AI Search for Physiologically Arousing Songs

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Subjects:

- AI Search
- Sound and Music Computing
- Human-Computer Interaction
- Wearable Tech

Sound and music can cause intense emotional reaction in listeners (Rickard, 2004), but the action of storing music in a playlist can easily distract the listener and ruin the experience. In addition to this, each listener may respond differently to the same song based on context, past experiences, and psychology (Sandra Garrido, 2011).

Physiological arousal is the state of the brain and sympathetic nervous system being 'awake', or highly active, often due to intense emotion or emotional stress. When a song causes a listener to get 'pumped up', it is accompanied by an increase in the user's physiological arousal (Francesca R. Dillman Carpentier, 2007). This can be measured using galvanic skin response (GSR) sensors, which measure a change in arousal (IMOTIONS, 2015). These are commonly used in lie detectors and are available very cheaply (seeed, n.d.).

We can model the problem of finding a song which causes increased physiological arousal as an AI search problem. The Spotify Web API includes an endpoint named `audio-features`, which returns a list of 13 scalars describing the properties of the song (Spotify, n.d.). These scalars include 'danceability', 'loudness', and 'instrumentalness', among others, and can be used as the axes of a high-dimensional space. We can map a fitness landscape onto this space, where each song is represented by a point in the space, and each point in the space has a fitness determined by how much the song increased a listener's physiological arousal.

The main difficulty in this project is how to perform a robust search with very limited data. It will take the full length of each song to determine the listener's change in arousal, and the task cannot be easily parallelised due to the need for a human listener, and the fact that each listener may respond differently to each song.

Once this system is working reliably, we will develop it into a wearable device so it can used portably. This system has applications for the general consumer, in addition to potential uses in a music therapy setting (Pelletier, 2004). Further research in the area could move to using more complex sensors, such as EEG headsets, rather than GSR sensors, or alternatively generating physiologically arousing music from scratch.

Anticipated Outcomes: Development of a system for automatic generation of playlists of physiologically arousing songs and miniaturisation of the system into a wearable device.

References

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