Below, I have listed every feature combination that I tried in my experiments for phase one. First, I tried the original combination that was included in the sample code. Just for fun, I then proceeded to add every single feature possible, and I found that this was the worst strategy I tried. After this, I tried every combination involving just removing one feature from the original combination, and I also tried only including one feature from the original combination. I realized that MFCC had the most impact on accuracy (which probably at least partly has to do with the number of dimensions it has). After this, I slowly tried to add additional features on top of MFCC to see which ones helped increase accuracy the most. After some more playing around, it seemed like the optimal combination that I was able to find was using every feature except for ZeroX and Chroma. I also found that lowering the numCoeff for MFCC to 10 seemed to improve the accuracy a little as well.

**Original**

<table>
<thead>
<tr>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centroid</td>
</tr>
<tr>
<td>Flux</td>
</tr>
<tr>
<td>RMS</td>
</tr>
<tr>
<td>MFCC</td>
</tr>
</tbody>
</table>

# of data points: 1000 dimensions: 23
fold 0 accuracy: 0.3652
fold 1 accuracy: 0.3804
fold 2 accuracy: 0.3956
fold 3 accuracy: 0.3701
fold 4 accuracy: 0.3618

**Added every feature**

<table>
<thead>
<tr>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centroid</td>
</tr>
<tr>
<td>Flux</td>
</tr>
<tr>
<td>RMS</td>
</tr>
<tr>
<td>MFCC</td>
</tr>
<tr>
<td>RollOff</td>
</tr>
<tr>
<td>ZeroX</td>
</tr>
<tr>
<td>Chroma</td>
</tr>
<tr>
<td>Kurtosis</td>
</tr>
</tbody>
</table>

# of data points: 1000 dimensions: 38
fold 0 accuracy: 0.1078
fold 1 accuracy: 0.0882
fold 2 accuracy: 0.0931
fold 3 accuracy: 0.0784
fold 4 accuracy: 0.1044

**Tried adding just RollOff**

<table>
<thead>
<tr>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centroid</td>
</tr>
</tbody>
</table>


Flux
RMS
MFCC
RollOff

# of data points: 1000 dimensions: 24
fold 0 accuracy: 0.3755
fold 1 accuracy: 0.3559
fold 2 accuracy: 0.3745
fold 3 accuracy: 0.3804
fold 4 accuracy: 0.3985

Removed centroid
Flux
RMS
MFCC

# of data points: 1000 dimensions: 22
fold 0 accuracy: 0.3642
fold 1 accuracy: 0.3814
fold 2 accuracy: 0.3740
fold 3 accuracy: 0.3760
fold 4 accuracy: 0.3554

Removed Flux
Centroid
RMS
MFCC

# of data points: 1000 dimensions: 22
fold 0 accuracy: 0.3515
fold 1 accuracy: 0.3603
fold 2 accuracy: 0.3456
fold 3 accuracy: 0.3426
fold 4 accuracy: 0.3603

Removed RMS
Centroid
Flux
MFCC

# of data points: 1000 dimensions: 22
fold 0 accuracy: 0.3578
fold 1 accuracy: 0.3672
fold 2 accuracy: 0.3598
fold 3 accuracy: 0.3564
fold 4 accuracy: 0.3672

**Removed MFCC**
Centroid
Flux
RMS

# of data points: 1000 dimensions: 3
fold 0 accuracy: 0.2515
fold 1 accuracy: 0.2559
fold 2 accuracy: 0.2456
fold 3 accuracy: 0.2250
fold 4 accuracy: 0.2578

**Just MFCC**
MFCC

# of data points: 1000 dimensions: 20
fold 0 accuracy: 0.3539
fold 1 accuracy: 0.3284
fold 2 accuracy: 0.3309
fold 3 accuracy: 0.3260
fold 4 accuracy: 0.3569

**MFCC + Rolloff**
MFCC
Rolloff

# of data points: 1000 dimensions: 21
fold 0 accuracy: 0.3520
fold 1 accuracy: 0.3279
fold 2 accuracy: 0.3554
fold 3 accuracy: 0.3348
fold 4 accuracy: 0.3574

**MFCC + ZeroX**
MFCC
ZeroX

# of data points: 1000 dimensions: 21
fold 0 accuracy: 0.0980
fold 1 accuracy: 0.1324
fold 2 accuracy: 0.0882
fold 3 accuracy: 0.1029
fold 4 accuracy: 0.0922

**MFCC + Chroma**
MFCC
Chroma

# of data points: 1000 dimensions: 32
fold 0 accuracy: 0.3358
fold 1 accuracy: 0.3368
fold 2 accuracy: 0.3446
fold 3 accuracy: 0.3623
fold 4 accuracy: 0.3525

**MFCC + Kurtosis**
MFCC
Kurtosis

# of data points: 1000 dimensions: 21
fold 0 accuracy: 0.3598
fold 1 accuracy: 0.3819
fold 2 accuracy: 0.3569
fold 3 accuracy: 0.3564
fold 4 accuracy: 0.3387

**MFCC + Centroid**
MFCC
Centroid

# of data points: 1000 dimensions: 21
fold 0 accuracy: 0.3539
fold 1 accuracy: 0.3696
fold 2 accuracy: 0.3402
fold 3 accuracy: 0.3088
fold 4 accuracy: 0.3574

**MFCC + Flux**
MFCC
Flux
# of data points: 1000 dimensions: 21
fold 0 accuracy: 0.3294
fold 1 accuracy: 0.3441
fold 2 accuracy: 0.3838
fold 3 accuracy: 0.3647
fold 4 accuracy: 0.3431

**MFCC + RMS**

MFCC
RMS

# of data points: 1000 dimensions: 21
fold 0 accuracy: 0.3554
fold 1 accuracy: 0.3716
fold 2 accuracy: 0.3363
fold 3 accuracy: 0.3569
fold 4 accuracy: 0.3417

**Just Chroma**

Chroma

# of data points: 1000 dimensions: 12
fold 0 accuracy: 0.2471
fold 1 accuracy: 0.2142
fold 2 accuracy: 0.2015
fold 3 accuracy: 0.1897
fold 4 accuracy: 0.2260

**MFCC plus good stuff**

MFCC
Flux
RMS
Chroma
Kurtosis

# of data points: 1000 dimensions: 35
fold 0 accuracy: 0.3598
fold 1 accuracy: 0.3667
fold 2 accuracy: 0.3995
fold 3 accuracy: 0.3706
fold 4 accuracy: 0.3725

**Everything except ZeroX**
Centroid
Flux
RMS
MFCC
RollOff
ZeroX
Chroma
Kurtosis

# of data points: 1000 dimensions: 37
fold 0 accuracy: 0.3784
fold 1 accuracy: 0.3814
fold 2 accuracy: 0.3779
fold 3 accuracy: 0.3637
fold 4 accuracy: 0.3676

Everything Except ZeroX and Chroma
Centroid
Flux
RMS
MFCC
RollOff
Kurtosis

# of data points: 1000 dimensions: 25
fold 0 accuracy: 0.3931
fold 1 accuracy: 0.4064
fold 2 accuracy: 0.3868
fold 3 accuracy: 0.3534
fold 4 accuracy: 0.4157

Set mfcc.numCoeffs to 10
# of data points: 1000 dimensions: 15
fold 0 accuracy: 0.3995
fold 1 accuracy: 0.4118
fold 2 accuracy: 0.3897
fold 3 accuracy: 0.3672
fold 4 accuracy: 0.4289

Set mfcc.numFilters to 12
# of data points: 1000 dimensions: 15
fold 0 accuracy: 0.4025
fold 1 accuracy: 0.4034
fold 2 accuracy: 0.3897
fold 3 accuracy: 0.4103
fold 4 accuracy: 0.4132