Exploiting Device And Audio Data To Tag Music With User-Aware Listening Contexts

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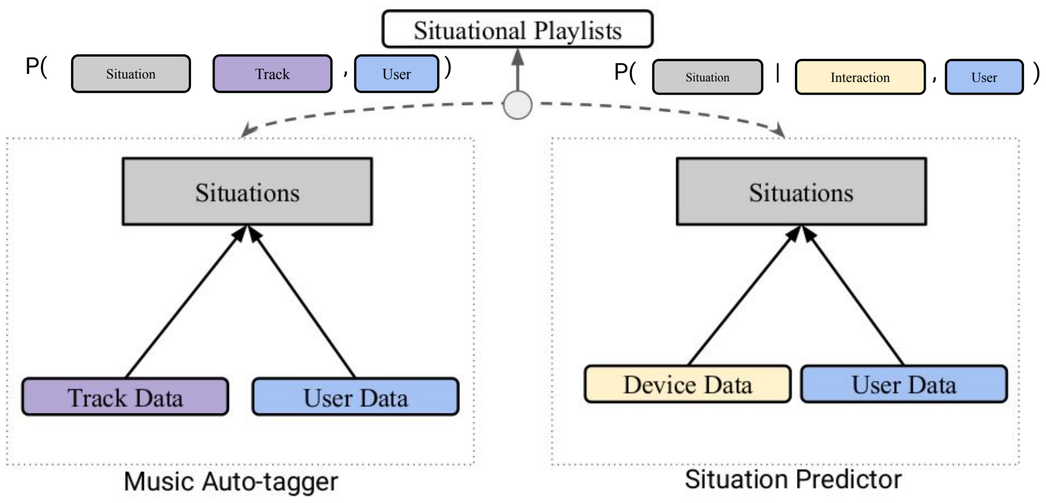
1. Introduction

Users listen to different music in different situations [1]

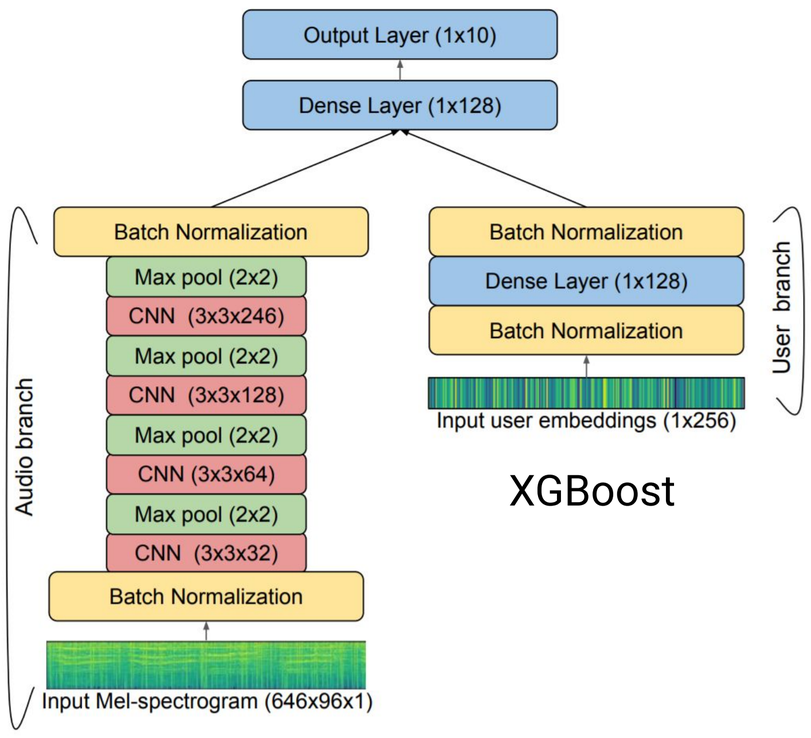
Streaming services are not aware of the listening situation

Our goals:
- Auto-tag tracks with their listening situations.
- Predict which situation a user is experiencing.

2. Proposed System



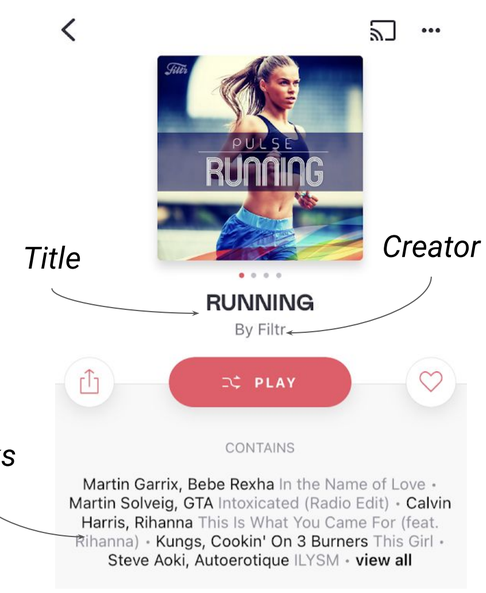
We propose a two-branch approach:
1. The first ia an auto-tagging model using the audio content and the user data to tag tracks [2]
2. The second is an XGBoost model to predict current situations given the device data



XGBoost

3. Dataset

We rely on playlists to collect and label data



<u>Situations:</u>

Sleep	Work	Gym	Party
Morning	Night	Run	Dance
Relax	Car	Train	Club

Device Data:

|Time | Day | Device | Network | Circular Time X | Circular Time Y | Circular Day X | Circular Day Y|

User information:
- Demographic: |Age | Gender| Country|
- Embeddings: 128-d from matrix factorization

Dataset is published for future research [3]

4. Results and Conclusion

The autotagger reaches satisfying performance in different evaluation setups

C	AUC		
	Cold User	Cold Track	Warm
4	0.889 (.009)	0.873 (.013)	0.959 (.013)
8	0.815 (.005)	0.866 (.007)	0.945 (.007)
12	0.852 (.004)	0.824 (.012)	0.941 (.012)

Predicting the situation for new users becomes noticeably harder

If the system is allowed to make multiple guesses, the accuracy increases significantly

C	Accuracy		Accuracy @3	
	Cold User	Warm	Cold User	Warm
4	47.46 (0.98)	66.96 (0.39)	90.51 (0.31)	96.3 (0.1)
8	30.95 (0.89)	49.23 (0.16)	64.11 (1.42)	79.62 (0.13)
12	25.00 (0.29)	39.92 (0.13)	52.04 (0.61)	67.62 (0.21)

5. References

[1] North, Adrian C., and David J. Hargreaves. "Situational influences on reported musical preference." Psychomusicology: A Journal of Research in Music Cognition 15.1-2 (1996): 30.
[2] Ibrahim, Karim M., et al. "Should we consider the users in contextual music auto-tagging models?" Proceedings of the International Society for Music Information Retrieval Conference, Montreal, Canada, 2020.
[3] https://zenodo.org/record/5552288

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