Song genre classification via waveform analysis

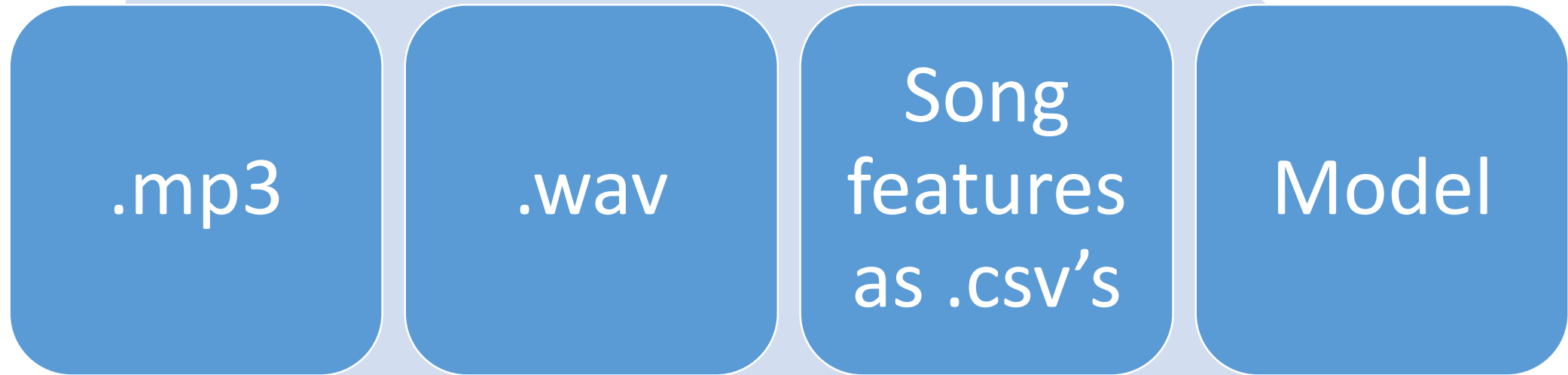Presented by Dr. Carl Joseph Siemon

Goal

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

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.
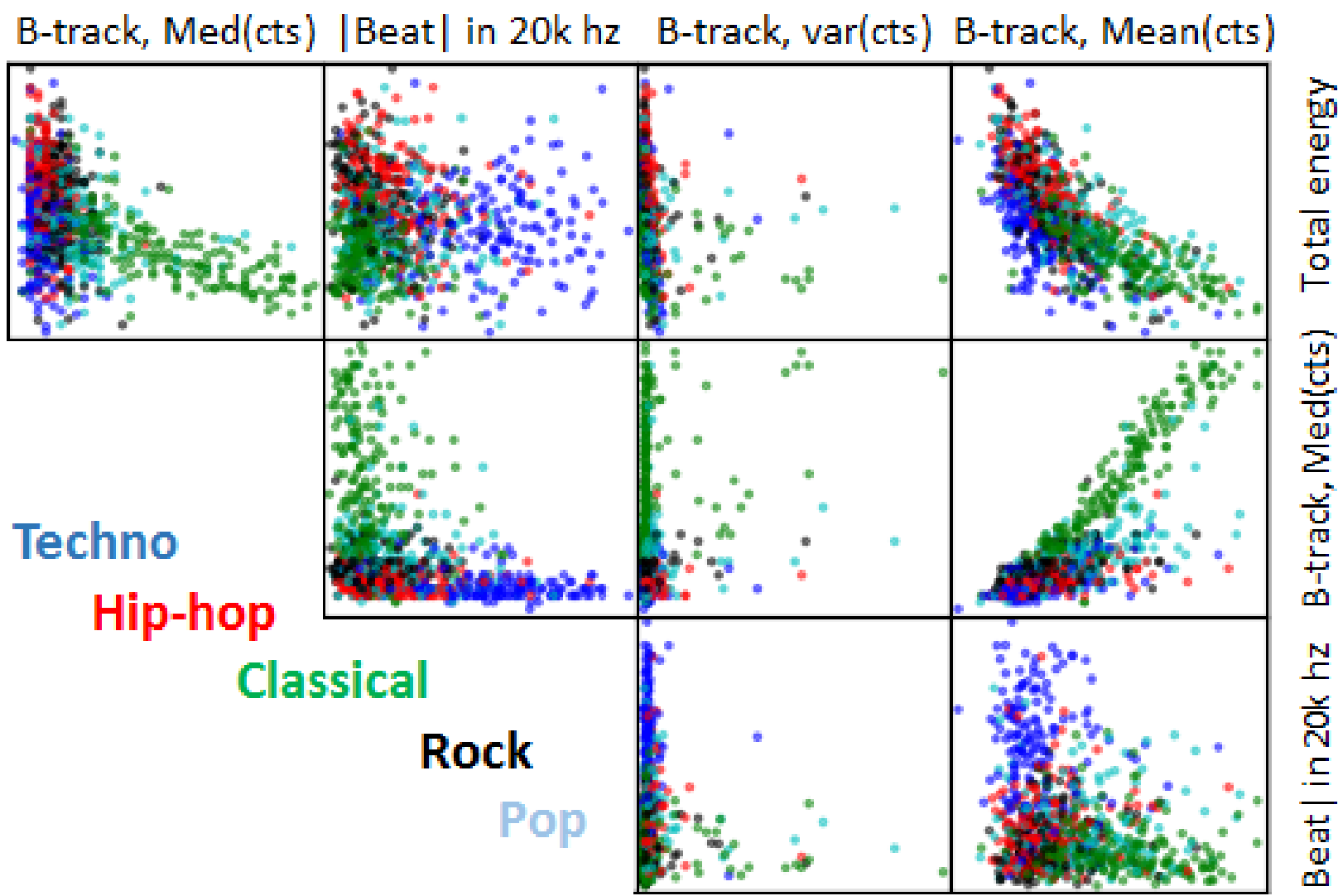
Pipeline

Summary of features

- Used Fast Fourier Transform and autocorrelation function to extract power/beat information vs. sound frequency

- Also computed zero crossing rate statistics

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
hip	139.0	20.0	23.0	0.0	13.0
roc	20.0	132.0	67.0	7.0	15.0
pop	27.0	44.0	75.0	15.0	15.0
cla	3.0	5.0	22.0	178.0	0.0
tec	15.0	3.0	17.0	4.0	161.0

Actual / Predicted

Recall=67.2, Precision=67.9
F1=67.4, Accuracy=67.2

Unsupervised Learning: K-Means Clustering

K-Means Cluster Purities
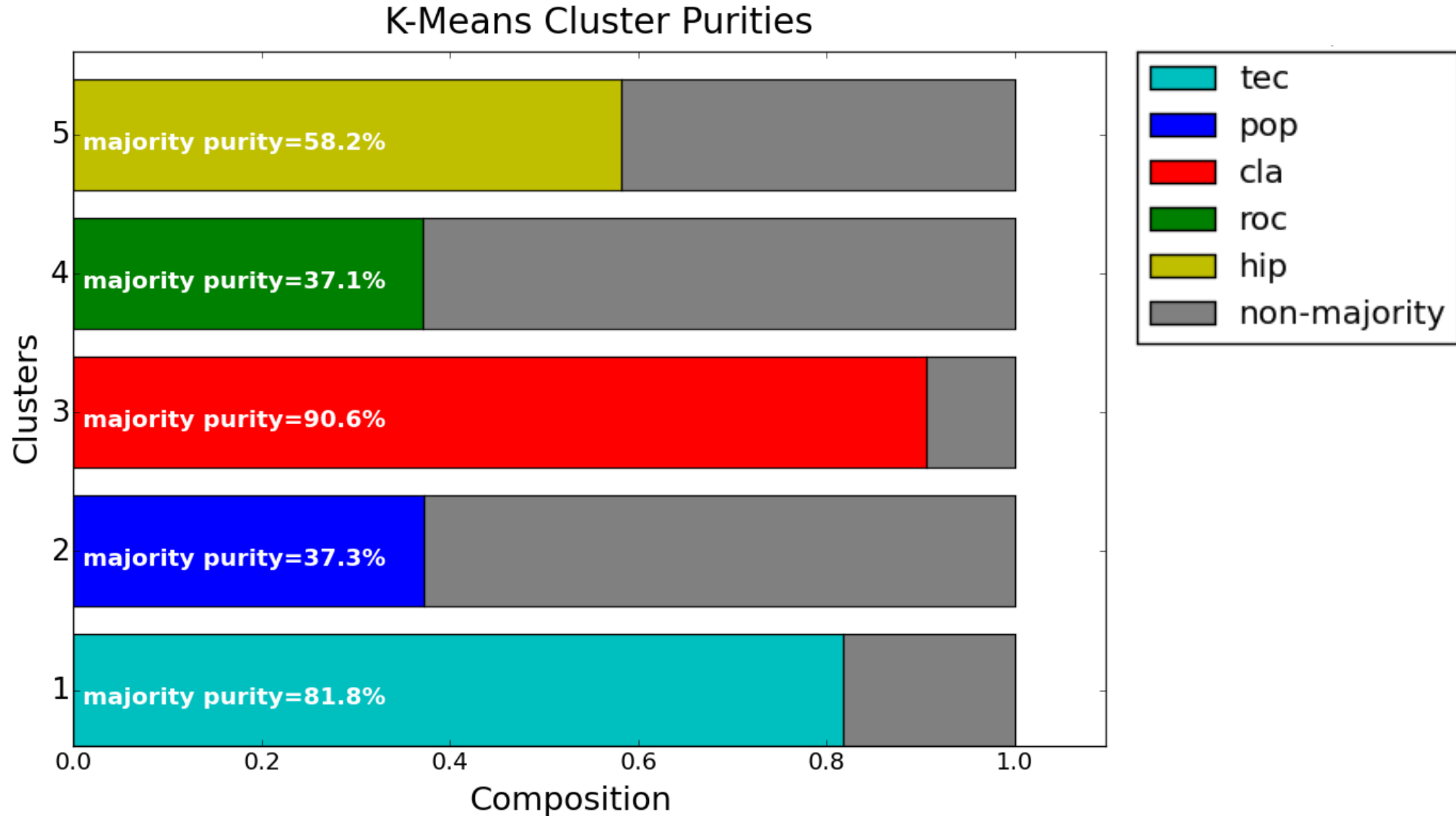
Thank You!

carljsiemon@gmail.com, 203-819-0579