

JJA's und FP's Music Similarity Measure

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Überblick

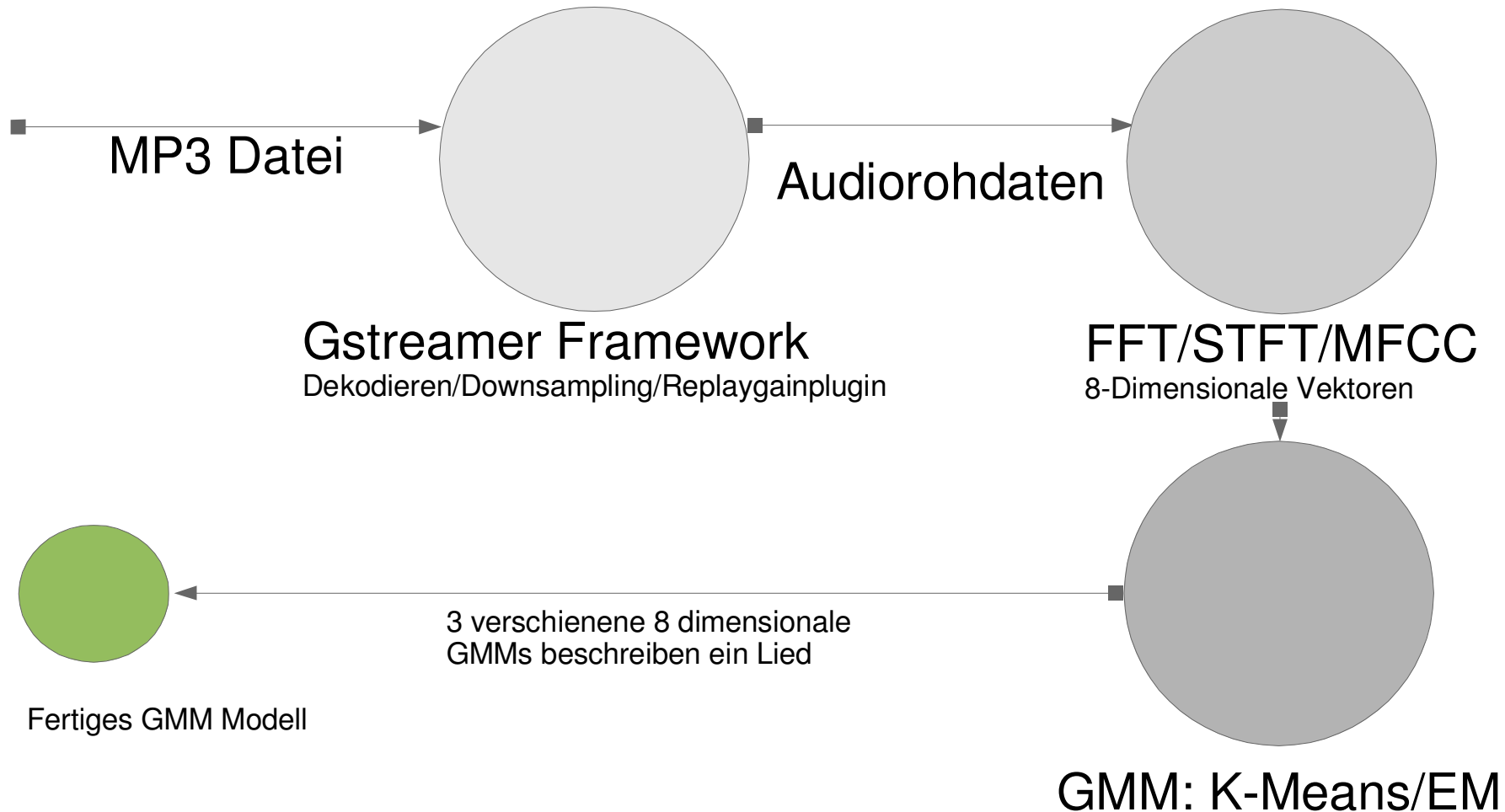
- Theoretische Funktionsweise des Similarity Measure vs. Implementation
- Ergebnisse
- Demonstration
- Bewertung des Similarity Measure

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Funktionsweise – Analyse



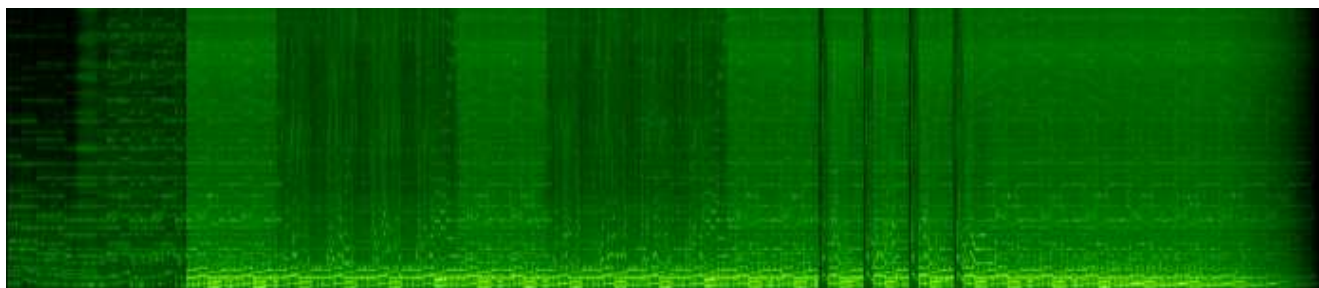
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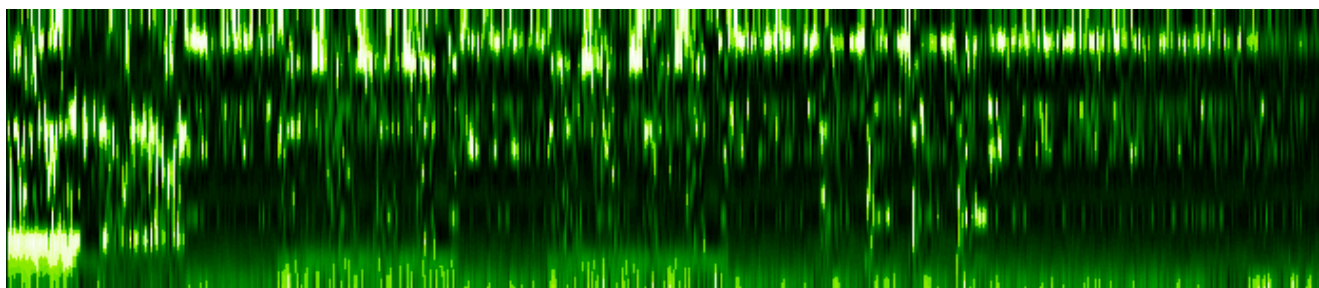


Implementation – MoC (1)

- Downsampling: Gstreamer Framework, Replaygain Plugin (<http://www.replaygain.org/>)
- FFT/STFT: FFTW (<http://www.fftw.org/>), Hamming Window



- MFCC



- GMM: Kmeans, EM > Textfile

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Implementation – MoC (2)

Ein fertiges Modell:

```
/remote/atlantis/aeneas/music/Archive/Liquido/Liquido - Narcotic.mp3
```

```
GMM: Mixture-Models 3 Gauss-Dimensions 8
```

```
MD5: 837a80a8d7bc61b344fb0ab6785faaa4
```

```
Covariances:
```

```
Model 0: 0.5836704201 0.05778080051 0.04200916437 0.03041367726 0.02973047942 0.02878068998 0.02208548173 0.03595959295
```

```
Model 1: 40.44099129 1.433405186 0.3081916536 0.07207895329 0.1230632125 0.09451858506 0.06059624308 0.09085823822
```

```
Model 2: 3.598839854 0.3134587635 0.2543565362 0.09195744987 0.1003495406 0.07099950858 0.05789780851 0.04593554571
```

```
Means:
```

```
Model 0: -13.23414441 1.538606874 0.7406380107 0.2624771121 0.4971593018 0.4032206717 0.05094057495 0.2087879342
```

```
Model 1: -19.48108631 2.196728232 -0.005798552071 0.1701927756 0.1473571404 0.2193392761 0.05199059348 0.04437656194
```

```
Model 2: -16.54618603 2.307149537 0.826302715 0.3784542597 0.4776691645 0.3971441903 0.1837909347 0.1429689988
```

```
Priors:
```

```
Model 0: 0.4806295691
```

```
Model 1: 0.2030549078
```

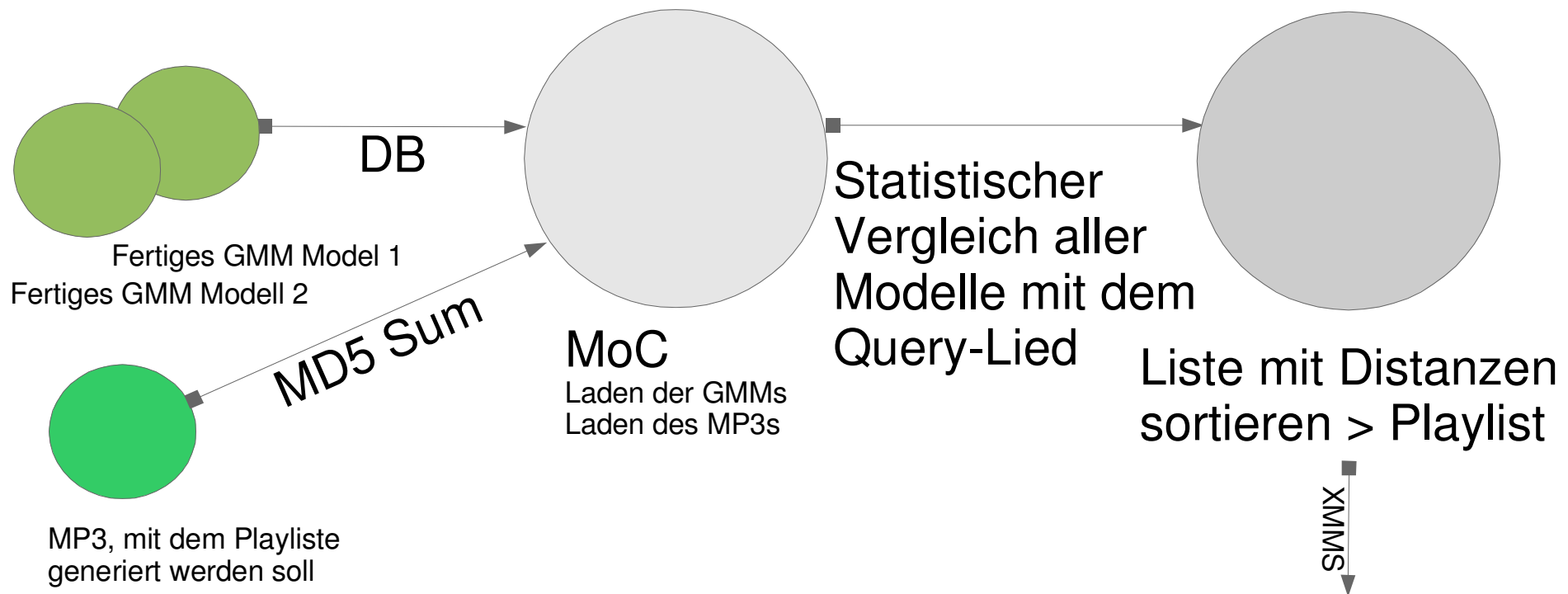
```
Model 2: 0.3163155231
```

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Funktionsweise – Query (1)



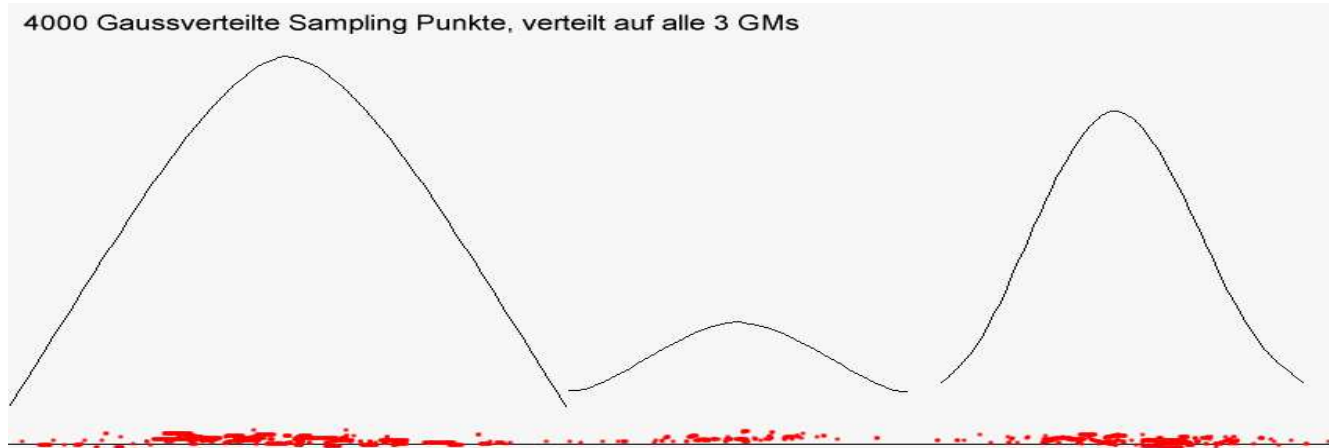
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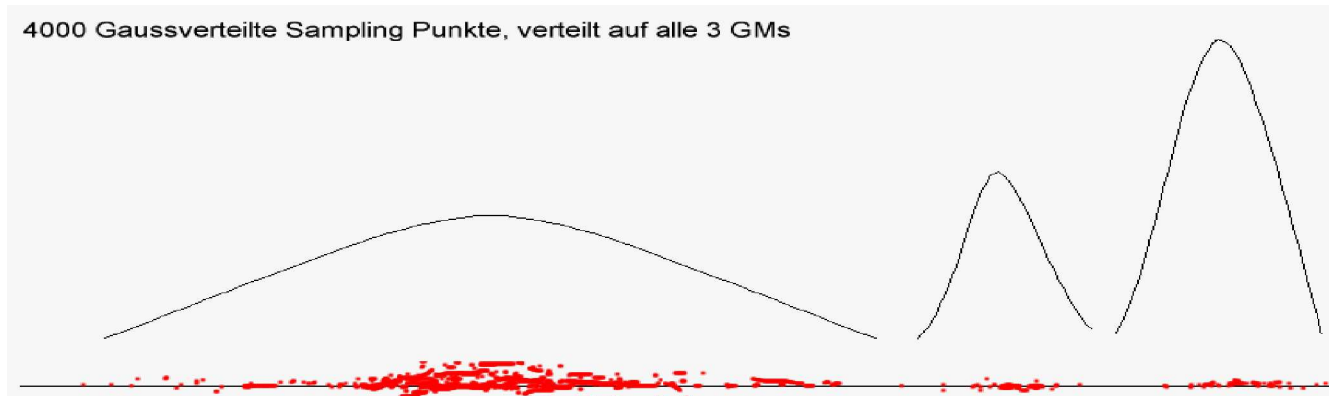


Funktionsweise – Query (2)

Lied 1
Anfrage



Lied 2



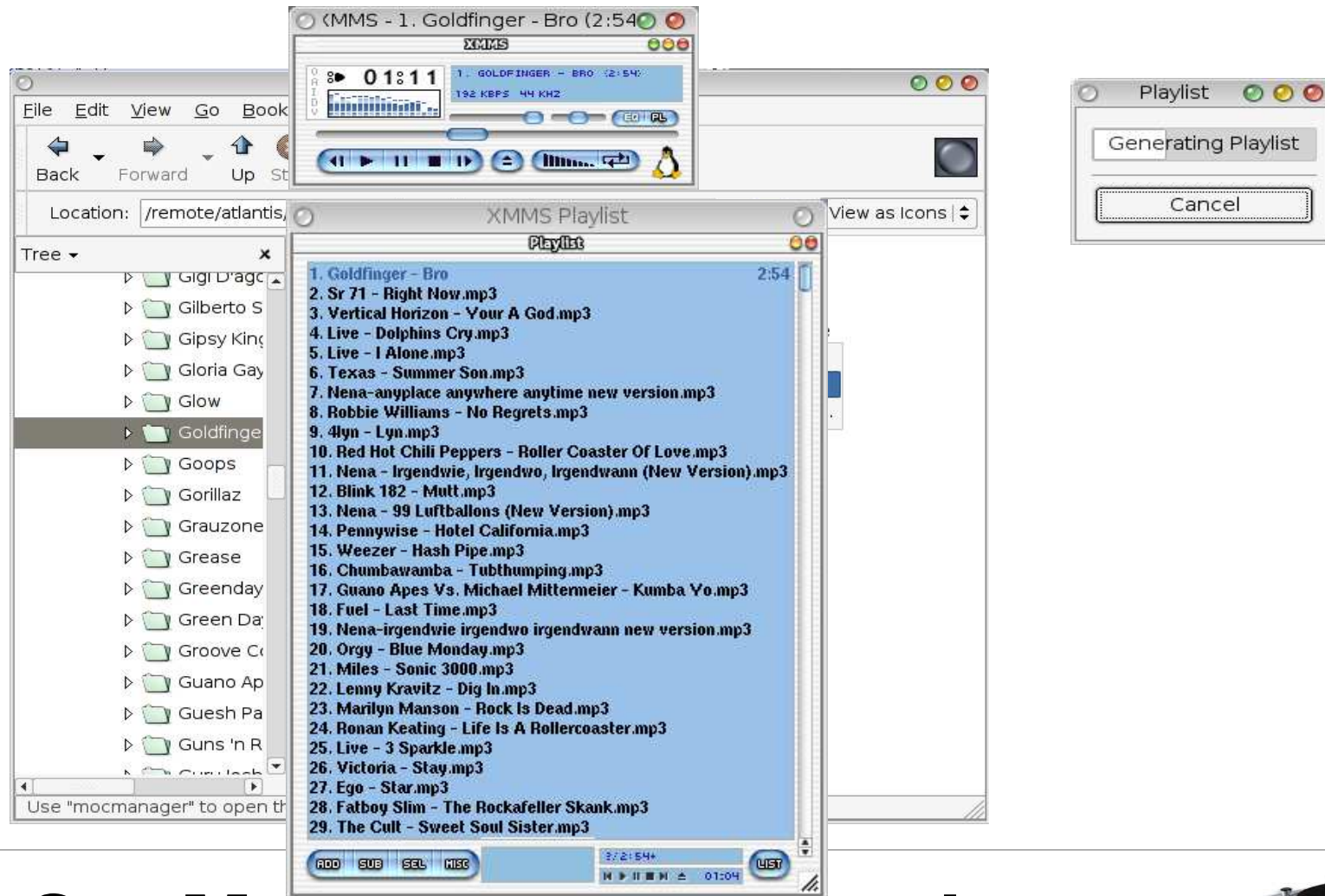
$$\text{distance} = |1 - \text{L1.distance(L2)/L1.distance(L1)}| + |1 - \text{L2.distance(L1)/L2.distance(L2)}| * 0.5$$

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Implementation – Query (1)



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Ergebnisse

- Normalisieren, bei normaler MP3 Sammlung notwendig
- 1738 Lieder in 26 Stunden MoC-ifiziert
- 1 Query (Eine Playliste erstellen) über 1738 Lieder dauert auf einem Athlon 600MHz ca. 60 Sekunden
- Verwendete Konfiguration:
 - Verarbeitetes Audiosignal 22.050HZ, 16Bit
 - Window Size: 2048 Samples (~92ms)
 - Window: 1/2 der Window Size overlapped, Hamming
 - Rechnungen mit 64 Bit Genauigkeit
- Entfernungen zwischen 2 Liedern (0.0moc – 1.0moc)

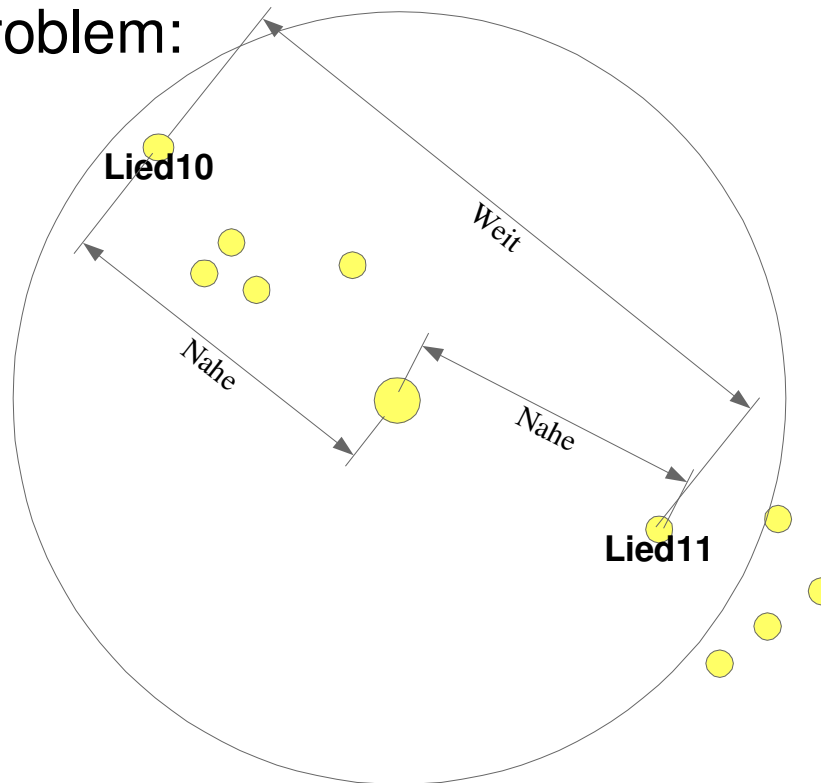
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Probleme

- Music Similarity Measure mit Drei 8-Dim. Modellen nicht ausdrucksstark genug?
- Anderes Problem:
- Paper
- Inhalt des Liedes



Playliste:

Lied1

Lied2

Lied3

...

Lied9

Lied10

X

Lied11

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Demonstration von MoC

1. Neue MoC Datenbank Einfügen 3 Liedern, Distanzanzeige, Query
2. Aufbau von ~/.moc/ und MD5 Dateien
3. Querys auf der 1700 Lieder großen Datenbank (Beispiele)
 1. Sehr Guter Query
 2. Durchschnittliche Playliste
 3. Sähr Schlächte Playliste
 4. Vorschläge Aus dem Publikum

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Bewertung des Similarity Measure

Endergebnisse: OK

Mögliche Verbesserungen:

- durch intelligentere Playlisten Generatoren
- Miteinbeziehen der Lautstärke/Energie des Musikstückes (Bob Marley != Drum and Base)
- Mehr GMMs / Liedcharakteristik

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Danke!

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