

# Current Trends of Artificial Intelligence

## Phase 5

### Progress

For this phase, we looked for a method to improve our feature selection. After some more research and reading we found the following paper: <http://ismir2011.ismir.net/papers/PS3-6.pdf>

This method describes the methods used by a certain toolkit music21. This toolkit is also compatible with our MusicXML input. The toolkit contains the methods to calculate different features and the user only needs to specify which features it wants to use. In this phase we used this tool for our feature selection based on the features described in the paper, and gave these features to our SVM. We can also request those calculated features from the toolkit. Here are some examples of the calculated features:

'Initial\_Time\_Signature', 'Compound\_Or\_Simple\_Meter', 'Triple\_Meter', 'Quintuple\_Meter',  
'Changes\_of\_Meter', 'Most\_Common\_Pitch\_Prevalence',  
'Most\_Common\_Pitch\_Class\_Prevalence', 'Relative\_Strength\_of\_Top\_Pitches',  
'Relative\_Strength\_of\_Top\_Pitch\_Classes', 'Interval\_Between\_Strongest\_Pitches',  
'Interval\_Between\_Strongest\_Pitch\_Classes',...

After running the experiments, we saw better results for Instrument, Style and Year predictions.

### Results

#### **Note Frequency (Old Best Result)**

Error performance (lower is better)

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Performer prediction 29;29;27;29;31 => 145

Instrument prediction 20;21;21;21;21 => 104

Style prediction 24;25;24;23;23 => 119

Year prediction 532;547;498;507;539 => 2623

Tempo prediction 2662.2;2238;3114.1;2416.3;2227.6 => 12658.2

#### **Note Duration**

Error performance (lower is better)

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Performer prediction 35;34;34;33;35 => 171

Instrument prediction 20;21;21;21;21 => 104

Style prediction 24;25;24;23;23 => 119  
Year prediction 532;518;498;507;539 => 2594  
Tempo prediction 3223.6;2199.5;3216.9;2646.8;2451.9 => 13738.7

We noticed immediately is the same results for the Style and Instrument Prediction.  
After taking a look closer to the data we saw that both prediction algorithms predict for all Styles *Postbop* and instruments *ts*, which is the reason of this result.

We see a small improvement for the year predictions, but there is no general improvement.

### Note Pattern

Error performance (lower is better)

-----  
Performer prediction 28;30;29;30;31 => 148  
Instrument prediction 17;18;17;19;18 => 89  
Style prediction 23;24;22;22;19 => 110  
Year prediction 510;523;466;515;564 => 2578  
Tempo prediction 2963.2;2357.9;2953.7;2796.8;2565.7 => 13637.3

These results are also interesting . We see an improvement for the Instrument, Year, Style Predictions. Certainly an improvement.

### Tempo Formula

Error performance (lower is better)

-----  
Performer prediction 28;30;29;30;31 => 148  
Instrument prediction 17;18;17;19;18 => 89  
Style prediction 23;24;22;22;19 => 110  
Year prediction 510;523;466;515;564 => 2578  
Tempo prediction 720.2;611;651.3;764.2;588 => 3334.7

### Fp-growth

Error performance (lower is better)

-----  
Performer prediction 34;33;32;34;34 => 167  
Instrument prediction 19;20;20;20;20 => 99  
Style prediction 23;24;23;22;22 => 114  
Year prediction 527;536;493;502;526 => 2584  
Tempo prediction 2582.9;2305.1;3469.3;2977;2276.7 => 13611

### music21-feature selection

Error performance (lower is better)

-----  
Performer prediction 32;25;28;30;30 => 145  
Instrument prediction 10;9;8;8;11 => 46

Style prediction 24;22;17;20;18 => 101  
Year prediction 385;488;369;390;454 => 2086  
Tempo prediction 2541.5;2130.5;2605.5;2491.4;2221 => 11989.9

### **Best Results for the Moment**

Error performance (lower is better)

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Performer prediction 29;29;27;29;31 => 145 (*Note Frequency*)(*has less mistakes on the bins than music21*)

Instrument prediction 10;9;8;8;11 => 46 (*Music21*)

Style prediction 24;22;17;20;18 => 101 (*Music21*)

Year prediction 385;488;369;390;454 => 2086 (*Music21*)

Tempo prediction 2662.2;2238;3114.1;2416.3;2227.6 => 3334.7 (*Tempo Formula*)

### **To run the code**

Run the following command to install all necessary libraries:

```
pip install -r requirements.txt
```

To install fpgrowth you must run:

```
python pyfim/setup_fim.py install
```

The pyfim library can be downloaded from <http://www.borgelt.net/pyfim.html>

To run the program, use command:

```
perl crossvalidate.pl .
```