’


Bivariate Scatter Plots
B-track, Med(cts)
|Beat| in 20k hz
B-track, var(cts)
B-track, Mean(cts)
Total energy
B-track, Med(cts)
|Beat| in 20k hz
Techno
Hip-hop
Classical
Rock
Pop


K-Fold Aggregate Confusion Matrix: Gradient Boosting Classifier
hip
roc
pop
cla
tec
Actual
Predicted
139.0 20.0 23.0 0.0 13.0
20.0 132.0 67.0 7.0 15.0
27.0 44.0 75.0 15.0 15.0
3.0 5.0 22.0 178.0 0.0
15.0 3.0 17.0 4.0 161.0
Recall=67.2, Precision=67.9
F1=67.4, Accuracy=67.2

Unsupervised Learning: K-Means Clustering



Future work

- Get more songs to build better model!

Thank You!

carljsiemon@gmail.com, 203-819-0579