

Current Trends of Artificial Intelligence

Phase 4

Progress

We have looked to two different methods this phase. Previously we had created our own method to find frequent patterns in measures but we found an algorithm that would find faster frequent patterns. The algorithm is fp-growth and we used the implementation of Christian Borgelt ¹. However the results are slightly worse than the results of our own method but it is much faster.

Also we did some more research on contrast mining. We studied different contrast mining algorithms i.e STUCCO and TAR3 and eventually implemented a STUCCO variant. Sadly we saw no improvement in using this method. The Frequency mining had a much better performance.

Results

Note Frequency (Old Best Result)

Error performance (lower is better)

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)

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.

¹ <http://www.borgelt.net/pyfim.html>

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

Best Results for the Moment

Error performance (lower is better)

Performer prediction 29;29;27;29;31 => 145 (*Note Frequency*)
Instrument prediction 17;18;17;19;18 => 89 (*Note Pattern*)
Style prediction 23;24;22;22;19 => 110 (*Note Pattern*)
Year prediction 510;523;466;515;564 => 2578 (*Note Pattern*)
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 .
```