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Designing a Heuristic Based Hybrid CNN with Attention Mechanism for the Effective Classification of Fish Species

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Abstract

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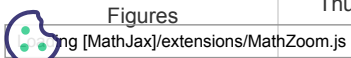
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In recent days, the population of fish species is enormously increased. The measurement of the total population of the fish species is also a complex task. The population of fishes can be easily identified by its classification of variants. But, the categorization of fishes is an annoying task for marine ecologists and biologists. The fishery activities can be easily managed by calculating the total population and size. Several methods are developed for classifying the fish species, but they take more computational time and manpower. These limitations are overthrown by automatic methods. The automatic method monitors the activities of fish and their path. The major advantages of this automatic System are to reduce labor requirement and time. This research study suggests a new fish species categorization model with the help of a Hybrid Convolution Neural Network(CNN) with an Attention Mechanism (HCNN-AM). In the initial phase, the images are aggregated from the standard benchmark dataset. Then, the images are forwarded to the hybrid CNN with an attention mechanism for effectively classifying the fish species, in which the attributes are optimized with the aid of a hybrid Fitness-based Hybrid Rat Swarm with Billiards-inspired Optimization (FH-RSBO). Therefore, the planned method is an efficient substitute for strenuous and time-consuming methods of physical recognition by marine experts. Thus, it becomes the most advantageous task to monitor the fish biodiversity in their natural habitats.

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☰ Contents

I. Introduction

For many professions and businesses, the ability to identify fish by their features is essential [6]. Environmental pressures, including global warming, climate change, and pollution, as well as cultural pressures, such as unrestricted overfishing and sustainable exploitation of marine natural resources, increase the impact on fish populations [7]. The results of these provide as more justification for the creation of a standardized, affordable, and trustworthy model to monitor the fish species across ecosystems [8]. Fish experts are often needed for accurate and objective identification of fish species, so manual methods to identify fish can be problematic [9]. They can be time-consuming, costly, and require extensive sampling efforts, harming the marine environment [10].

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