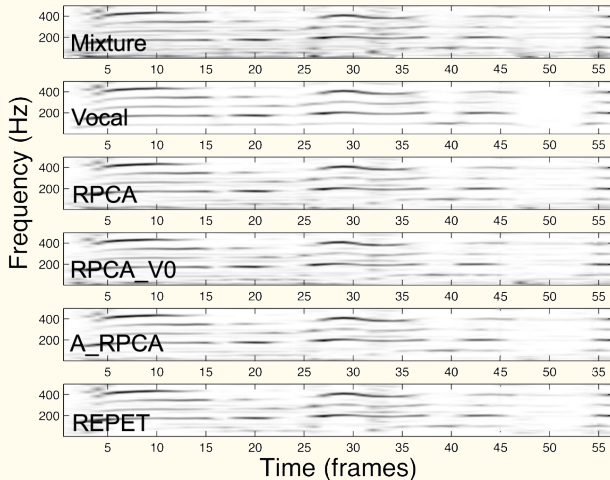# MIR at LabROSA in 2014

Dan Ellis, Colin Raffel, Zhuo Chen, Dawen Liang,
Minshu Zhan, Brian McFee, Nicole Rivilis,
Jia-Ming (James) Liu, Cyril Gaudefroy, Hèléne
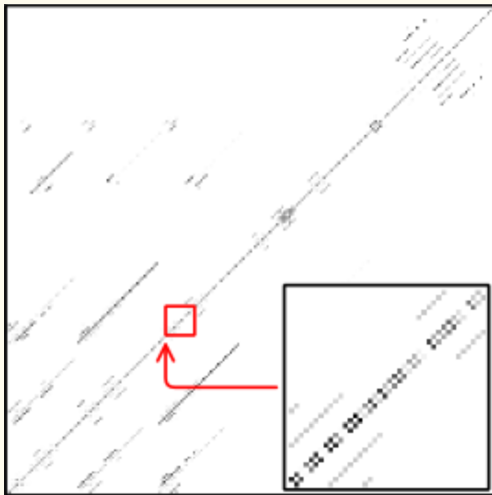Papadopoulos, Hilary Mogul, Dylan Kario

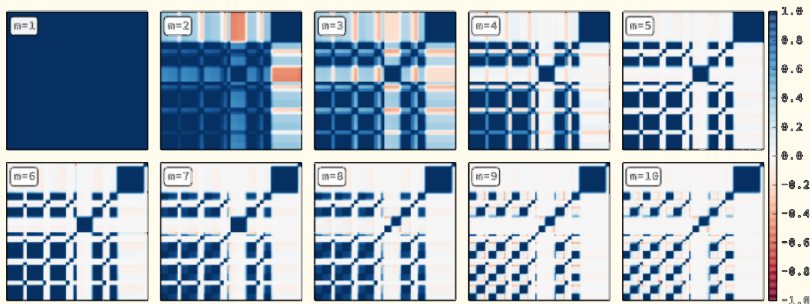NEMISIG, January 31st 2015

Adaptive RPCA

Papadopoulos and Ellis, *"Music-Content-Adaptive Robust Principal Component Analysis for a Semantically Consistent Separation of Foreground and Background in Music Audio Signals"*
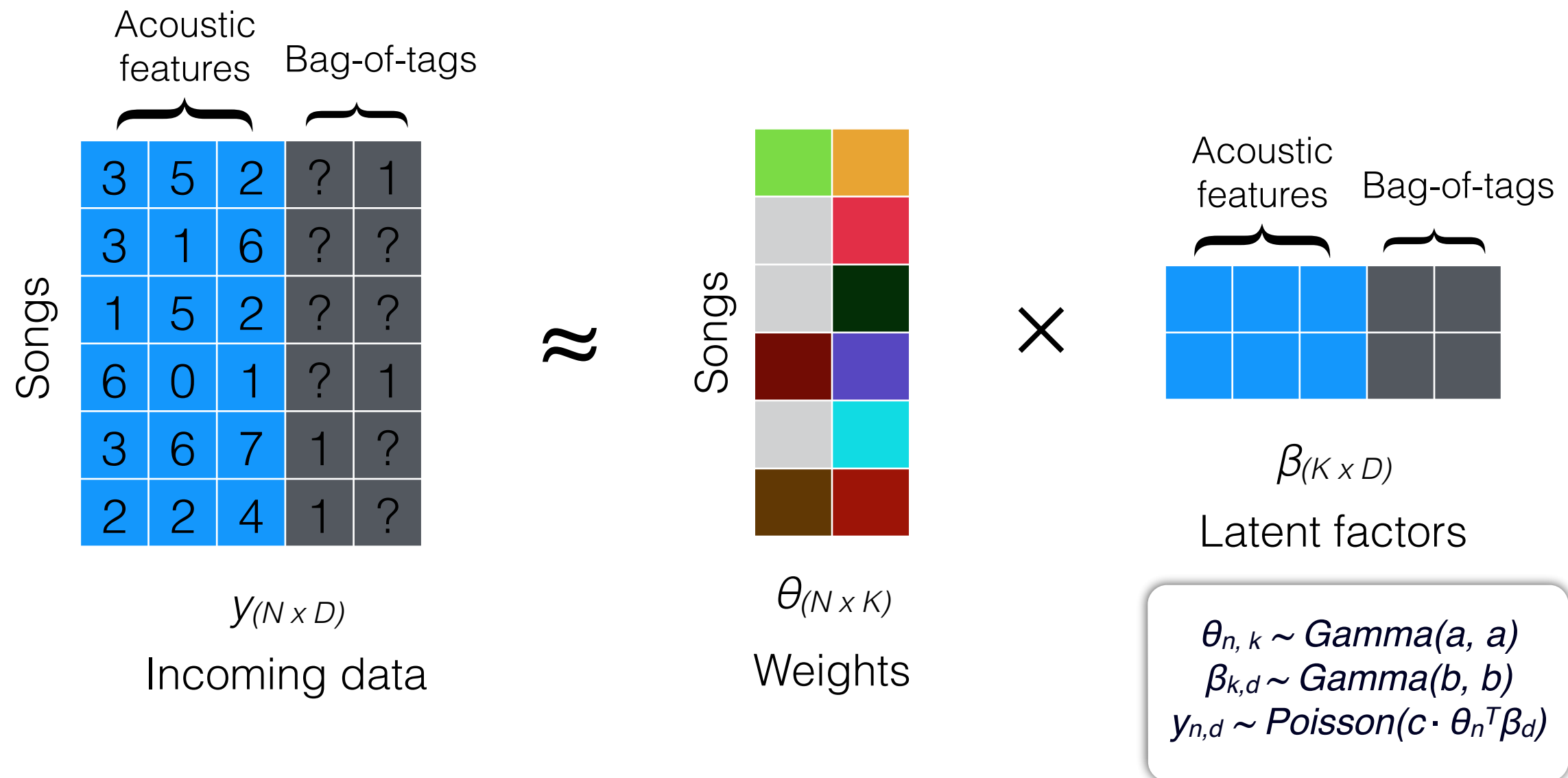
Spectral Segmentation

McFee and Ellis, *"Analyzing Song Structure with Spectral Clustering"*

Spectral Segmentation

McFee and Ellis, *"Analyzing Song Structure with Spectral Clustering"*

Scalable Music tagging with Poisson Factorization (Liang, Paisley, Ellis, ISMIR 2014)
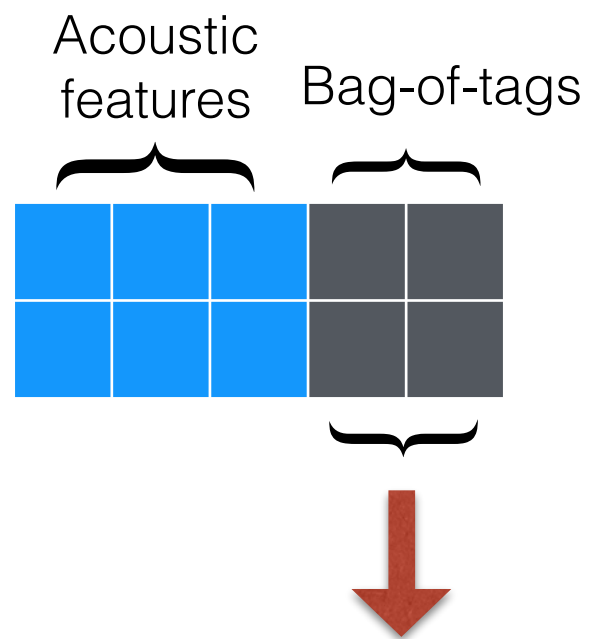

- Exploit the shared latent structure between the acoustic features and semantic tags

- Stochastic variational inference for scalable inference

  - Music auto-tagging with MSD + last.fm in 20 minutes

Results on MSD

$\beta_{(K \times D)}$

Latent factors

Acoustic features   Bag-of-tags

- The latent factors help to explain the VQ-histogram representation

- Potentially useful for content-based music recommendation

"Pop"	"Indie"	"Jazz"	"Classical"	"Metal"	"Reggae"	"Electronic"	"Experimental"	"Country"
pop	indie	chillout	piano	metal	reggae	house	instrumental	country
female vocal	rock	lounge	instrumental	death metal	funk	electro	ambient	classic country
dance	alternative	chill	ambient	thrash metal	funky	electronic	experimental	male vocal
electronic	indie rock	downtempo	classic	brutal death metal	dance	dance	electronic	blues
sexy	post punk	smooth jazz	beautiful	grindcore	hip-hop	electric house	psychedelic	folk
love	psychedelic	relax	chillout	heavy metal	party	techno	progressive	love songs
synth pop	new wave	ambient	relax	black metal	sexy	minimal	rock	americana

Collaborative topic Poisson factorization for content-based recommendation
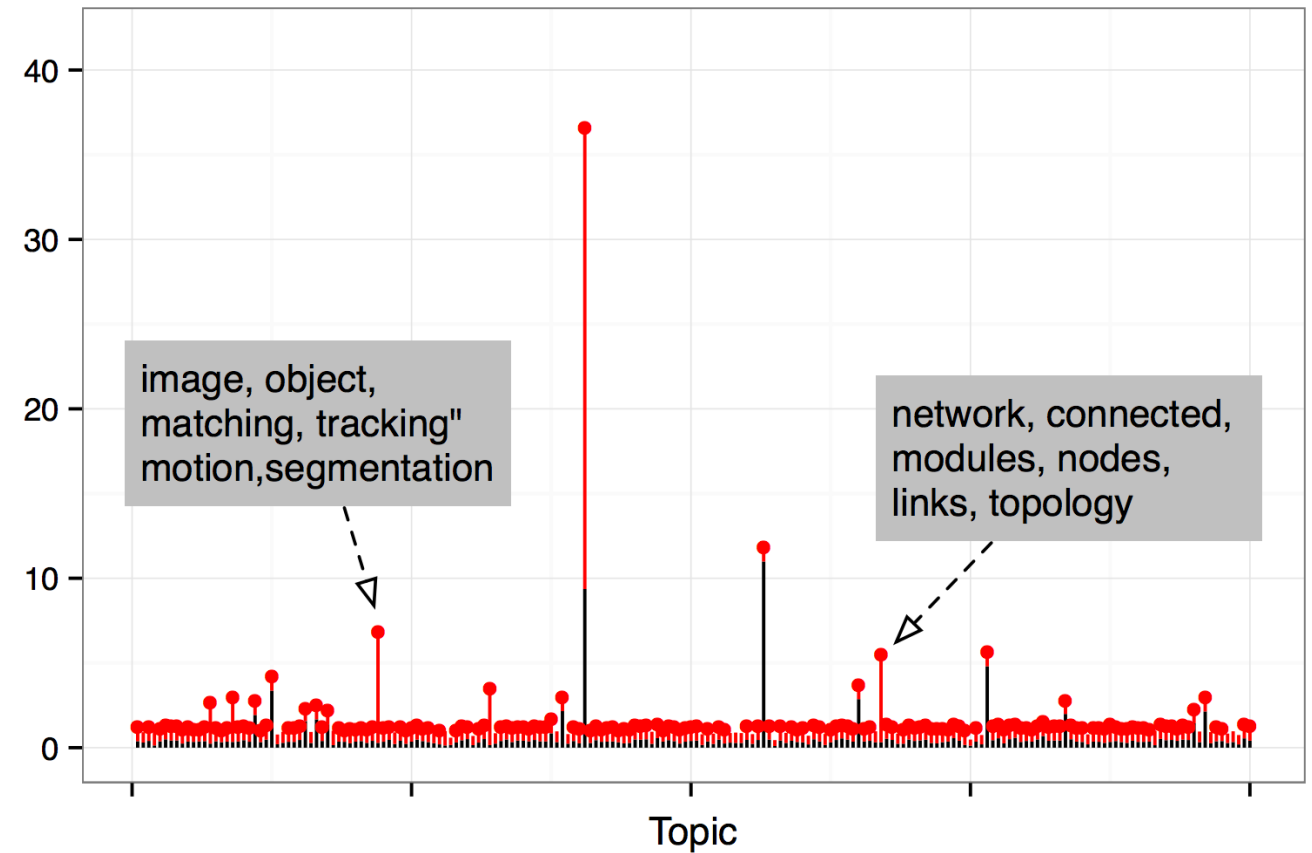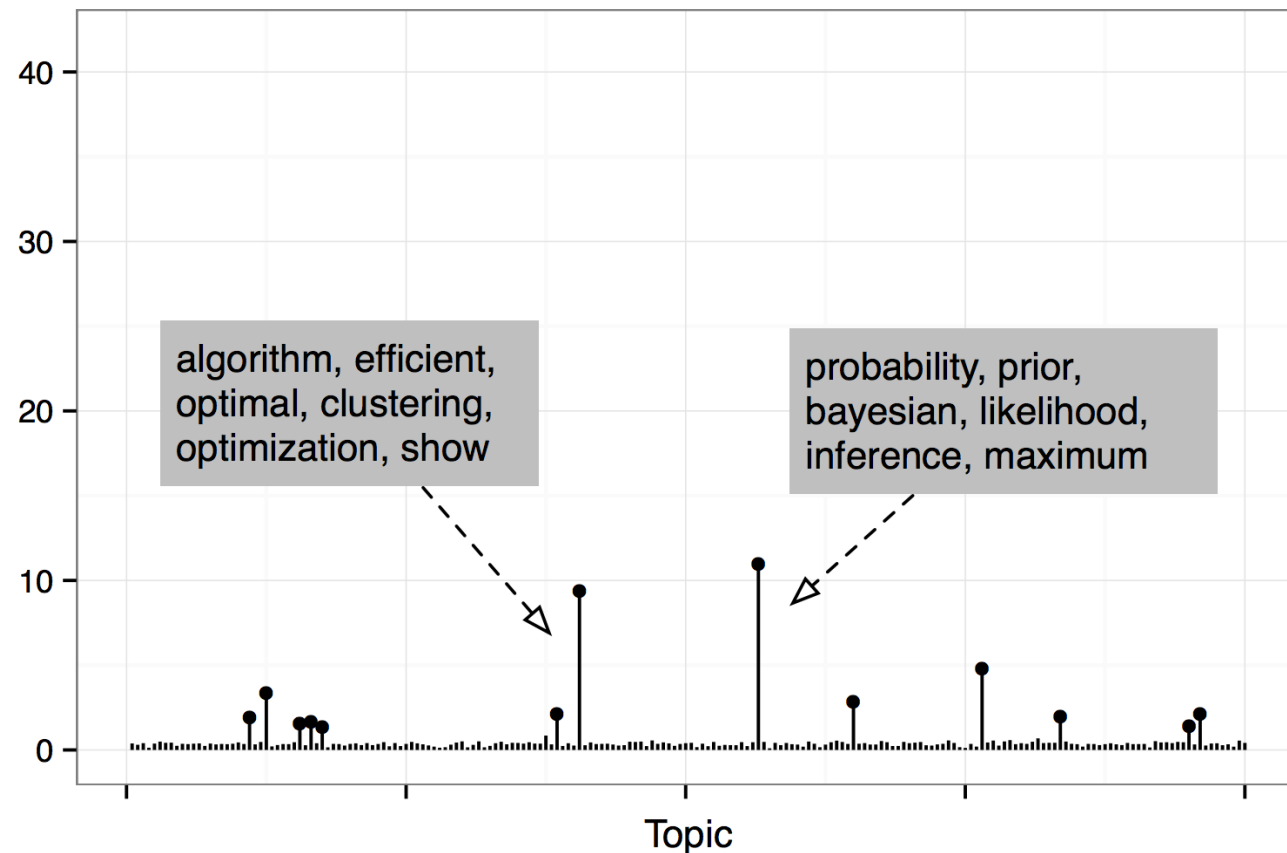
- Collaborative filtering attempts project user and item to a low-dimensional latent space

  - Use content as a starting point for the item projection

  - Allow user-item interaction to make correction, accounting for what content cannot capture

mir_eval

```python
import mir_eval
# Load in beat annotations
reference_beats = mir_eval.io.load_events('ref_beats.txt')
estimated_beats = mir_eval.io.load_events('est_beats.txt')
# scores will be a dictionary where the key is the metric name
# and the value is the score achieved
scores = mir_eval.beat.evaluate(reference_beats, estimated_beats)
# evaluate() will pass keyword args to the metric functions
scores = mir_eval.beat.evaluate(reference_beats, estimated_beats,
                                f_measure_threshold=0.05,
                                cemgil_sigma=0.02)
# You can also perform pre-processing and compute metrics manually
reference_beats = mir_eval.beat.trim_beats(reference_beats)
estimated_beats = mir_eval.beat.trim_beats(estimated_beats)
f_meas = mir_eval.beat.f_measure(reference_beats, estimated_beats,
                                 f_measure_threshold=0.05)
cemgil = mir_eval.beat.cemgil(reference_beats, estimated_beats,
                              cemgil_sigma=0.02)
```

Raffel, McFee, Humphrey, Salamon, Nieto, Liang and Ellis, "mir_eval:
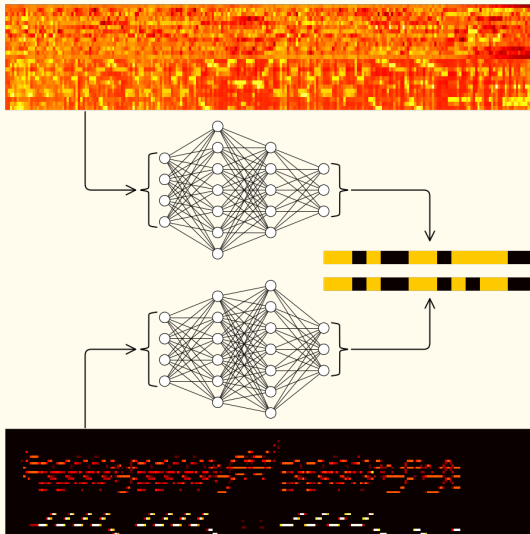*A Transparent Implementation of Common MIR Metrics*

MIDI Dataset
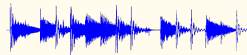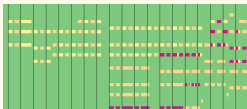
Raffel, Mogul, Shi and Ellis

MIDI Dataset

Raffel, Mogul, Shi and Ellis

Thanks!

http://labrosa.ee.columbia.edu