Timbral and Semantic Features for Music Playlists

Machine Learning for Music Discovery Workshop at ICML '16

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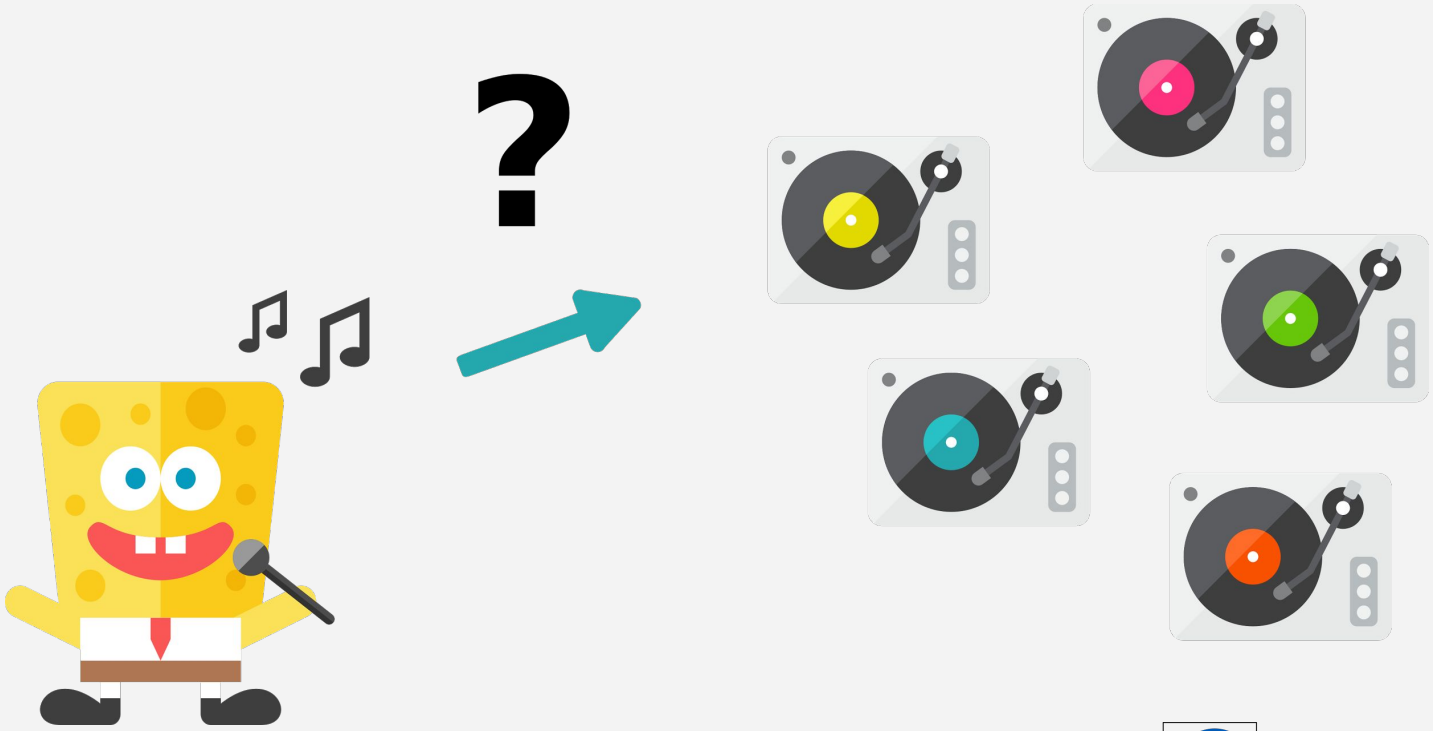
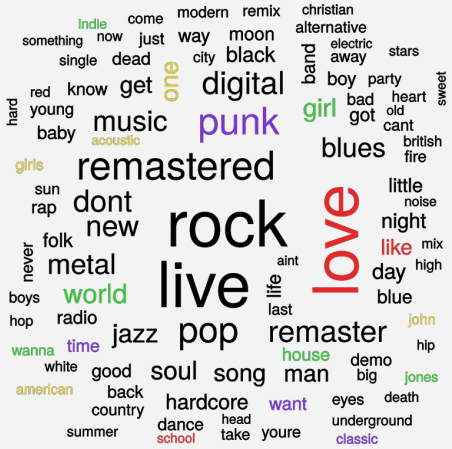
Department of Computational Perception
JOHANNES KEPLER UNIVERSITY LINZ

Song to playlist classification



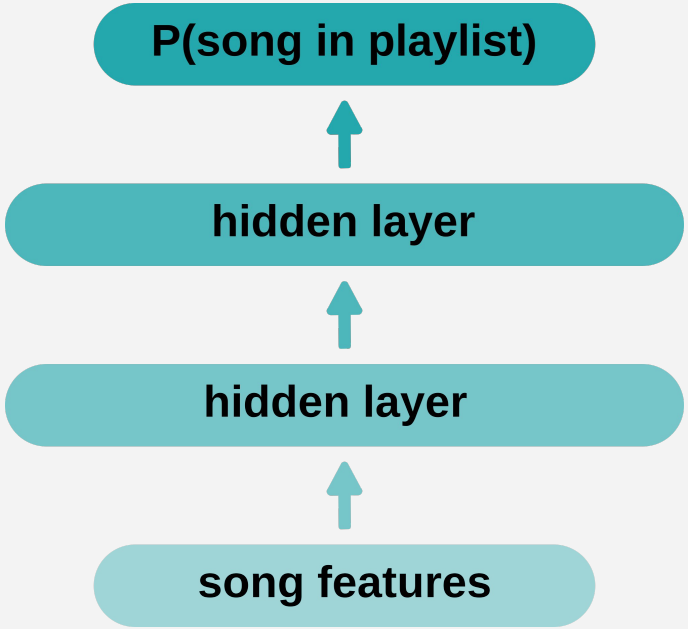
Feature extraction

$input_{timbre}$



$input_{semantic}$

Neural network classifier



$$\mathcal{L}(\theta) = \sum_{i,j} -y_{ij} \log f_j(x_i) - (1 - y_{ij}) \log (1 - f_j(x_i))$$

Numerical study

Datasets overview

#artists	#playlists	#songs
2+	258	4,674
5+	226	4,123
19+	170	3,244

Results

Classifier's performance

score	#artists	i-vectors train	i-vectors valid	word-vectors train	word-vectors valid
Binary cross-entropy	2	0.0279	0.0267	0.0180	0.0204
	5	0.0306	0.0302	0.0232	0.0250
	19	0.0388	0.0380	0.0306	0.0326
Average precision	2	2.36%	0.66%	29.97%	17.32%
	5	2.98%	0.64%	16.72%	8.13%
	19	2.72%	0.71%	11.44%	5.06%

Results

Classifier's performance

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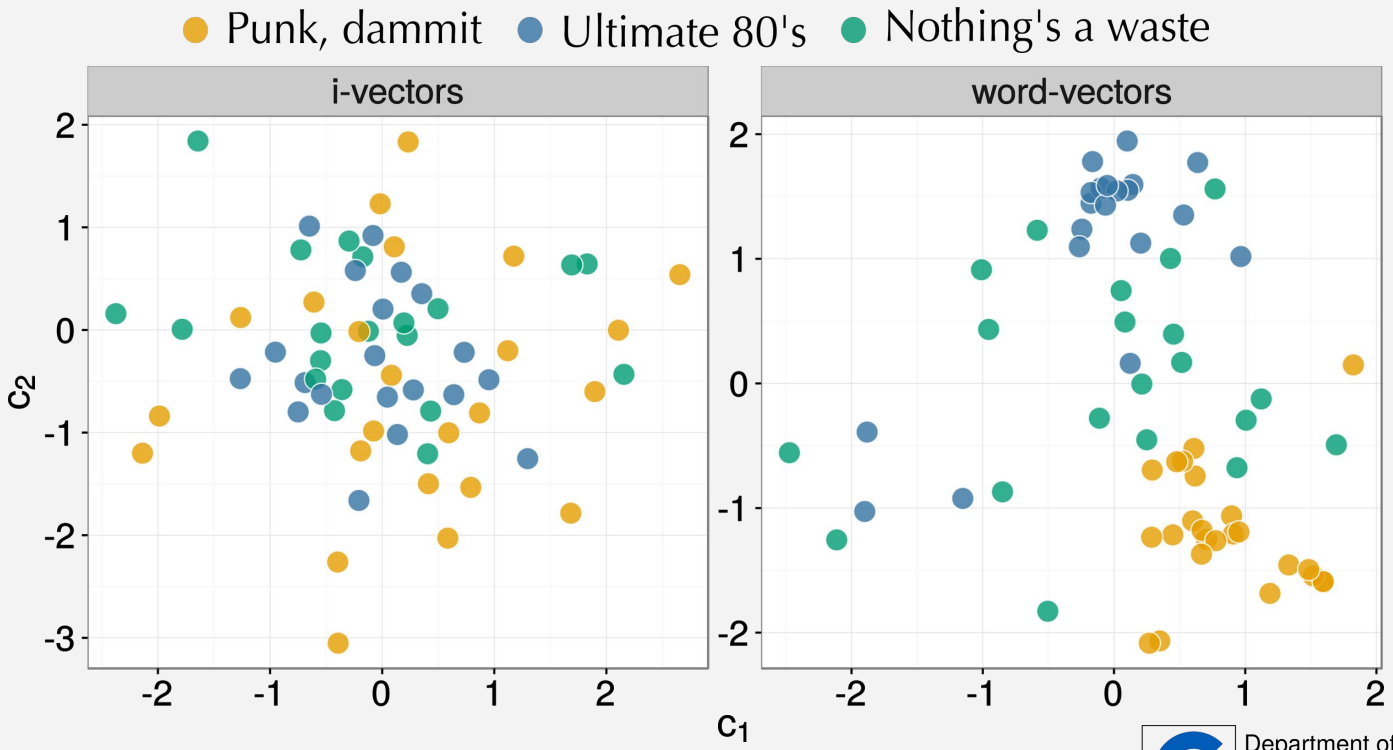
Song features visualization



Thanks for your attention!

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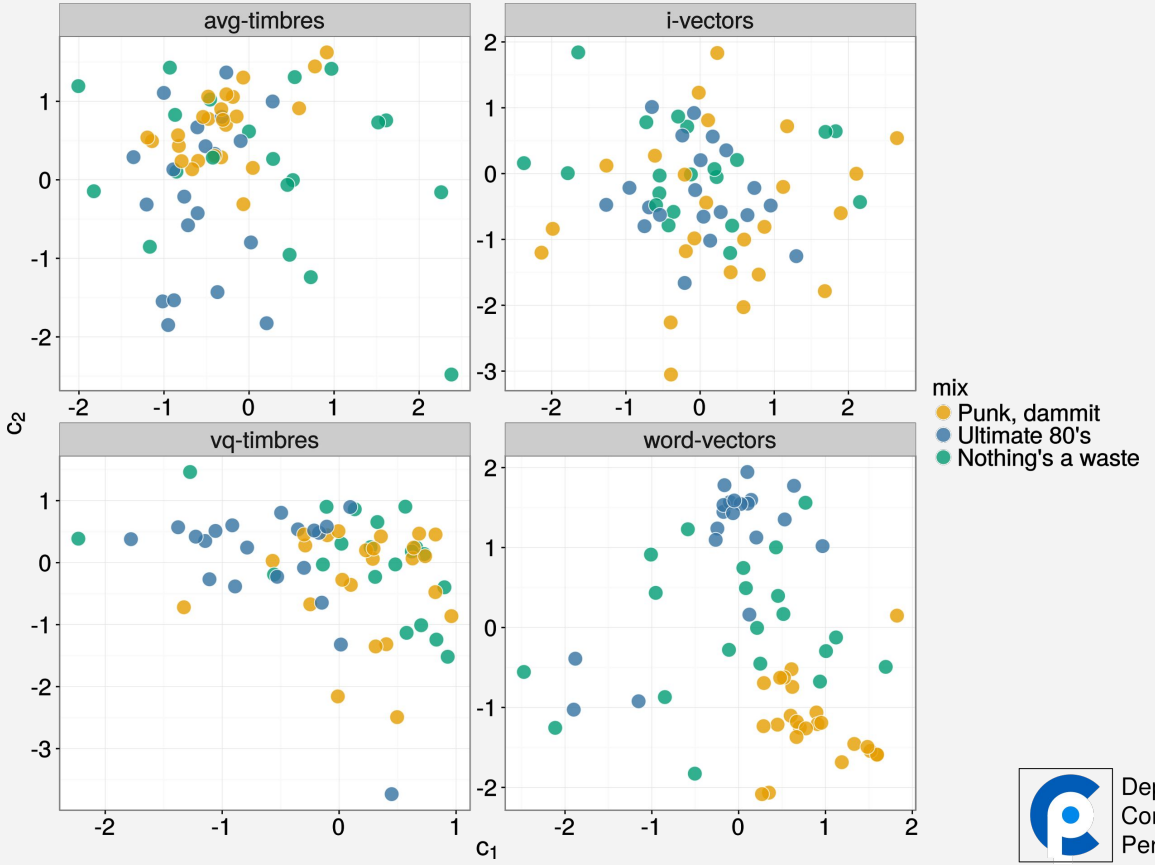
Song features visualization

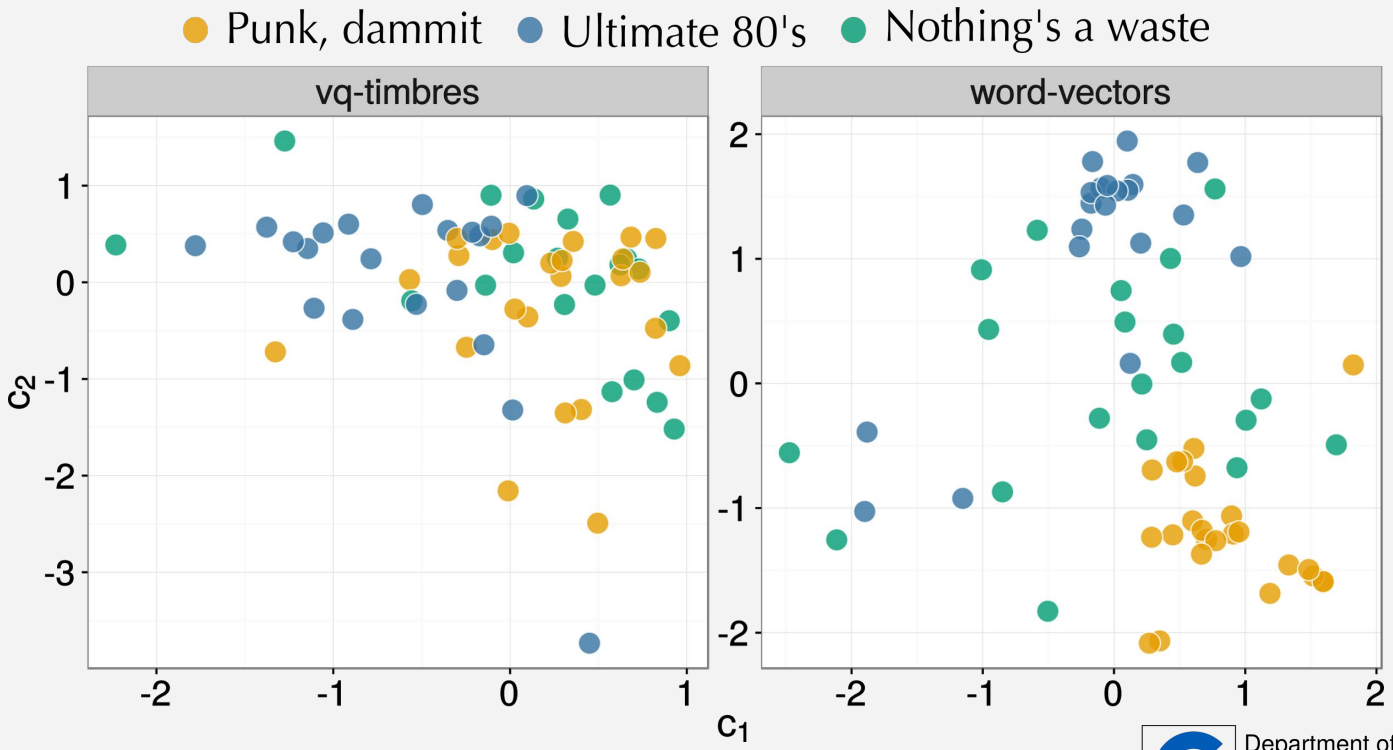


Results

Classifier's performance

		avg-timbres		vq-timbres		i-vectors		word-vectors	
score	#artists	train	valid	train	valid	train	valid	train	valid
Binary cross-entropy	2	0.0244	0.0262	0.0249	0.0257	0.0279	0.0267	0.0180	0.0204
	5	0.0286	0.0296	0.0288	0.0290	0.0306	0.0302	0.0232	0.0250
	19	0.0355	0.0376	0.0363	0.0365	0.0388	0.0380	0.0306	0.0326
Average precision	2	9.64%	1.22%	6.01%	1.28%	2.36%	0.66%	29.97%	17.32%
	5	6.11%	1.06%	4.03%	1.16%	2.98%	0.64%	16.72%	8.13%
	19	8.86%	1.23%	4.22%	1.47%	2.72%	0.71%	11.44%	5.06%

Vector-quantized timbres



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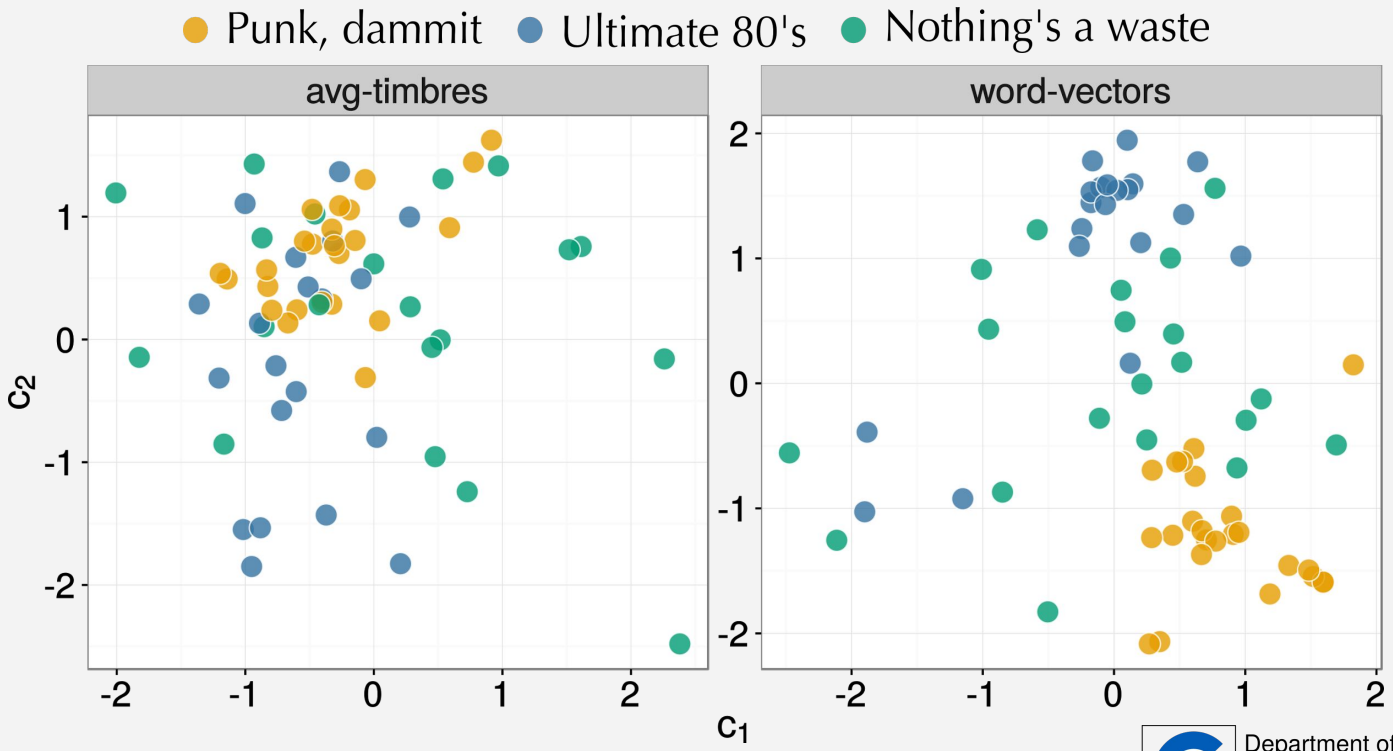
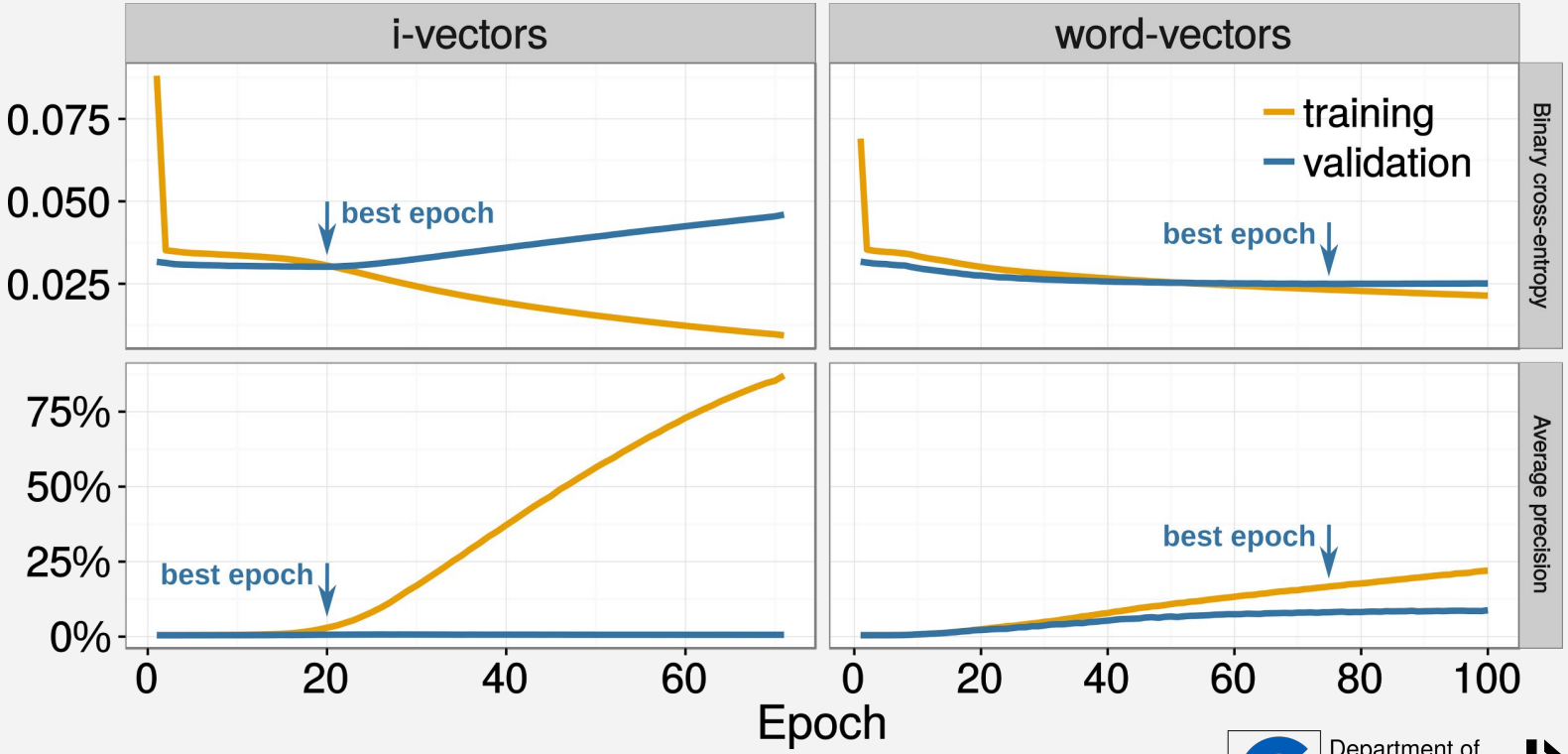
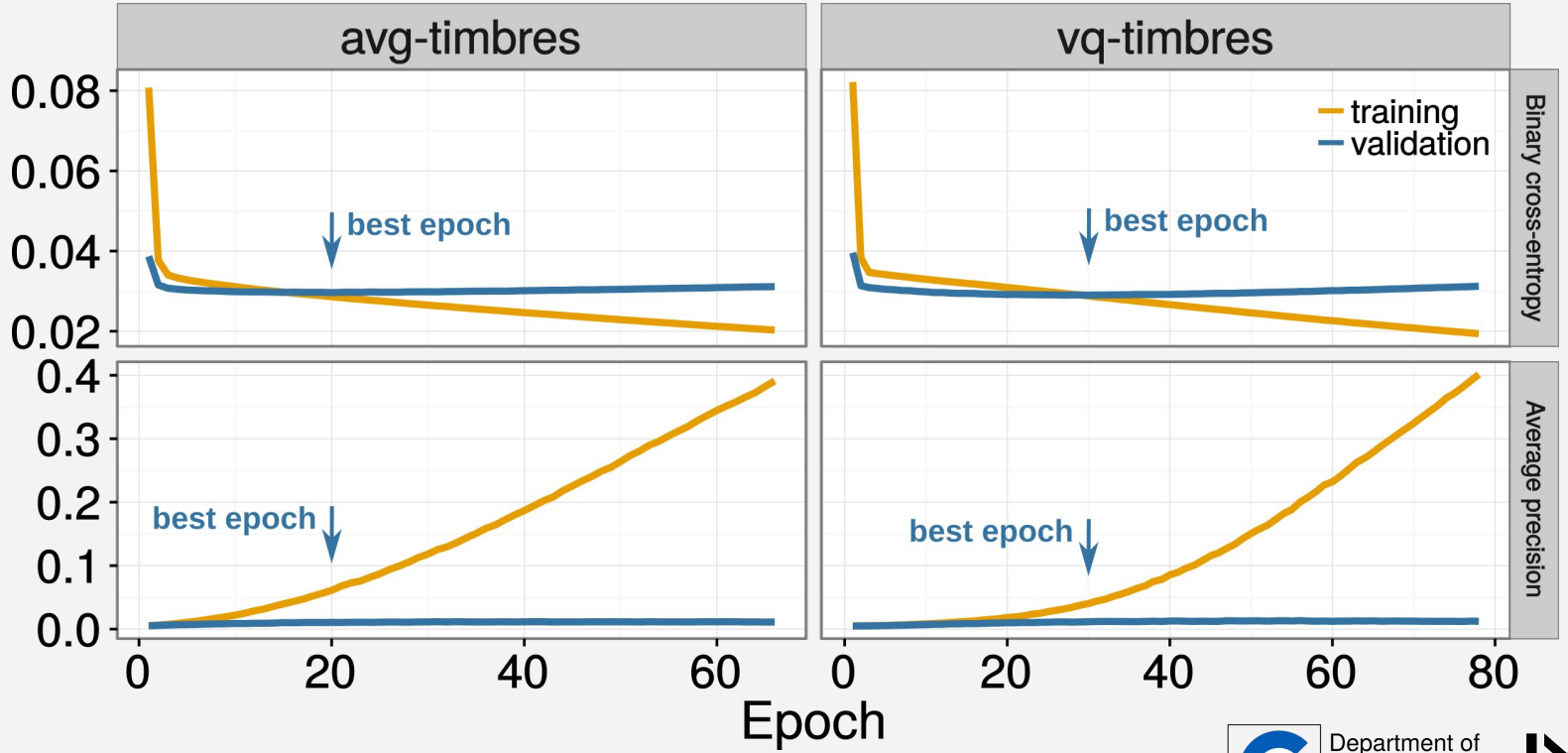
Averaged timbres



Evolution for the 5+ artists subset



Evolution for the 5+ artists subset



Results

Classifier's validation performance

score	#artists	avg-timbres	vq-timbres	i-vectors	word-vectors
Binary cross-entropy	2	0.0262	0.0257	0.0267	0.0204
	5	0.0296	0.0290	0.0302	0.0250
	19	0.0376	0.0365	0.0380	0.0326
Average precision	2	1.22%	1.28%	0.66%	17.32%
	5	1.06%	1.16%	0.64%	8.13%
	19	1.23%	1.47%	0.71%	5.06%