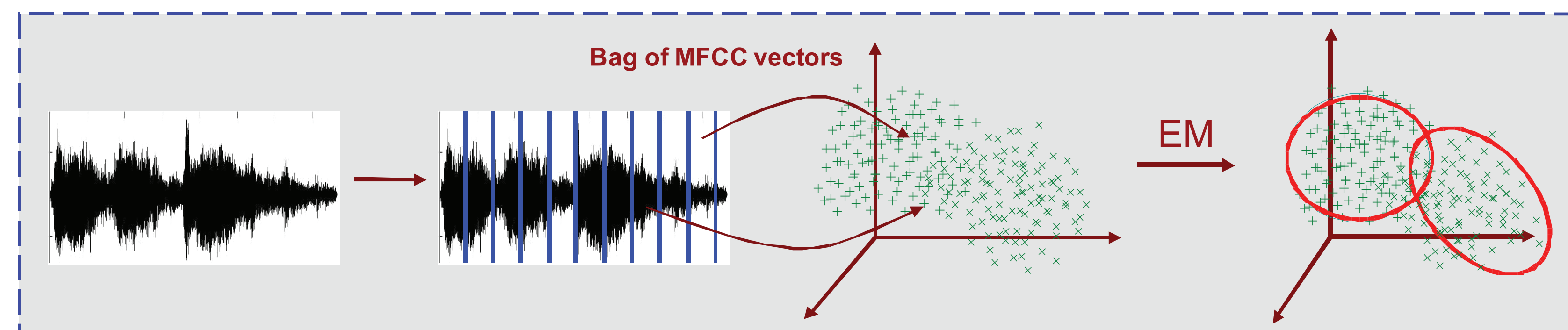


# Auto-Tagging of Music Content with Semantic Multinomials

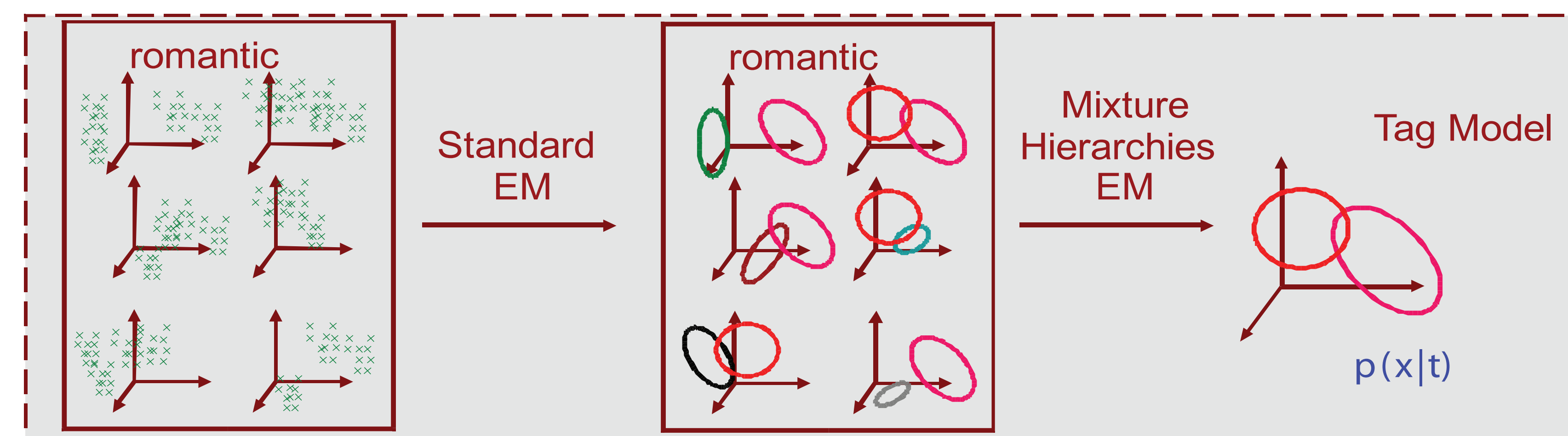
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 Computer Audition Laboratory, University of California, San Diego  
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 Data, Papers, and additional Information can be found at:  
<http://cosmal.ucsd.edu/cal/>

## Step 1 - Model songs



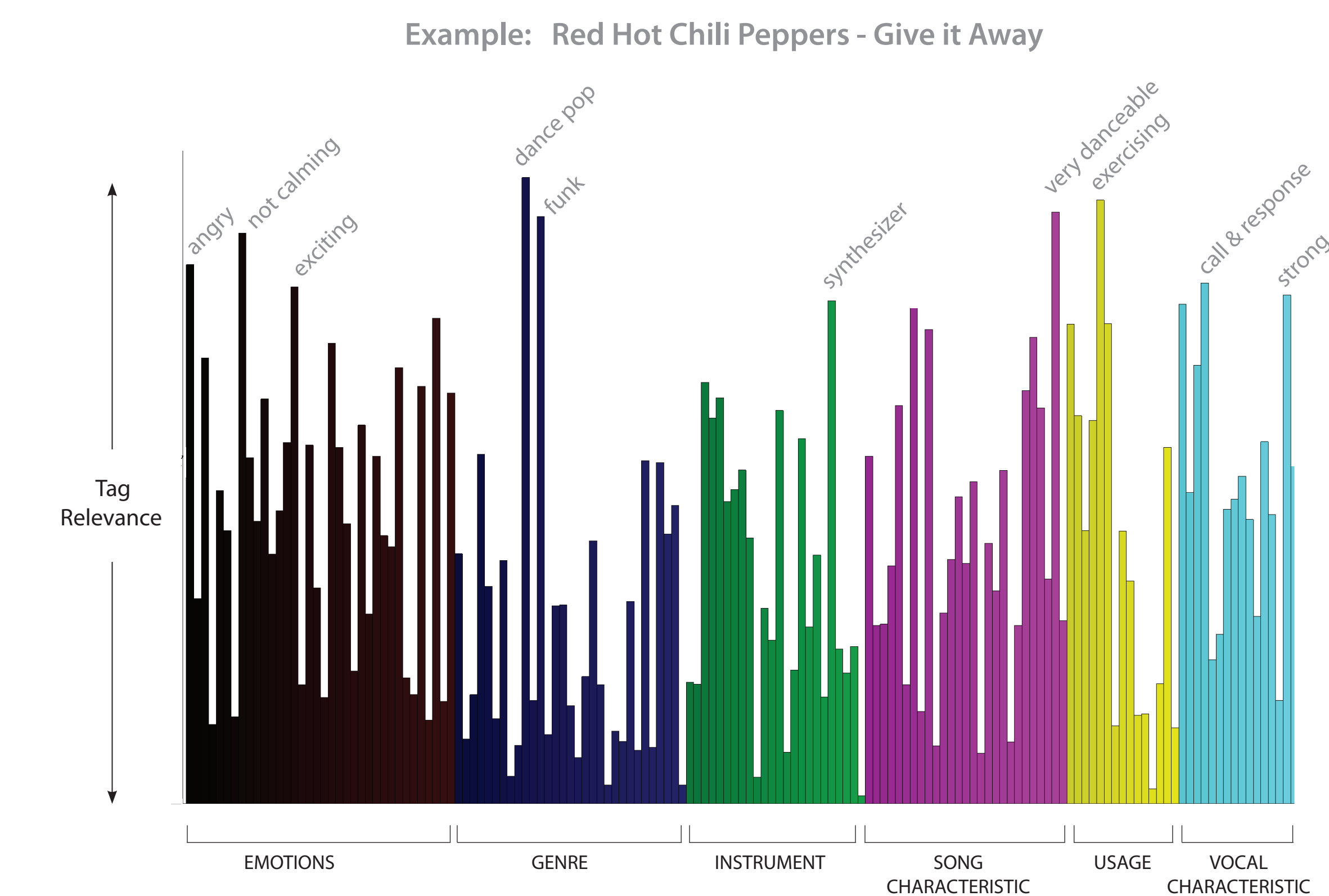
- Segment audio signals
- Extract short-time feature vectors
- Estimate song-GMM with EM algorithm

## Step 2 - Model tags



- Identify songs associated with a tag
- Estimate a song-GMM for each song
- Mixture Hierarchies EM estimates a tag-GMM
- + Efficient parameter estimation & inference
- + Smoothed song representation  $\Rightarrow$  better density estimate

## Step 3 - Tag new songs



- Evaluate song likelihoods under each tag model
- Annotation: most likely tags for given song features
- Retrieval: most likely songs for given tag model

Full details of the algorithm are described in:  
**Semantic Annotation and Retrieval of Music and Sound Effects**  
 D. Turnbull, L. Barrington, D. Torres, G. Lanckriet  
*IEEE Transactions on Audio, Speech, and Language*, 467-476, Feb. 2008

## Results

Retrieval Metric	Score	Rank
F-measure	0.28	1
Average Tag Accuracy	0.90	2 (1st place = 0.91)
AUC ROC-Tag	0.77	1
Annotation Metric	Score	Rank
AUC ROC-Clip	0.84	1