EAST WEST UNIVERSITY

CSE366: Artificial Intelligence

"Related Works"

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Group 05

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Related Work Summary Table

Title	Dataset name & URL	Descripton	Method name	Accuracy	Research question	Pros & Cons	Citation
(2024) Tea Leaf Disease Detection: Federated Learning CNN Used for Accurate Severity Analysis	Tea Leaf Disease Dataset (collected from six geographical	Images of diseased tea leaves categorized into four severity levels (1_V_Low) 1–20%, (2_Low) 21–40%, (3_Med) 41–60%, (4_High) 61–80%, (5_V_High) 81–100%. Data from six clients, each with local datasets. Total ~5100 images used for CNN training.	Federated Learning with Convolutional Neural Network (CNN) using Federated Averaging algorithm and Decision Tree for interpretability.	95–97% (highest 97% for df_5)	Can a federated CNN model accurately classify tea leaf disease severity while maintaining privacy across distributed data sources?	The model gives high accuracy, ensures data privacy, and works well for different datasets. However, the dataset is not public, needs good computing power and internet, and is limited to tea leaves only.	1

(2024) Tea leaf age quality: Age-stratified tea leaf quality classification dataset	Name:Tea Leaf Age Quality: Age-Stratified Tea Leaf Quality Classification Dataset URL-https://data.mendeley.com/datasets/7t964jmmy3/1	The dataset has 2,208 tea leaf images in 4 age-based quality classes (T1–T4), with raw, annotated, and augmented versions for machine learning.	YOLOv8 was used as the supervised backbone for detecting and classifying tea leaves.	**mAP:**87.9% **Precision**-89% **Recall-**84.0 %	Can object detection models accurately detect and classify tea leaves by age and quality?	High-quality annotations, inter-annotator reliability is strong, but the dataset is limited to leaf age classification	2
(2023) A Novel Approach For the Detection of Tea Leaf Disease Using Deep Neural Network	**Dataset:** Tea leaf dataset **URL:** https://www.kaggle.com/datasets/saikatdatta1994/tea-leaf-disease	A deep learning-based model using a **Convolutional Neural Network (CNN)** is proposed for **tea leaf disease detection**. Using the **Tea Leaf Disease dataset** (5867 images, six classes), the model achieved **96.56% accuracy**. It effectively	The study uses a **Deep Convolutional Neural Network (CNN)** with **data augmentation**, optimized using the **Adam optimizer** and **ReLU–Softmax activations**. It applies **TensorFlow-Keras** for training	overall accuracy on the test dataset was **96.56%**.	Is it possible to achieve significantly higher accuracy in classifying tea leaf diseases compared to existing methods by using a novel Deep Convolutional Neural Network (CNN) architecture?	The model achieved a high overall accuracy of 96.56% with a new public dataset of 5,867 images and a backend API for real-world use, but showed lower accuracy for Gray Blight (93.46%) and Red Spot (92%) and is currently limited to identifying	3

		classifies diseased and healthy leaves and can be integrated with **IoT or mobile applications** for real-time monitoring.	and evaluates performance through **accuracy, precision, recall, F1-score,** and **confusion matrix analysis**.			only five disease types.	
(2025) Tea leaf disease detection using segment anything model and deep convolutional neural networks	**Dataset:** S. Datta, Tea Leaf Disease, Kaggle.com, 2022 [online]. **URL:** https://www.kaggle.com/datasets/saikatdatta1994/tea-leaf-disease.	This paper presents a CNN-based approach combined with advanced image preprocessing and segmentation techniques to accurately detect and classify six types of tea leaf diseases, achieving a 95.06% accuracy.	The paper uses advanced image preprocessing with OpenCV, zero-shot segmentation using Meta's SAM model, and a custom CNN combined with MLP, SVM, and Decision Tree classifiers	CNN+MLP model achieved a test accuracy of 95.06%.	How can an automated system using image preprocessing, zero-shot segmentation, and a custom CNN effectively detect and accurately classify tea leaf diseases to enable early and cost-efficient disease management?	**Pros:** High accuracy (95.06%), effective preprocessing, early and cost-efficient disease detection. **Cons:** SAM segmentation less reliable, some disease confusion, lower performance on certain classes, limited disease coverage.	4
(2020) Tea leaf disease detection using	The research paper used a custom-de	The paper presents a computationally efficient	The paper employs a three-step methodology using	The paper reports an overall	How can computationally intelligent image	**Pros:** Novel NSGA-II and PCA-based system with	5

multi-objective image segmentation	veloped tea leaf disease dataset from three tea gardens in Assam, India, containing 312 labeled images of five diseases, but no public URL is provided for access.	system using NSGA-II-based image segmentation, PCA feature reduction, and multi-class SVM classification to automatically detect five tea leaf diseases from 312 mobile-captured images, achieving an average accuracy of 83% and enabling in-field use by farmers.	mobile-captured images with minimal preprocessing, NSGA-II for image segmentation, PCA for feature reduction, and multi-class SVM with an RBF kernel for classifying five tea leaf diseases.	average accuracy of 83% for detecting five tea leaf diseases, with individual accuracies ranging from 75% to over 92% depending on the disease.	processing algorithms—specifically NSGA-II, PCA, and multi-class SVM—be integrated to develop an accurate, low-overhead, automated system for early-stage detection and classification of multiple tea leaf diseases using mobile-captured images?	multi-class SVM detects five tea leaf diseases early from real images with 83% accuracy. **Cons:** Small dataset, lower accuracy for Red Spider, kernel sensitivity, and limited to visible-light images.	

Reference Paper for Comparison:

[1]. Kabir MM, Hafiz MS, Bandyopadhyaa S, Jim JR, Mridha MF. Tea leaf age quality: Age-stratified tea leaf quality classification dataset. *Data Brief.* 2024 Apr 21;54:110462. doi: 10.1016/j.dib.2024.110462. PMID: 38711743; PMCID: PMC11070690. https://pmc.ncbi.nlm.nih.gov/articles/PMC11070690/

[2]. S. Vats, V. Kukreja, and S. Mehta, "Tea Leaf Disease Detection: Federated Learning CNN Used for Accurate Severity Analysis," 2024 IEEE International Conference on Interdisciplinary Approaches in Technology and Management for Social Innovation

(IATMSI), Gwalior, India, 2024, pp. 1-6, doi: 10.1109/IATMSI60426.2024.10503207. Keywords: {Data privacy; Technological innovation; Federated learning; Neural networks; Transforms; Data models; Robustness; Tea leaf diseases; Convolutional neural networks (CNNs); Federated learning; Disease classification; Severity levels}. https://ieeexplore.ieee.org/abstract/document/10503207

[3] S. Datta and N. Gupta, "A Novel Approach For the Detection of Tea Leaf Disease Using Deep Neural Network," *Procedia Computer Science*, vol. 218, pp. 2273–2286, 2023. https://www.sciencedirect.com/science/article/pii/S187705092300203X?via%3Dihub

[4] Balasundaram, A., Sundaresan, P., Bhavsar, A., Mattu, M., Kavitha, M. S., & Shaik, A. (2025). Tea leaf disease detection using segment anything model and deep convolutional neural networks. *Results in Engineering, 25,* 103784. https://doi.org/10.1016/j.rineng.2024.103784

[5] S. Mukhopadhyay, M. Paul, R. Pal, and D. De, "Tea leaf disease detection using multi-objective image segmentation," *Multimedia Tools and Applications*, vol. 80, pp. 753–771, 2021. https://doi.org/10.1007/s11042-020-09567-1