

# Break the Loop: Gender Imbalance in Music Recommenders

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## Overview

- ◆ **Fair** representation of artists and serving them through recommendations
- ◆ **Gender** fairness is one of the artists' main concerns
- ◆ 1) **Qualitative approach** understanding artists concerns
- ◆ 2) **Quantitative analysis** to understand how CF approach performs with respect to the artists' gender
- ◆ 3) **Simulation** of feedback loops and analysis of progressive **re-ranking**

Link to the paper:



## 1. Qualitative Approach

- ◆ **Semi-structured interviews** with 9 participants
- ◆ Recorded, transcribed and Qualitative Content Analysis
- ◆ Covered different topics: Lack of control, context of music, transparency, etc.

## Results

- ◆ **Strong tendency against influencing users:**  
"I don't see why we should tell the users which genres they should listen to"
- ◆ **Except regarding gender; Artists expressed the need for more gender balance in music consumption:**  
"I think there should be actions to correct some biases. The question is in which cases it should be corrected and in which not. In heavy metal music, I imagine that there aren't many female singers. Maybe we could give them more visibility, otherwise they would never be seen"  
"(...) the population of the world is 50% women. So it would be ridiculous if the system wouldn't recommend them."
- ◆ **The artists suggests a progressive change towards 50% gender balance:**  
"otherwise the users could perceive it as something bad and leave the platform."

## 2. Quantitative Analysis

### Data

- ◆ **Last.fm 360K Dataset:** 220K Users and 12K artists
- ◆ **Last.fm 1B Dataset:** 112K users covering 465K tracks by 33K artists
- ◆ **Enriched dataset** with gender information of artists:

Data available online:

<https://doi.org/10.5281/zenodo.3748787>



### Evaluation

- ◆ For each artists' Gender: **Accuracy, Exposure, Ranking**

## Results

Results of recommendations on the Tracks level

Algo	Avg position		% females rec.	Hellinger distance
	1st female	1st male		
ALS	24.9162	4.6993	28.99	0.1374
POP	0.8726	0.8239	66.66	0.3404
RND	3.6422	0.2819	21.72	0.1507

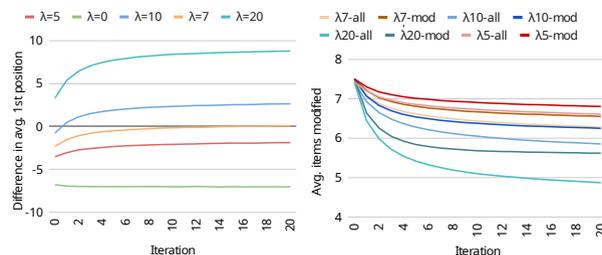
Algo	P@1		P@10		nDCG@100	
	female	male	female	male	female	male
ALS	0.1701	0.3176	0.2193	0.1142	0.1323	0.1802
POP	0.0200	0.0329	0.0261	0.0073	0.0317	0.0092
RND	0.0001	0.0002	0.0001	0.0002	0.0001	0.0002

Results of recommendations on the Artists level

Algo	Avg position		% females rec.	Hellinger distance	
	1st female	1st male			
LFM-1b	ALS	6.7717	0.6142	25.44	0.0988
	POP	0.1325	1.7299	32.44	0.1577
	RND	3.3015	0.3046	23.30	0.1346

LFM-360k	ALS	8.3165	0.7136	26.27	0.2102
	POP	0.9191	0.2713	29.31	0.2670
	RND	3.3973	0.2951	22.77	0.2597

## 3. Simulations



Simulation of the exposure of female and male artists in the recommendations. ( $\lambda$  is number of positions male artists are penalized in the ranking)

## Conclusion

- ◆ Artists would like to see balanced recommendations in terms of the artists' gender
- ◆ Results of CF show **difference on average first position** of female and male artists
- ◆ **The exposure of content by female and male artists is not balanced**
- ◆ Simulating the feedback loop shows that gender can be balanced in a longer term by gradually **increasing the exposure** of female artists in the recommendations.
- ◆ This balance is achieved **without severely affecting performance**