Related Work:

Related Work Summary Table

Title	Dataset Name & URL	Dataset Description	Method Name	Accuracy	Pros	Cons	Citation
Microscopic Image of Different Processed Rice Varieties of Bangladesh	PRBD: Microscopic Image of Different Processed Rice Varieties of Bangladesh https://data.mendeley.com/datasets/sfp9s96prh/1	This dataset contains ten unique rice categories, which are: Aush, Beroi, BR-28, BR-29, Ghee Bhog, Katari Nazir, Katari Siddho, Swarna, Miniket, and Chinigura, in Bangladesh. These were collected from the local markets of Dhaka, Bangladesh. This dataset contains a total of 2000 high-resolution microscopic images and 8000 Augmented images.	DenseNet 201	Original Dataset- 93%	Regional varieties, nutritional information, global diversity, popularity data, Miniket rice, local types, undocumented quality, unverified nutritional claims, need for further research	visual similarity, limited generalization, single-source data, no external validation, controlled environment only.	Md Tohsin et al., 2025 https://doi.org/10.1016/j.dib.2025.112058
Rice Classification Using Spatio-Spectral Deep	RGB and VIS/NIR Hyperspectral Imaging	90 varieties, 8640 kernels, RGB, hyperspectral, VIS/NIR, seed-level,	SVM	99.84%	non-destructive, automatic feature extraction, spatio-spectral, no manual features,	specialized hardware, not publicly available, low reproducibilit	Chatnuntawech, I., Srinualnoi, T., Phadungsil, P., &

Convolutional Neural Network	Data for 90 Rice Seed Varieties https://zenodo.org/records/3241923	high-resolution, non-destructive imaging, phenotyping			hyperspectral imaging	y, limited accessibility	Kongkaew, T. (2018). *Rice Classification Using Spatio-Spectral Deep Convolutional Neural Network*. arXiv. https://arXiv.org/abs/1805.11491
Development of a Convolutional Neural Networks-Based Model to Classify the Rice Varieties	Smartphone Rice Variety Image Dataset (4-class)	4 rice varieties (Bhalum-5, Shahsarang, Nagina-22, IR-64), smartphone images	5-layer Convolutional Neural Network (CNN)	91.0%	Simple model, uses widely accessible images	Limited classes; no microscopic detail; not tested across many varieties	Kaur, S., Singh, B. K., Kumar, S., Singh, N., & Kumar, A. (2023). Development of a convolutional neural networks-based model to classify the rice varieties. Indian Journal of Hill Farming, 37(01), 78–82. https://doi.org/10.56678/ijhf/2023/v37/i1/201
Enhancing the Classification Accuracy of Rice Varieties	Ipsala, Arborio, Basmati, Jasmine, Karacadag rice image dataset (Turkish	Hyperspectral images of hybrid indica paddy rice grains (number of classes not publicly available; private dataset)	CARS (Competitive Adaptive Reweighted Sampling) + CNN +	95.33%	High classification accuracy, Spectral features exploited for better differentiation	Limited to 17 rice varieties; may not generalize to other varieties, High-resolution images	Tran Thi Kim, Pham Viet Tuan, Koo Insoo, Mariano Vladimir, Do Hong Tuan.

Using CNNs	rice varieties)		Transformer			required, which may not be readily available, The study did not explore the impact of environmental factors on classification accuracy.	(2023). Enhancing the Classification Accuracy of Rice Varieties Using CNNs. International Journal of Electrical Engineering & Telecommunications (IJEETC), Vol. 13, No. 6. DOI: [10.12944/IJEETC.13.6.01](https://doi.org/10.12944/IJEETC.13.6.01)
Identification of Hybrid Indica Paddy Rice Grain Varieties Based on Hyperspectral Imaging and Deep Learning	Hyperspectral images of hybrid indica paddy rice grains	hyperspectral images, hybrid indica rice, grain-level data, spectral bands, high-resolution, non-destructive imaging	CNN	95.33%	high accuracy, spectral features, enhanced differentiation, non-destructive	specialized hardware, not RGB-compatible, limited generalization, reduced accessibility	Meng Zhang, Shuang Li, Hongyu Zhang, Yifan Zhang, Yifan Zhang, Yu Zhang. (2024). Identification of Hybrid Indica Paddy Rice Grain Varieties Based on Hyperspectral Imaging

							and Deep Learning. Biosensors, 15(10), 647. DOI: [10.3390/bios15100647](https://doi.org/10.3390/bios15100647)
An Overall Real-Time Mechanism for Classification and Quality Evaluation of Rice	Rice Grain Dataset	20,000 images of 6 rice varieties in China (private dataset); includes classification, completeness grading, and chalkiness evaluation	One-stage object detection + CNN + ML	97.89%,	Integrated pipeline for classification and quality evaluation, Multi-task capability, high accuracy in both classification and detection	Large system complexity, unknown generalization to unseen rice varieties, requires substantial computational resources	Wanke Xia, Ruoxin Peng, Haoqi Chu, Xinlei Zhu, Zhiyu Yang, Lili Yang. (2025). An Overall Real-Time Mechanism for Classification and Quality Evaluation of Rice. arXiv. DOI: [10.48550/arXiv.2502.13764] https://doi.org/10.48550/arXiv.2502.13764
An Efficient Classification of Rice	**I**psala–Arborio–Basmati–Jas	75,000 rice grain images (15,000 per variety) of 5 types: Ipsala, Arborio,	Quantized Neural Networks	99.87%	Extremely low memory usage: only 23.1 KB for model	Quantization may reduce model precision,	Tasci, M., Istanbullu, A., Kosunalp,

Variety with Quantized Neural Networks	mine–Karacadag Rice Image Dataset	Basmati, Jasmine, and Karacadag. Each image is 256×256 pixels.	(QNN) based on Multi-Layer Perceptron (MLP) and LeNet-5 architectures with varying quantization levels.		parameters, 23× fewer billion operations per second (GOPs) compared to similar studies, Suitable for deployment on resource-constrained edge devices.	Model complexity trade-offs may affect performance.	S., Iliev, T., Stoyanov, I., & Beloev, I. (2023). An Efficient Classification of Rice Variety with Quantized Neural Networks. Electronics, 12(10), 2285. https://doi.org/10.3390/electronics12102285
Classification of Rice Texture Based on Rice Image Using InceptionV3 CNN	Rice Texture Image Dataset (Private, Indonesia	1,560 rice images, multiple classes	Inception V3 Convolutional Neural Network (CNN)	95.7%	High classification accuracy.Utilizes a modern CNN architecture.Suitable for texture-based classification	The dataset is small, which may lead to overfitting. Limited variety of rice textures in the dataset	Budiono, G., & Wirawan, R. (2023). Classification of Rice Texture Based on Rice Image Using CNN (InceptionV3). Techno Nusa Mandiri: Journal of Computing and Information Technology, 20(2), 103–110.

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