
A REVIEW ON DETECTION OF GRASSERIE DISEASE IN SILKWORM

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Abstract.

The sericulture industry is currently undergoing a significant transformation through the adoption of the Internet of Things (IoT), Artificial Intelligence (AI), and advanced image processing techniques. These technologies are being deployed to combat prevalent silkworm diseases and modernize traditional, labor-intensive farming practices. IoT-enabled sensors provide farmers with immediate feedback on critical environmental metrics, such as humidity and temperature, which are vital for silkworm survival. Furthermore, computing platforms like the Raspberry Pi, when integrated with AI and image processing algorithms, facilitate the real-time diagnosis of diseases and the assessment of silkworm health with classification accuracies reaching up to 99%. The convergence of these technologies enhances system reliability and autonomy, leading to higher quality silk production and a reduction in manual labor. Current research indicates that such automated systems can sort cocoons at high speeds and mitigate yield losses caused by suboptimal rearing conditions, thereby fostering a more resilient and sustainable sericulture sector.

Keywords: Sericulture, Internet of Things (IoT), Artificial Intelligence (AI), Machine Learning (ML), Raspberry Pi, Disease Detection.

1. INTRODUCTION

Sericulture being an ancient but important sector, especially in countries such as India and China, where it is essential to maintain standard environmental parameters such as temperatures, humidity, and cleanliness for better silkworm rearing. The occurrence of diseases is a serious problem in these circumstances, which further leads to a decrease in the quality of cocoons and sometimes in financial setbacks, with manual methods being time-consuming and imprecise. The combination of IoT technology and image processing technology will help in continuous environmental parameter tracking, automatic disinfection and irrigation systems, and accurate identification of diseases in silkworms. Moreover, AI and machine learning algorithms in camera-based systems will help in quick analysis and early detection of diseases, which is not possible in other systems. Therefore, a

combination of advanced intelligent systems with existing pathological knowledge will help in increasing productivity, improving quality, and providing a bright future to sericulture.

2. IMPLEMENTATION AND ARCHITECTURE

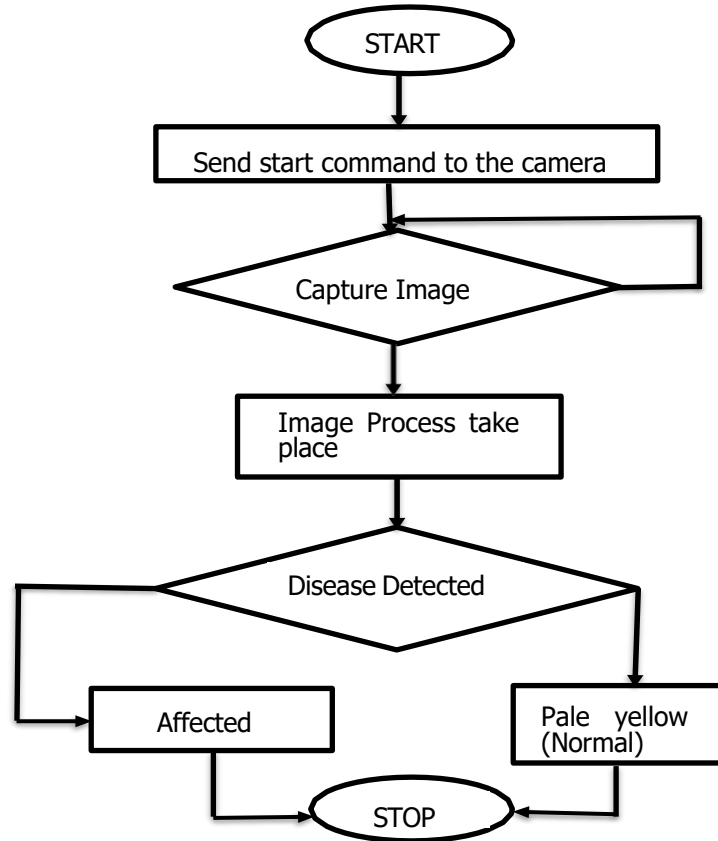


Fig 2.1: Pipeline of the Silkworm Detection

2.1 System Architecture Overview This architecture design is targeted to achieve silkworm disease detection as a sequential image-processing pipeline. The first stage focuses on image acquisition; the second stage does the disease analysis and classification.

- **Input Layer:** This layer captures silkworm images by the help of a camera or image upload mechanism.
- **Processing Layer:** The captured image is processed and analysed by the trained detection model in order to identify disease presence. This kind of lightweight architecture makes processing fast, deployment easy, and thus detects reliably in real-time applications of sericulture.

2. METHODOLOGIES

This survey synthesizes methodological advances across four interlocking stages:

3.1. Dataset Collection and Pre-processing: The Image Processing Module is the core of the system, enabling accurate detection of Grasserie disease from silkworm images. Each image is resized to YOLO's fixed input dimensions to maintain uniformity across the dataset. Noise removal and pixel-level normalization are applied to enhance image quality and consistency. The pre-processed images are analysed by YOLO's convolutional layers to extract disease-related visual features. Multi-scale detection improves accuracy by identifying symptoms such as swelling, colour changes, and irregular textures.

3.2. User Interface: The user interface acts as the main interaction platform for the YOLO-based detection system. Users can upload silkworm images easily through a simple and intuitive interface. Once uploaded, the image is processed in real time using the trained YOLO model. The system classifies the silkworm as healthy or Grasserie-affected with a confidence score. The interface is designed to be user-friendly and accessible for both technical and non-technical users.

Quantitative Analysis of Parameters

A summary of key parameters from the reviewed literature is presented below:

- Dhruvakumar et al. [1] Combines DHT11 sensors with Arduino–NodeMCU and image analysis to automate irrigation and disinfection, improving cocoon yield and disease detection precision.
- Manjunatha et al. [2] Uses Raspberry Pi and camera modules with ML-based analysis for continuous, high-resolution image monitoring of silkworm diseases.
- Puneeth & Veena [3] Integrates IoT sensors, wearables, and computer vision to enable predictive analytics, real-time monitoring, and early disease intervention.
- Guo-Ping & Xi-Jie [4] Reviews silkworm pathology and diagnostics extensively but provides limited quantitative analysis of environmental parameters.
- Shilpa B. Kodli et al. [5] Applies CNN-based image classification for major silkworm diseases, achieving ~99% accuracy via a web application without environmental inputs.

4. CONCLUSION

The AI The integration of IoT, Artificial Intelligence, and Deep Learning represents a paradigm shift in sericulture. As evidenced by the literature and the proposed system architecture, these technologies significantly enhance the efficiency, reliability, and automation of silkworm rearing. The reviewed systems demonstrate high efficacy in disease detection and classification, with accuracies ranging from 85% to 99%. While deep learning models offer superior resilience and precision, the combination of these algorithms with low-cost hardware like the Raspberry Pi ensures that these solutions are accessible and scalable. Future developments should focus on optimizing these systems to handle

environmental variables more robustly and further reducing the computational load for edge devices. Ultimately, automating disease detection allows farmers to safeguard their crops against mass infection, ensuring a sustainable and profitable silk production industry. And combat bias through semantic analysis, AI tools will become even more integral to personalized learning paths. The successful integration of these technologies depends on an approach that prioritizes oversight and continuous evaluation. Ultimately, the goal is not to replace human educators but to augment their capabilities and empower learners with tools that are scalable and supportive.

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Biographies



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