Chapter 8
Recent Trends in Biomedical Technologies:
Challenges and Opportunities

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ABSTRACT

Telemedicine is the use of immersive multimedia communication to transmit patient knowledge in order to conduct consultations, medical tests and operations, and medical professional partnerships from a distance. The fact that telemedicine is an "accessible and rapidly changing science" is often emphasized. The constant advancement of technology, which paves the way for the expansion of internet connections and the expansion of data processing capability, has increased the possibilities for the global health industry, especially telemedicine, to expand. Information exchange, data mining, the internet of things, wearables, digital computing, and robotics are all emerging as key drivers of creativity in the coming decade.

1. INTRODUCTION

Swarm Intelligence (SI) is a population-based optimization approach that is a sub-domain of soft computing techniques. To solve issues, it typically imitates the social behaviors of many animals seen in nature. In today's world of quadratic equations, Swarm Intelligence (SI) aids in the optimization of quadratic equations with maximum accuracy and in the shortest time possible. Particle Swarm Optimization (PSO) is a kind of swarm intelligence that replicates birds' social behavior while hunting for food. The expanded Kaptur's entropy criteria approach is used as the fitness function in this article to optimize two

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threshold values utilizing the basic PSO methodology. In computer vision, edge detection is a crucial task. It is still an active study field since it is often employed as a first step in extracting information from pictures. Edge detection is utilized in object identification, picture segmentation, and understanding an image's structure. The edges of an image provide extremely useful information about the items' frontier/boundary in a computer vision application., Rao 2019- M.Han 2010.

Changes in the object's characteristics, such as geometry, shape, size, light intensity, and reflection, create the image's edges. In a gray-level picture, an edge is the line that separates two areas of different grey levels. To put it another way, an edge is a break in the picture intensity or its first derivative. There are two kinds of picture intensity discontinuities. Step discontinuities and line discontinuities are the two types of discontinuities. The rapid variations in picture intensity cause step discontinuities. Line discontinuities, on the other hand, are sudden changes in picture intensity that recover to their previous intensity after a given distance H.Gao 2010- Wu,B 2012. However, because to the smoothing provided by most sensing equipment, low-frequency components in pictures, and external noise, these discontinuities are seldom seen in actual photographs. As a result, the ramp edges were created by step intensity change edges, whereas the roof edges were made by line intensity change edges. It is essential to develop efficient image processing techniques, and clustering is one of them, to offer the proper job of pattern identification. Many current clustering techniques, on the other hand, rely on human tweaking and cannot guarantee correct results when visual input is distorted. One of the most significant difficulties of automatization in many areas of social life is the use of machine vision. The authors investigate the use of machine vision in autonomous cars. The definition of other road users (autonomous vehicles), identification of road infrastructure, and road marking are the main objectives of such study. (Jayakumar D.N 2014- Senthilnath J 2011).

2. BIOMEDICAL IMAGE PROCESSING

Most current methods are unique, and it seems that some modifications are required to utilize them in other situations. Some methods for organizing machine vision require a significant amount of computer power. The article focuses on methods to enhance the quality of pattern recognition. The suggested paper's relevance to the computer vision field is explained by the fact that computer vision may be integrated in vehicles, drones, and utilized to automate processes like road traffic and space monitoring. It is critical to offer accurate computer vision work since mistakes may result in fatalities and damages.

The authors claim that their goal is to develop efficient image processing techniques in order to prevent such outcomes. Segmentation and clustering are two terms that may be used to describe them. They do not, however, guarantee reliable findings in the event of visual information distortion or a high degree of noise. The reason for this is because these techniques need manual tweaking. The paper's authors attempted to create a clustering technique based on particle swarm optimization (PSO) that automatically selects parameters. This technique also incorporates the k-means clustering method, which calculates the minimum value of the distance function to arrange pixels into a predefined number of clusters. The particle group motion (pixel-by-pixel transit across the picture) and search for the optimum solution for the whole swarm (search for pixel with the highest average intensity value in a specific area) are utilized in comparison to the PSO.

In contrast to the original k-means technique, there is no requirement for the user to predetermine the cluster quantity, and in addition to the distance function reduction operation, the color function minimiza-