

# Analysing the performance of the OLAF framework in the context of identifying music in movies

## 1 The OLAF framework

The framework is written in C and designed for use on embedded systems. It makes use of audio fingerprinting to analyse audio clips and uses frequency peaks to extract event points, which are then turned into fingerprints.

## 2 Research question

How well does the OLAF framework perform in identifying music in movies?

- How can parameters be configured to improve OLAF's performance with regards to the benchmark?
- How does OLAF perform in practice with identifying samples in real movies?

## 3 Method

OLAF has many parameters to vary, some of which will be tested. The best performing parameter is used for search speed and scalability analysis. The parameters either impact fingerprint creation, search speed or match selection.

## 4 Selectors

OLAF returns multiple results. Therefore, three different selectors have been implemented to select one single result:

### Ideal selector:

Selects the correct result if there is one. Otherwise, selects a wrong result if there are any.

### Most matches selector:

Selects the result with the most exact matches (collisions with the database).

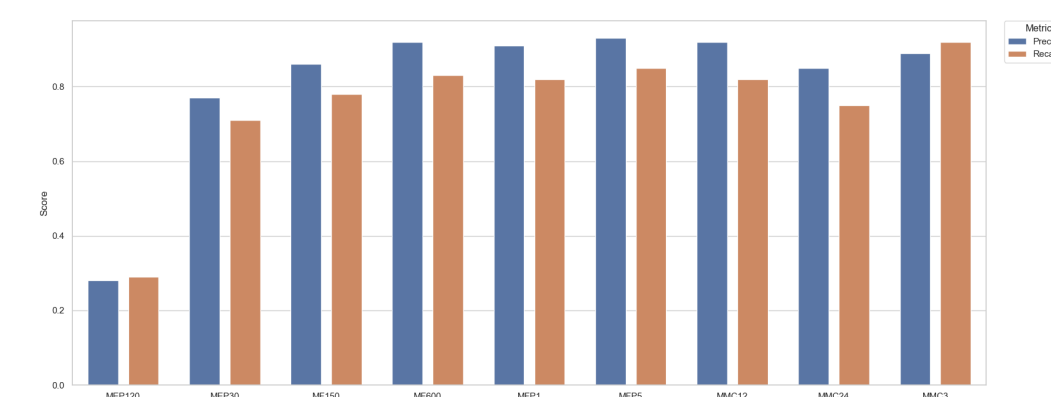
### Random selector:

Selects a random result from the list of results

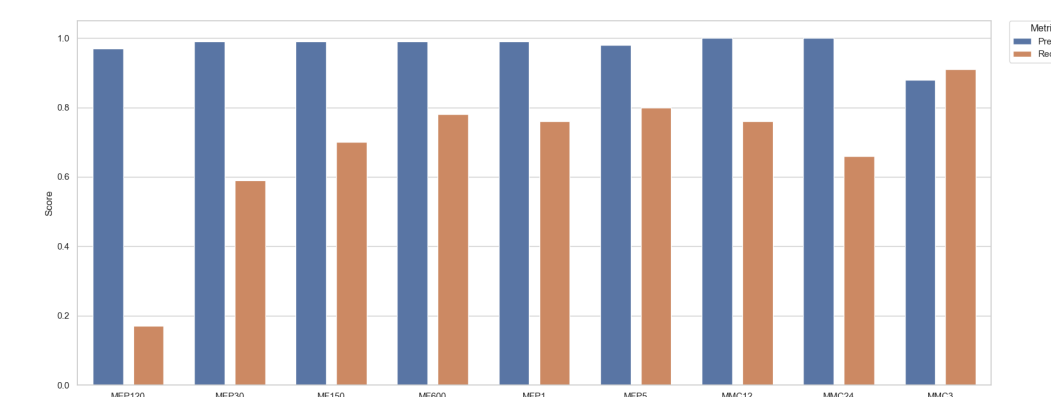
## 6 Conclusions

The most matches selector performed well on the synthesised data across most parameter setups, reaching a recall of 0.80 and a precision of 0.98. However, the performance of pitch shifts and tempo changes is poor. OLAF also has a fast average query time, taking about 1 second to search through the whole data set for every parameter. Increasing the database size from 10 to 980 songs only increases the average query time by a factor 1.17.

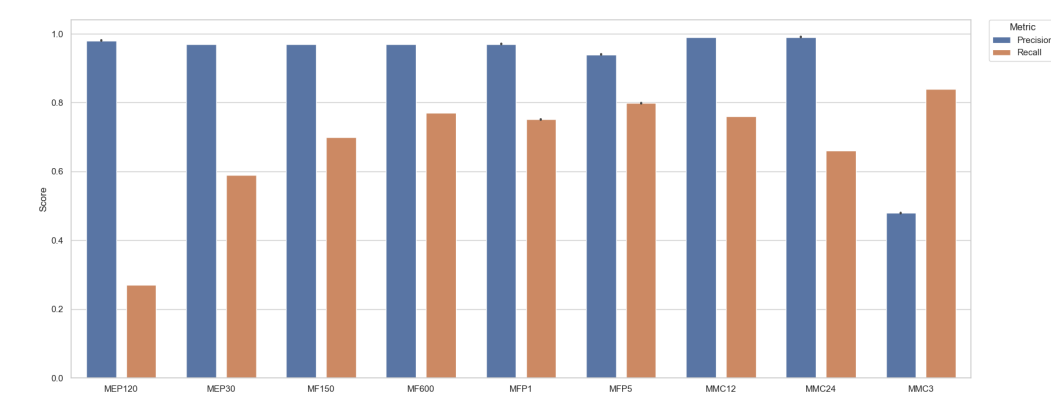
## 5 Results



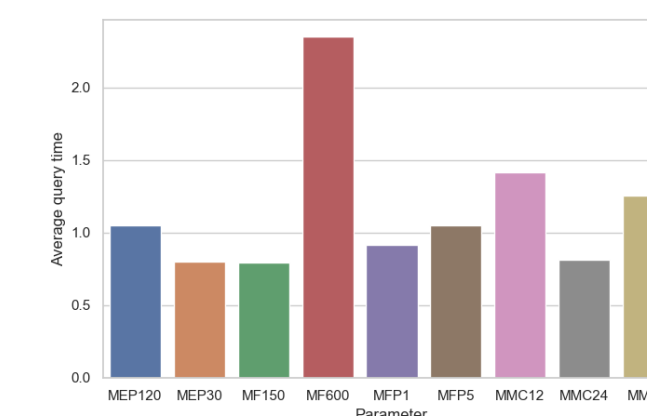
1. Different parameters for ideal selector



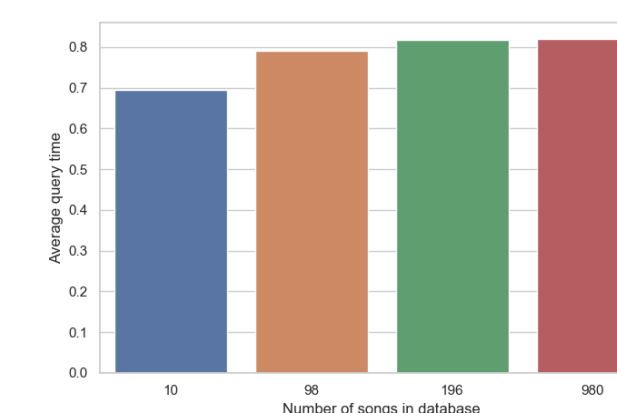
2. Different parameters for most matches selector



3. Different parameters for random selector



4. Search speed per parameter



5. Search speed for different database sizes

Finally, the selected parameter setup increases the amount of correctly identified songs in movies from 1 true positive out of 134 clips to 5 true positives and 3 false positives.

## 7 Limitations

More parameter setups could be tested. The benchmark could be expanded by including more noise categories, tracks and criteria.