

Chapter 7

Personalized Music Recommendation System for Athletes Using EEG Signals

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ABSTRACT

Personalized music recommendation system that uses EEG data to assess athletes' emotional states, such as calm, focus, excitement, and suggests music to enhance their performance. The system includes three key components: emotion classification, music profiling, and integration. EEG signals are collected from athletes during tasks designed to evoke specific emotions, followed by feature extraction and emotion classification using machine learning. A curated music database categorizes tracks by emotional characteristics (e.g., tempo, genre, mood) to match identified emotional states. The emotion recognition model integrates with the music recommendation system to suggest real-time tracks. The system is tested using athlete feedback, aiming to improve mental focus, relaxation, and motivation during training and competition, offering a data-driven approach to music therapy for peak performance

1. INTRODUCTION

1.1 The Power of Music in Enhancing Athletic Performance

Music has long been recognized as a tool for athletes to inspire, manage stress, and improve focus. Its impact on emotions, cognitive function, and physical performance makes it an invaluable part of an athlete's routine. However, most athletes' current music choices are based on personal preference or general assumptions rather than their real-time mental state, which may limit the potential benefits.

1.2 Challenges of Traditional Music Approaches for Athletes

Although music can have a profound effect on performance, traditional methods of music selection tend to overlook the athlete's unique psychological state. Relying on static playlists or personal taste doesn't consider factors like focus, relaxation, or mental fatigue, which can fluctuate throughout training or competition. As a result, these approaches might not be fully effective in optimizing performance or supporting emotional balance.

1.3 The Role of EEG in Understanding Cognitive States

Advances in machine learning, neuroscience, and wearable technology have opened new possibilities for improving music selection. By utilizing EEG (Electroencephalogram) technology, we can monitor an athlete's brain activity in real time, gaining insights into cognitive states such as:

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