**Classification of Underwater Fish Species using Custom Built Deep Learning Architecture**

The increasing use of underwater exploration and monitoring systems has led to a growing demand for accurate fish species identification. This project presents a novel approach for classifying underwater fish species by developing a custom-built deep learning architecture tailored to the challenges of underwater imagery. Traditional machine learning techniques often struggle with the variability of underwater environments, including factors like water turbidity, lighting conditions, and fish occlusion. To address these issues, our architecture integrates convolutional neural networks (CNNs) optimized for feature extraction in low-visibility settings, with additional layers designed for handling spatial variations in underwater imagery.

The system was trained using a diverse dataset of fish species captured in real-world underwater environments, ensuring robustness to variations in color, shape, and background. Through extensive experimentation, the proposed model achieved high accuracy in recognizing multiple species, outperforming traditional models. Our approach also includes a preprocessing pipeline for enhancing image quality and removing noise. The results demonstrate the potential of deep learning models to contribute significantly to marine biology, ecological monitoring, and underwater biodiversity research.

**Keywords**: Underwater imagery, Fish species classification, Deep learning, Convolutional neural networks, Marine biodiversity.

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