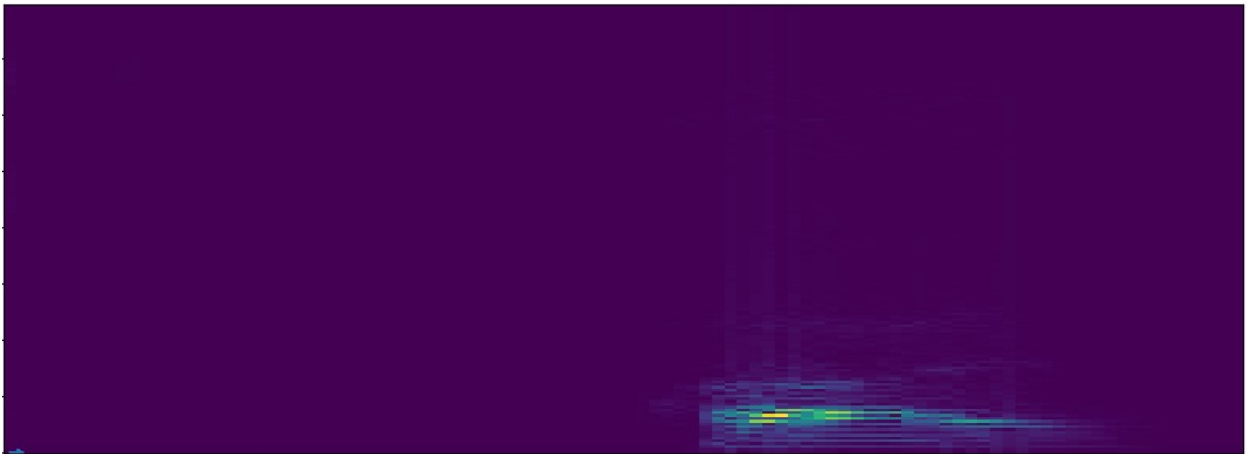


MCA Assignment 2

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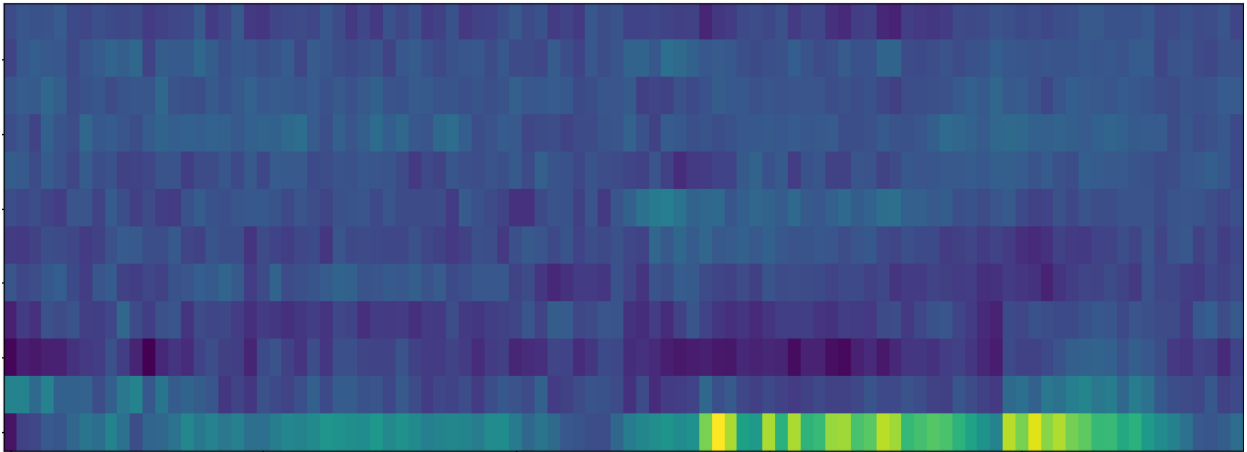
Part 1

Sample spectrogram (data/training/five/0bd689d7_nohash_2.wav)



Part 2

Sample MFCC (data/training/five/0bd689d7_nohash_2.wav)



Part 3

Spectrogram:

Confusion Matrix

```
[[139   3  54  11   6   1  32   5   7   2]
 [  3 140   5   1  15  16  26   3   2  19]
 [  7   2 122  27   4   1  42   2  29   0]
 [  0   0  71 100   0   0  37   4  34   2]
 [  5  19  20   4 180   9  35   1   7   0]
 [  1  53  11   1   5 126  23   4   1  17]
 [  0   1  16   2   7   0 222   6   8   0]
 [  9  20  16   8   7   9  45 135   5   9]
 [  2   2  22  21   1   0  47   8 139   1]
 [  1  49  13   4   5  25  17   5   3 108]]
```

	precision	recall	f1-score
0	0.83	0.53	0.65
1	0.48	0.61	0.54
2	0.35	0.52	0.42
3	0.56	0.40	0.47
4	0.78	0.64	0.71
5	0.67	0.52	0.59
6	0.42	0.85	0.56
7	0.78	0.51	0.62
8	0.59	0.57	0.58
9	0.68	0.47	0.56
macro avg	0.62	0.56	0.57
weighted avg	0.62	0.57	0.57
accuracy			0.57

MFCC (without random noise augmentation):

Confusion Matrix

```
[[212  5  27  2  5  2  0  4  1  2]
 [  5 176  6  1  9  8  6  3  3 13]
 [  3  10 182 11  6  8  2  5  6  3]
 [  2  4  32 169  0  3  2  5 27  4]
 [  5 19  17  1 212 15  2  6  2  1]
 [  3 13  7  8  1 182  4  6  7 11]
 [  0  0  2  2  2  8 237  1  7  3]
 [  1  7 11  7  5  7  4 212  1  8]
 [  2  1 10 30  1  6  9  1 179  4]
 [  4 36  6  5  0 15  2  4  2 156]]
```

	precision	recall	f1-score
0	0.89	0.82	0.85
1	0.65	0.77	0.70
2	0.61	0.77	0.68
3	0.72	0.68	0.70
4	0.88	0.76	0.81
5	0.72	0.75	0.73
6	0.88	0.90	0.89
7	0.86	0.81	0.83
8	0.76	0.74	0.75
9	0.76	0.68	0.72
macro avg	0.77	0.77	0.77
weighted avg	0.78	0.77	0.77
accuracy			0.77

MFCC (with random noise augmentation):

Confusion Matrix

```
[[229  0  21  1  4  1  1  1  0  2]
 [ 9 188  2  1  5  6  3  1  3 12]
 [ 4 10 189 10  6  3  0  5  6  3]
 [ 2  1  20 192  0  3  2  5 19  4]
 [ 6 11 12  1 231 10  2  3  1  3]
 [ 0 11  7 11  4 184  6  9  4  6]
 [ 1  1  2  1  3  3 239  1  6  5]
 [ 0  4  6  2  5  3  4 226  3 10]
 [ 2  5  7 23  3  4  5  1 189  4]
 [ 5 17  3  8  2 10  0  3  2 180]]
```

	precision	recall	f1-score
0	0.89	0.88	0.88
1	0.76	0.82	0.79
2	0.70	0.80	0.75
3	0.77	0.77	0.77
4	0.88	0.82	0.85
5	0.81	0.76	0.78
6	0.91	0.91	0.91
7	0.89	0.86	0.87
8	0.81	0.78	0.79
9	0.79	0.78	0.78
macro avg	0.82	0.82	0.82
weighted avg	0.82	0.82	0.82
accuracy			0.82