Chapter 19
A Survey on Exploring the Relationship Between Music and Mental Health Using Machine Learning Analysis

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ABSTRACT

This chapter embarks on a journey to probe the intricate relationship between music and mental health through the lens of machine learning algorithms. Acknowledging music's profound influence on emotions and moods, the study delves into its potential therapeutic role for individuals grappling with mental health issues. Capitalizing on the advancements in machine learning, this endeavour endeavours to unveil hidden patterns, correlations, and even causal connections between distinct musical attributes and mental health outcomes. The research methodology charted involves the assimilation of a diverse dataset of music tracks and mental health indicators sourced from participants. Leveraging audio signal processing techniques, pertinent musical features such as tempo, rhythm, pitch, and emotional valence will be extracted. This trove of data will then be subjected to an array of machine learning.

INTRODUCTION

The convergence of music and mental health forms a compelling and nuanced arena for exploration one that intersects human emotion, cultural expression, and therapeutic potential (Bose et al., 2023). In this modern age, where technology unlocks new dimensions of inquiry, the combination of music with machine learning algorithms presents an unprecedented opportunity to unearth the intricate relationship between

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melodies and mental well-being (Regin et al., 2023a). This section introduces the research backdrop and significance, delineates the research objectives, and provides an overview of the methodology charted for this enlightening journey (Rahman et al., 2021).

Music's transformative influence on human emotions has been etched across cultures and centuries (Regin et al., 2023b). It has provided solace during times of distress, ignited joy in moments of celebration, and acted as an unspoken channel for the expression of feelings that words often fail to capture (Angeline et al., 2023). The growing recognition of music's therapeutic potential, particularly in the realm of mental health, has spurred an earnest quest to understand the mechanics of this symbiotic relationship (Rajest et al., 2023a). From alleviating stress and anxiety to aiding in the management of mood disorders, music has showcased its ability to facilitate emotional release and catalyze healing (Raglio et al., 2020).

The music with machine learning algorithms presents a ground-breaking frontier (Manickam Natarajan, 2020). As technology surges forward, the analytical precision of machine learning can be harnessed to decode the intricate connections between specific musical attributes and mental health outcomes (Rajest et al., 2023b). By peering into the harmonious marriage of music and data, this research strives to elevate our comprehension of how music can be wielded as a tool to foster mental well-being (Kruthika et al., 2021; Tak et al., 2023).

The objectives of this research endeavour form the guiding stars illuminating this intellectual journey: To uncover patterns and correlations between distinct musical elements and mental health indicators (Abbassy & Mohamed, 2016). This includes identifying how musical attributes, such as tempo, rhythm, and emotional valence, resonate with participants' mental states (Obaid et al., 2023; Kumar Nomula, 2023). To explore potential causal relationships between specific musical attributes and changes in mental health outcomes (Khalifa et al., 2013). By delving into causality, the research aims to ascertain whether certain musical features have a direct impact on enhancing emotional well-being (Shukla et al., 2023; Vashishtha & Kapoor, 2023).). To provide insights that can inform the development of music-based interventions for mental health treatment (Boopathy, 2023). By discerning the musical elements that evoke positive emotional responses, this research aims to contribute to the refinement of therapeutic approaches (Abbassy Mohamed, 2020; Sneha & Thapar, 2019).

The methodology adopted for this research journey embodies a comprehensive and systematic approach, blending quantitative analysis with an empathetic understanding of human experiences (Bala Kuta & Bin Sulaiman, 2023). The process unfolds through distinct stages: A diverse dataset of music tracks, spanning genres and emotional nuances, will be assembled (Regin et al., 2023c). Concurrently, mental health indicators sourced from participants will encompass self-reported measures such as anxiety levels, stressors, and well-being (Sadek et al., 2021). Leveraging advanced audio signal processing techniques, pertinent musical attributes-such as tempo, rhythm, pitch, and emotional valence-will be extracted from the amassed music tracks (Oak et al., 2019). The heart of the research lies in the application of machine learning algorithms. Regression, classification, and clustering methods will be harnessed to dissect the intricate interplay between musical attributes and mental health outcomes (Saxena, 2022). Informed consent, privacy protection, and adherence to ethical guidelines will be the bedrock of participant engagement and data handling (Khalifa et al., 2014; Kothuru, 2023).