East West University

CSE366: Artificial Intelligence

"Related Works"

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Md Saif Abrar Chowdhury (2022-3-60-051)							
Ref	**Title**	**Dataset Description**	**Methods**	**Results**	**Pros**	**Cons**	**Future Work**
1	[2022] Targeted Data Augmentation and Hierarchical Classification with Deep Learning for Fish Species Identification in Underwater Images	Fish Recognition Ground-Truth (FGRT) (4,000+ images, 20 species), LifeClef 2015 (6,473 images, 93 species)	CNNs (ResNet, DenseNet); transfer learning; targeted data augmentation; hierarchical classification	99.86% accuracy (FGRT), 81.5% (LifeClef)	Tackles class imbalance; high accuracy; hierarchical structure	Results may not generalize to new or local datasets	Extend to real-time & region-specific applications
2	[2021] Fish species recognition based on attention residual networks	Fish-Pak dataset (10 species) and related public benchmark datasets	Attention Residual Neural Networks (AttResNet); feature fusion	97.2% accuracy (Fish-Pak), 96.2% (Fish4Knowledge)	Improved feature representation; strong generalization	Tested on relatively small datasets	Apply to larger and more diverse datasets

Syeda Rehnova Nobo (2022-3-60-058)							
Ref	**Title**	**Dataset Description**	**Methods**	**Results**	**Pros**	**Cons**	**Future Work**
3	[2022] Targeted Data Augmentation and Hierarchical Classification with Deep Learning for Fish Species Identification in Underwater Images	Uses public benchmark fish datasets, e.g., Fish Recognition Ground-Truth, LifeClef 2015 Fish	Deep CNNs, transfer learning, targeted augmentation, hierarchical classification	Achieved 99.86% accuracy (FRGT), 81.53% (LifeClef 2015)	Tackles data imbalance; hierarchical approach mirrors taxonomy; real-world images	May require specialized annotation and computing resources	Extend to real-time systems; fine-tune for region-specific data like Bangladesh
4	[2018] Fish Recognition based on Convolutional Neural Network	Fish4Knowledge dataset (images from underwater cameras, 23 species)	CNN with local response normalization; 5 layers, dropout	Classification accuracy of 94.7%	Simple CNN architecture performs well; open implementation	Limited architecture exploration; single dataset focus	Test deeper models; cross-domain and environmental robustness

Tasfia Binte Jahangir (2022-3-60-111)							
Ref	**Title**	**Dataset Description**	**Methods**	**Results**	**Pros**	**Cons**	**Future Work**
5	[2019] Underwater Fish Species Recognition using Deep Learning Techniques	27,370 images, 23 species (highly imbalanced, least frequent ~1000x less than the most), URL:Fish4Knowledge	DeepCNN (3 conv layers, ReLU, dropout), DeepCNN-SVM, DeepCNN-KNN; Keras with TensorFlow.	Good precision-recall, comparable to 98.4% (Qin et al.), 97.4% (Salman et al.).	Hybrid models improve performance.	Imbalance affects results; blurry images need preprocessing.	Likely improve preprocessing, address imbalance.
6	[2017] Underwater Fish Species Classification using Convolutional Neural Network and Deep Learning	27,142 images, 21 species Fish4Knowledge	Preprocessing (Gaussian, Otsu's, morphological ops), CNN (ReLU/tanh/Softmax, Adam optimizer).	ReLU: 96.29%, tanh: 72.62%, Softmax: 61.91%; 0.00183s/frame.	High accuracy, fast for real-time use.	Misclassification due to noise; not 100% accurate.	Enhance images to recover features.

Ahsanur Parul (2022-3-60-190)							
Ref	**Title**	**Dataset Description**	**Methods**	**Results**	**Pros**	**Cons**	**Future Work**
7	[2019] Automatic Fish Species Classification Using Deep Convolutional Neural Networks	Training Dataset: QUT Fish Dataset (3960 images across 3 environments: controlled, out-of-water, in-situ). Testing Dataset: LifeClef2015 Fish dataset (20,000 images across 15 species).	1.Alexnet 2. VGGNet	AlexNet: 90.48%	• Lower computational complexity than VGGNet • Efficient with fewer layers and training images •Outperformed original AlexNet on test accuracy	•Underperformed compared to VGGNet on validation • Limited to only 6 species	
8	[2018] Fish Species Recognition Based on CNN Using Annotated Image	• Total Data: 1000 images • 50 species, 20 samples each	1.Alexnet 2. CIFAR-10 CNN	Top-5 accuracy: 91.4%	• Obtained higher recognition accuracy than the original RGB color image. • Top-5 accuracy approach suitable for practical applications	• Only 20 images per class (limited training data) • Performance still relatively low for top-1 accuracy compared to larger datasets/models	

Reference Paper for Comparison

Comprehensive Smartphone Image Dataset for Fish Species Identification in Bangladesh
24,925 images of 21 common freshwater species, raw images with real backgrounds, captured in Bangladesh's rivers and local markets. Intended for open CV and ML research focused on fish species detection and recognition in diverse local settings[10][1].

[1] A. Ben Tamou, A. Benzinou, K. Nasreddine, "Targeted Data Augmentation and Hierarchical Classification with Deep Learning for Fish Species Identification in Underwater Images," J. Imaging, vol. 8, no. 8, 214, 2022. [Online]. Available: https://www.mdpi.com/2313-433X/8/8/214
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[5] Deep, B. V., & Dash, R. (2019). Underwater Fish Species Recognition using Deep Learning Techniques. 2019 6th International Conference on Signal Processing and Integrated Networks (SPIN).
[6] Rathi, D., Jain, S., & Indu, S. Underwater Fish Species Classification using Convolutional Neural Network and Deep Learning. Delhi Technological University.

[7] M. A. Iqbal, Z. Wang, Z. A. Ali, and S. Riaz, "Automatic fish species classification using deep convolutional neural networks," *Wireless Personal Communications*, vol. 107, no. 4, pp. 1425–1443, Dec. 2019, doi: 10.1007/s11277-019-06634-1.
[8] T. Miyazono and T. Saitoh, "Fish species recognition based on CNN using annotated im-age," in *IT Convergence and Security 2017*, K. J. Kim, et al., Eds. Singapore: Springer, 2018, vol. 449, *Lecture Notes in Electrical Engineering*, pp. 155–163, doi: 10.1007/978-981-10-6451-7_19.