

# LEMONS: Listenable Explanations for Music recOmmender Systems

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## Introduction

Different types of explanations in recommender system research have been proposed. However, none of the existing approaches provides explanations in the same modality of music itself, i.e. **listenable**. We address this shortcoming in LEMONS by:

- (1) Adopting an audio-based music recommender system.
- (2) Providing listenable explanations of the recommended tracks.

## System Overview

### (1) Audio-based Recommender System:

We train a convolutional neural network on mel-spectrograms of the input audios to predict the relevance of a specific track for each user separately. We consider tracks that have been listened to as relevant, and randomly select tracks that have never been listened to as non-relevant.

### (2) Listenable explanations:

We use audioLIME to generate explanations on the predicted relevant tracks. audioLIME assigns a score to each interpretable feature of the audio. The higher the score, the more important the interpretable feature is for the prediction.

### (3) Dataset:

We train and evaluate on 7 users with different music tastes from the Million Song Dataset. We also test on musdb18.

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### User/Persona Selection

Below you can explore the 7 users/personas of our demo. Each user is characterized by a distinctive music preference.

Which user?

Elizabeth - (rock, alternative metal, heavy metal)

### Selected user profile

**Elizabeth**  
Her top 3 genres she likes are rock, alternative metal, and heavy metal.  
She listened to 826 tracks (shown below sorted by playcount) for a total of 1918 listening events.

	title	artist	album	playcount	track
679	You Often Forget (malignant)...	Revoluting Cocks	Big Sexy Land	37	TRNSVAT128F147B61
536	Never Enough	Five Finger Death Punch	The Way Of The Fist	23	TRQPJAC128F9320B6
209	5.45	Gang Of Four	Entertainment	17	TR0TJAM128F1466DC
1553	Crossing Over	Five Finger Death Punch	War Is The Answer	14	TRPOCPP12903CAE12
655	Dressed In Decay	OKY	An Answer Can Be Found	14	TRVINSF128E078E1C
238	Skin Ticket (Album Version)	Slipknot	Iowa	13	TRSDVCM128F423846
903	Return of the Ties	Delinquent Habits	Escena Alterlatina	13	TRWYUZI128F931167
595	Salvation	Five Finger Death Punch	The Way Of The Fist	13	TRPQWV128F933856
1555	Bodies	Drowning Pool	Sinner	12	TRILVCI12903CCC9E
551	Sermon	Drowning Pool	Sinner	12	TRLNLRD12903CCC9F
448					

Fig. 1: Landing page of the demo.

## Listenable Explanations

We offer three explanations based on different types of interpretable features:

### (1) Time-based explanations

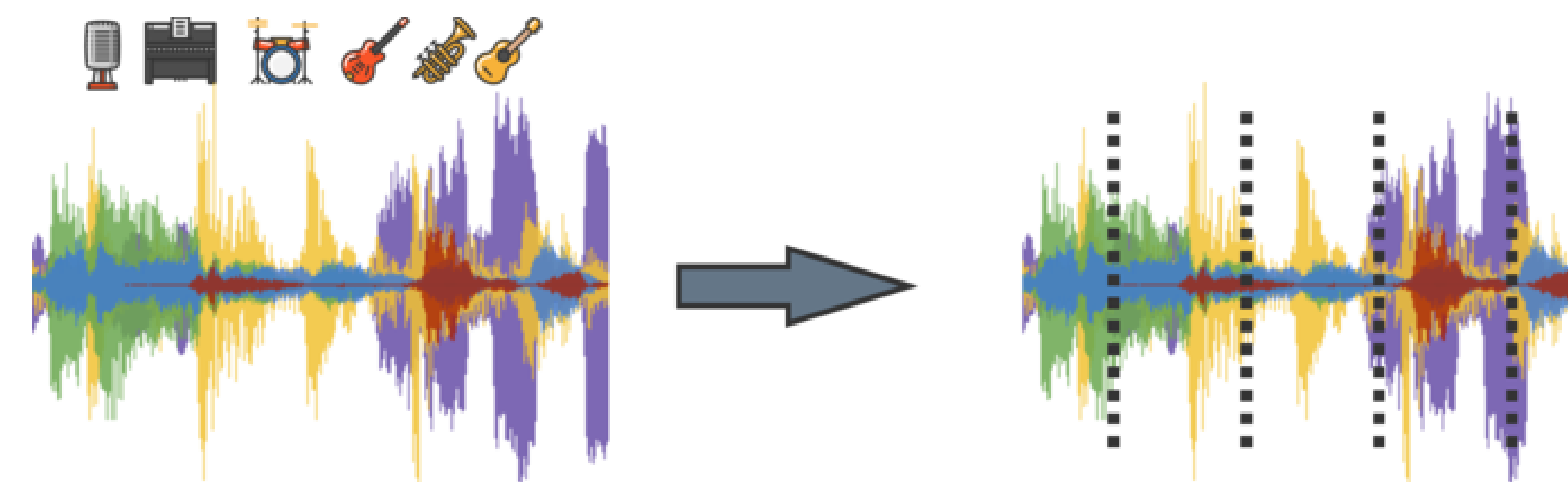


Fig. 2: The input audio is split into equally sized time segments.

### (2) Source-based explanations

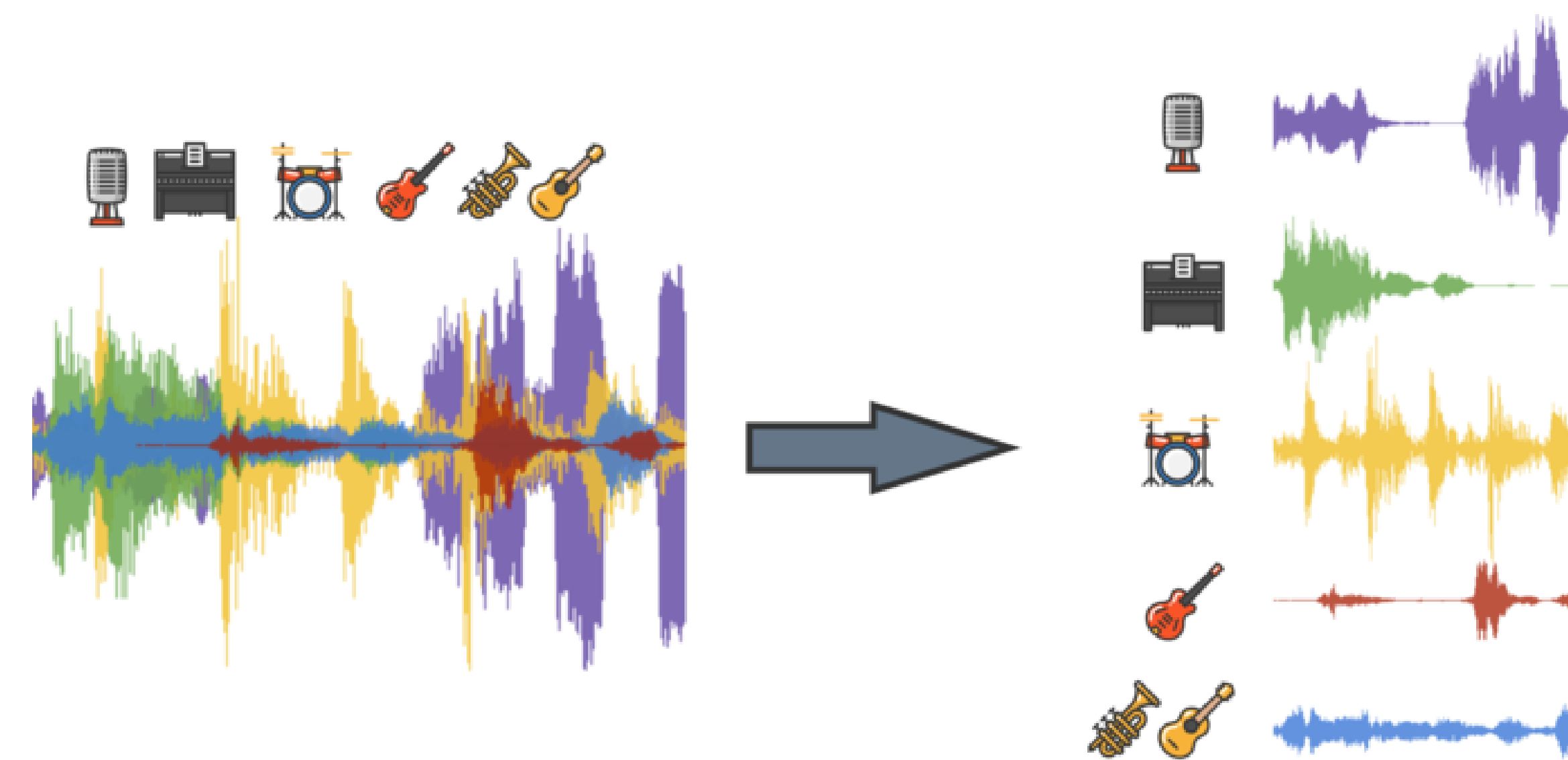


Fig. 3: The input audio is separated into 5 instrumental sources.

### (3) Time and Source-based explanations

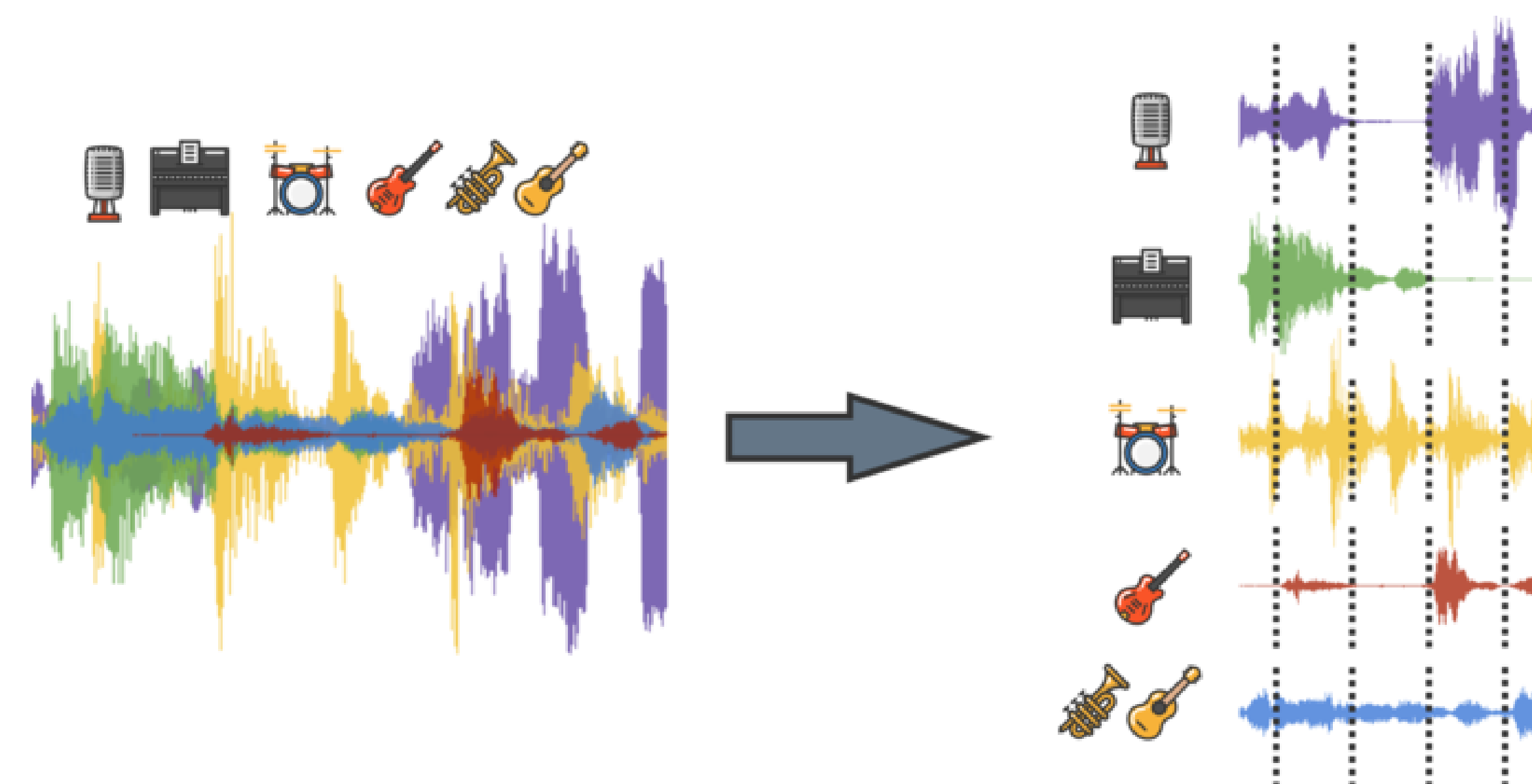


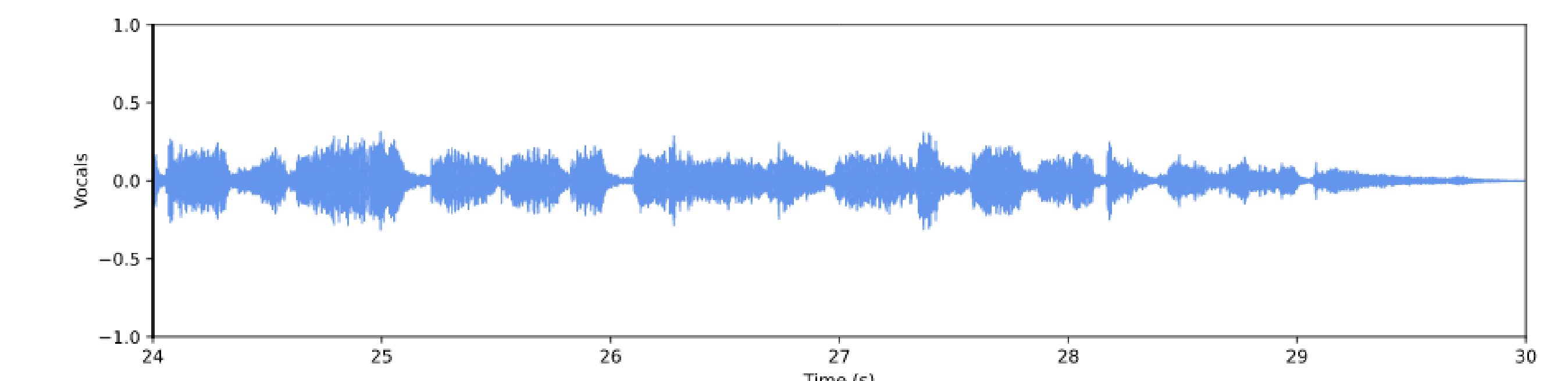
Fig. 4: The input audio is separated into 5 instrumental sources and segmented into equally sized time segments.

## Explanation Interface

We show the listenable explanations by displaying the **Top Highlight** and the **Top-3 Components**.

### Top Highlight

What is the component of the audio that influenced the recommendation the most?



### Top-3 Components

What are the top-3 components of the audio that influenced the recommendation the most?

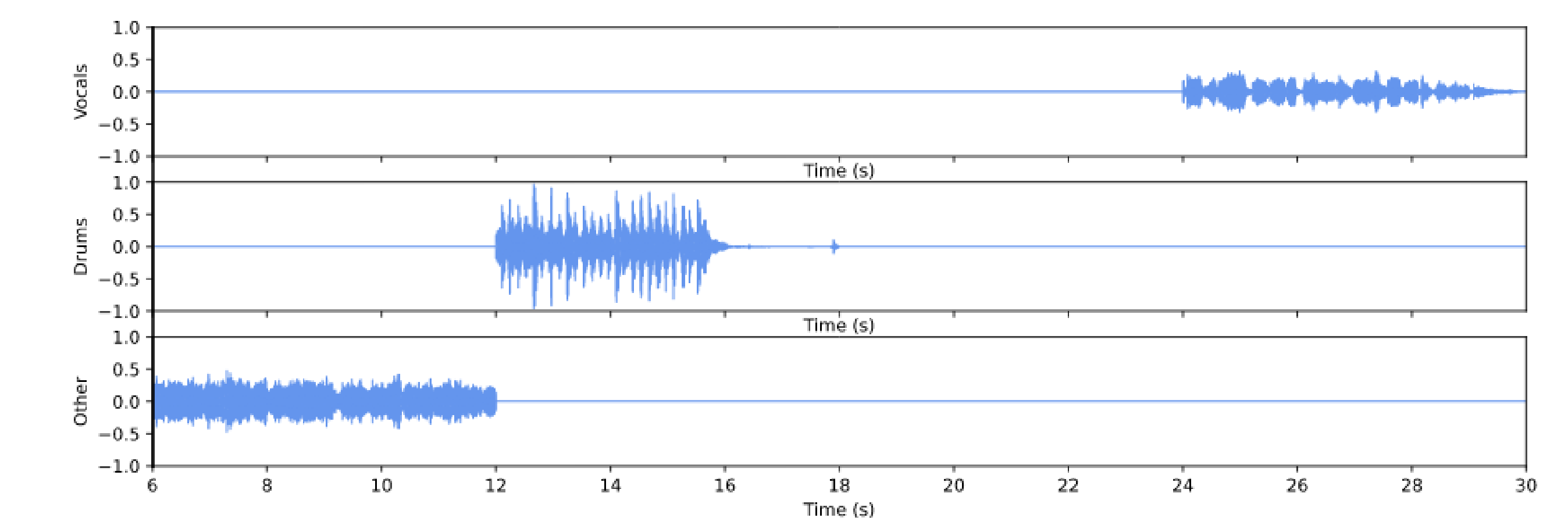


Fig. 5: Explanation interface.

## Future Work & Discussion

We presented a novel approach to generate listenable explanations for music recommender systems (LEMONS). As future work, we plan to use a more meaningful time segmentation scheme (e.g. chorus vs. verse), to incorporate collaborative filtering data, and to investigate the usefulness and quality of the explanations through a user study.

(1) **Thinking about your favourite song, what would be a reasonable listenable explanation of it? Would you listen to it after hearing the explanation?**

(2) **Do you think listenable explanations would make the recommendation more transparent? Would you be more satisfied of the recommendation?**

(3) **Generally, in which context would you expect a listenable explanation?**