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
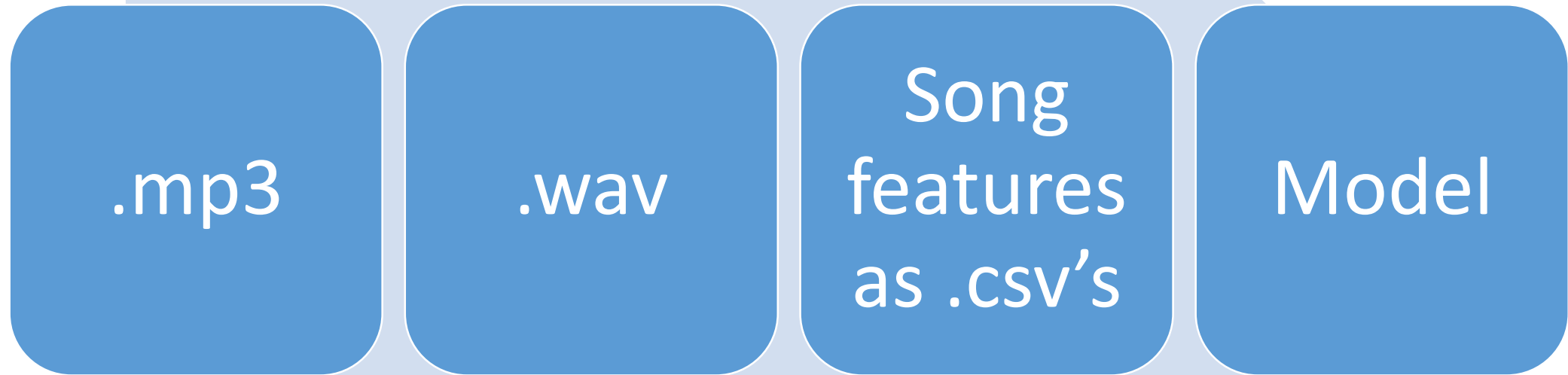
Why?

- Can use this technology to recommend music to listeners based on what they are listening to

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.
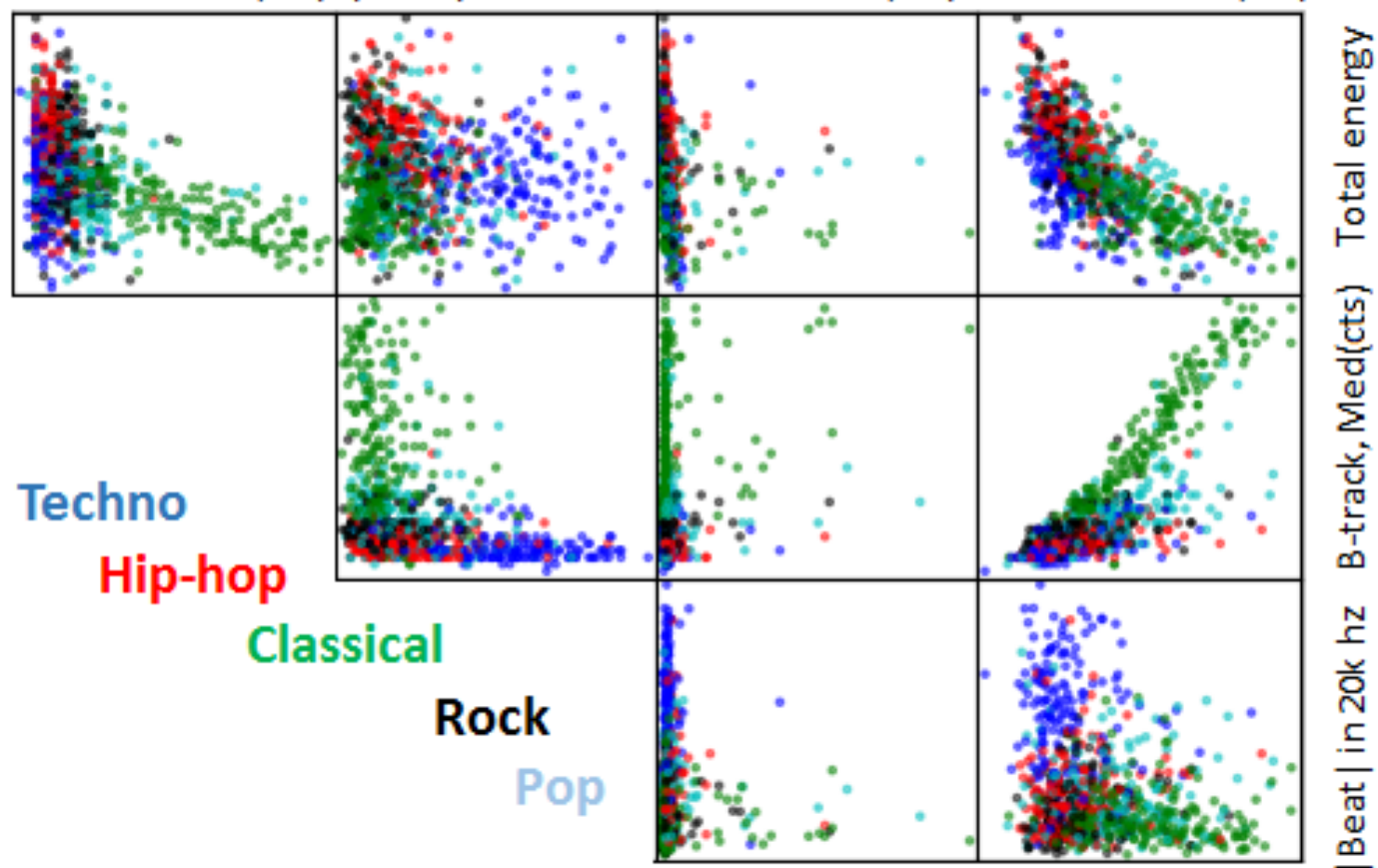
Pipeline

Summary of features

- Engineered nine types of features

- Used Fast Fourier Transform and autocorrelation function to extract power and beat information as a function of sound frequency

- Also computed zero crossing rate statistics

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

Bivariate Scatter Plots

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

We can also use unsupervised learning to see how songs are grouped 'naturally' by the machine

Unsupervised Learning: K-Means Clustering

K-Means Cluster Purities
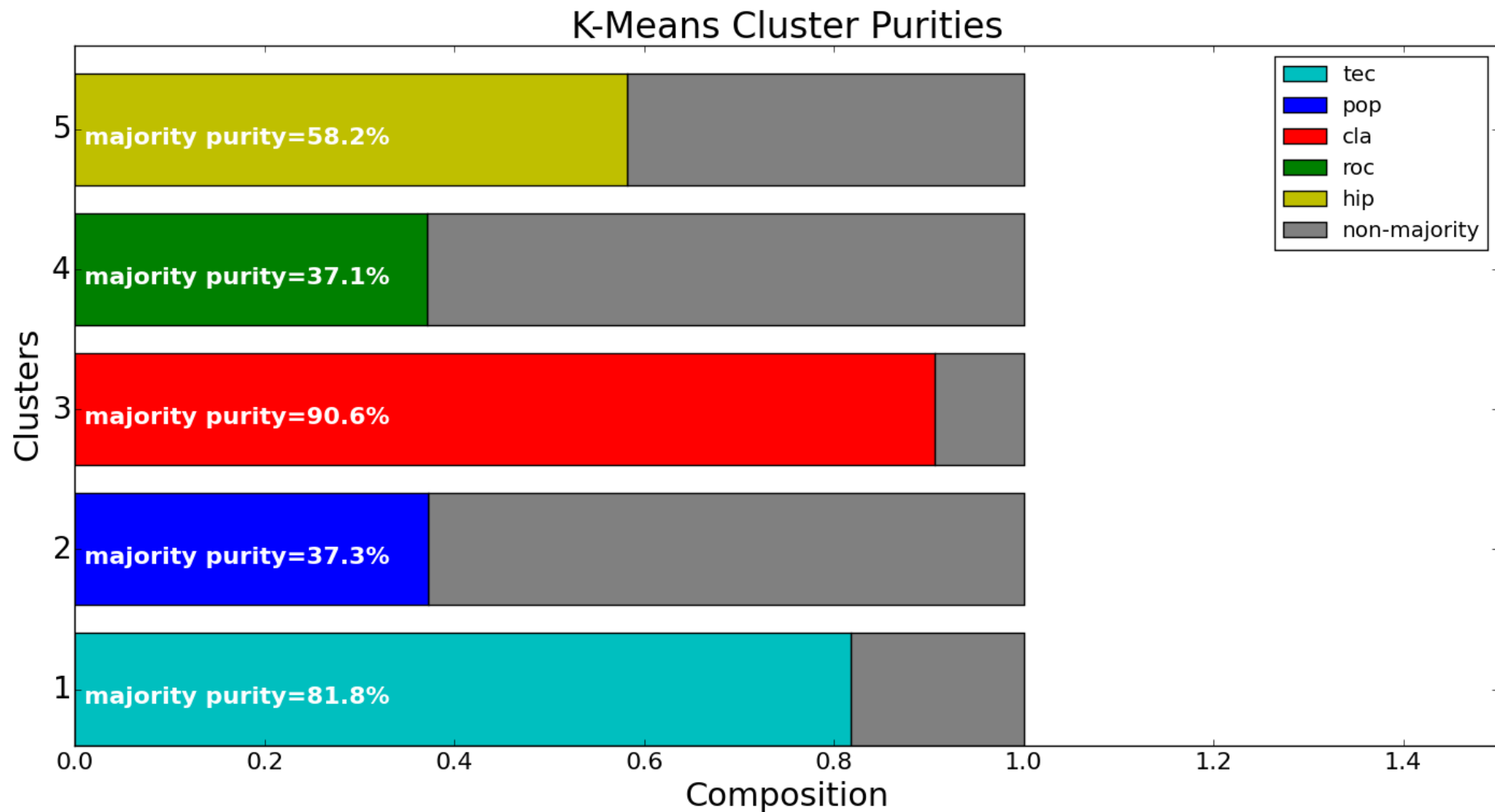
Future work

- Get more songs to build better model!

Thank You!

carljsiemon@gmail.com, 203-819-0579