Current Trends of

Artificial Intelligence

Phase 3

Progress

We haven't done much in this phase because there were deadlines for other courses we had to make. However we did implement a mathematical formula that greatly reduced the error performance of the tempo prediction.

Formula: $$\frac{Beats * Number\ of\ Measures * 60}{Duration\ of\ Song} = Tempo$$

The beats and number of measures can be found in our XML file. The duration of the song is the duration of the MIDI file. However this formula gives only an estimation and is sometimes completely wrong. We don't know yet if it is because the number of measures can be wrong in our files or if the formula is flawed.

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.

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

This 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

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)*

Future Plans

Combine all the best results in one program and try contrast pattern mining. We will also try to improve the tempo and year prediction with the use of lineair regression.

To run the code

Run the following command to install all necessary libraries:

pip install -r requirements.txt

To run the program, use command:

```
perl crossvalidate.pl .
```