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Generative Artificial Intelligence to Provide Seamless Music Transition

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ABSTRACT

Listeners of streamed music may experience brief pauses or interruptions between songs, which can disrupt the listening experience. This disclosure describes techniques for eliminating or reducing pauses between songs on music streaming platforms, thereby providing a seamless, uninterrupted listening experience for users. Artificial intelligence (AI) or machine learning (ML) modules analyze rhythms of the current and upcoming songs. A seamless transition between songs is achieved by determining points in sequential songs that have a common rhythm, or by synthetically generating and inserting a transitional piece of music between sequential songs.

KEYWORDS

- Music streaming
- Generative AI
- Music generation
- Audio generation
- Song transition
- Crossfade
- Audio void
- Transitional music
- Seamless transition
- Rhythm analysis
- Rhythm matching
- Rhythm pattern
- Beat structure
- Timing signature
- Pause reduction
- Beat synchronization

BACKGROUND

Listeners of streamed music may experience brief pauses or interruptions between songs, which can disrupt the listening experience by creating an unpleasant audio void. Such pauses can occur when the user manually skips to the next song or when the app automatically transitions to the next song after the current song ends. The pauses can be jarring and detract from the overall listening experience.

DESCRIPTION

This disclosure describes techniques for eliminating or reducing pauses between songs on music streaming platforms, thereby providing a seamless, uninterrupted listening experience to users. Artificial intelligence (AI) or machine learning (ML) models are used to analyze rhythms of the current and upcoming songs, and to generate a seamless transition between the songs, as explained in greater detail below.

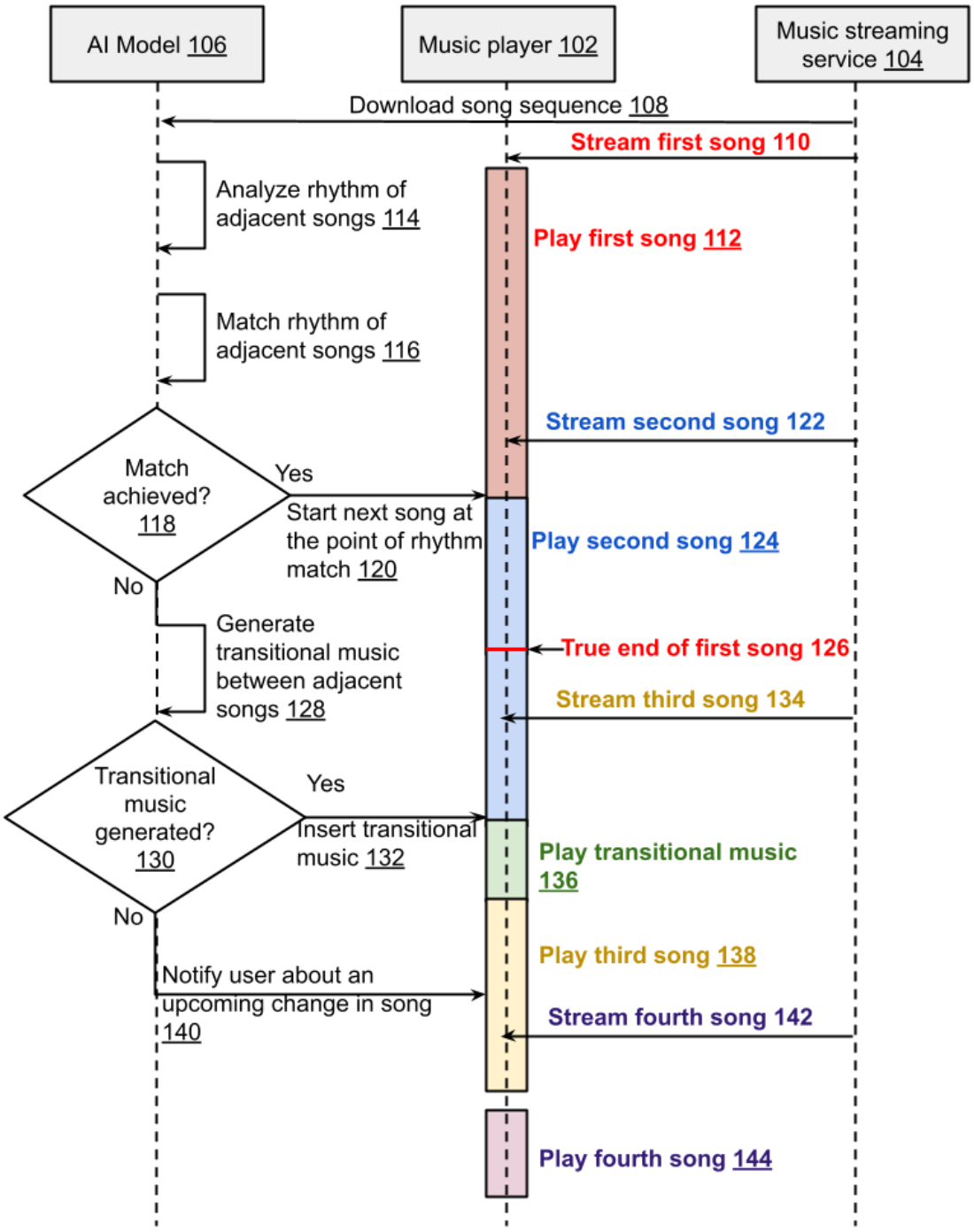

Fig. 1: Seamless music transition using AI/ML models

Fig. 1 illustrates seamless music transition using an AI/ML model. A user listens to music on a music player (102), which receives streamed music from a streaming service (104). The streaming service feeds songs in a particular sequence, e.g., a first song (red) followed by a

second song (blue) followed by a third (yellow) followed by a fourth (purple), etc. A song can either come naturally to an end and be followed by the next song, or it can be skipped by the user to the next song. In either case, to achieve a seamless transition between songs in a song sequence, the music streaming service provides the song sequence (108) to an AI model or ML engine (106). The first song (red) is streamed to the player (110) and played (112).

Rhythm analysis and matching

The AI model analyzes the rhythms of the first and second songs (114) to find a point of common rhythm, e.g., where their rhythms match (116). If a time point is found where the two songs match in rhythm (118), the next (second) song is started at the point of the rhythm match (120), even as the actual end of the first song (126) may be some time away (e.g., in response to user input to skip to the next song, or at a time point near the end of the first song that has a rhythm match). The AI/ML engine analyzes the rhythm patterns of the current and upcoming songs in the sequence to extract key rhythmic features such as tempo, beat structure, and time signature. The extracted rhythmic features are used to identify points of seamless transition between the two songs. A point is found where the rhythmic patterns of the two songs align, enabling a smooth, uninterrupted transition.

Rhythm generation

It is possible that no common rhythm is found (118) between sequential songs (a time point of match is not found), e.g., as between the second (blue) and third (yellow) songs in the example of Fig. 1. In such a case, the AI model generates a transitional piece of music that seamlessly bridges the gap between the second and third songs (128). The generated music is tailored to match the rhythmic characteristics of the source and target songs, ensuring a smooth and natural transition.

If such a piece of transitional music is successfully generated (130), when the second song streams (122) and finishes playing (124) (or the user initiates skip), and before playback of the third song is initiated, the AI-generated transitional music (green) is inserted (132) and played (136). The third song is streamed (134) and playback of the third song (138) is initiated after the transitional music has been played, thereby seamlessly transitioning music playback between the second and third songs.

User notification

It is possible that no common rhythm is found between sequential songs and no transitional music is successfully generated (130), e.g., between the third (yellow) and fourth (purple) songs. In such a case, the AI/ML engine determines the duration of the next beat that can be synchronized and notifies the user ahead of time (140). The notification provides the user an alert about an upcoming gap in music, enabling the user to mentally prepare for the brief gap during song change. The fourth song is streamed (142) and played (144).

In this manner, music streaming platforms can effectively eliminate or significantly reduce pauses or awkward transitions between songs, providing users with an uninterrupted and enjoyable listening experience. Note that while Fig. 1 illustrates the AI/ML engine performing song analysis to determine matches or generate transitional music as song playback continues on a music player, in various implementations, different song sequences may be analyzed offline and beat matches/ transitional music generated and cached prior to music playback, thus providing seamless transitions at low computational cost.

CONCLUSION

This disclosure describes techniques for eliminating or reducing pauses between songs on music streaming platforms, thereby providing a seamless, uninterrupted listening experience for

users. Artificial intelligence (AI) or machine learning (ML) modules analyze rhythms of the current and upcoming songs. A seamless transition between songs is achieved by determining points in sequential songs that have a common rhythm, or by synthetically generating and inserting a transitional piece of music between sequential songs.