Cotton Disease Recognition Using Transfer Learning Techniques (YOLO)

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Abstract*: Cotton cultivation is vulnerable to various diseases, severely affecting crop yield and quality. Traditional manual inspection methods are labor-intensive and not scalable. This study presents an automated cotton disease detection system using the YOLO (You Only Look Once) architecture and transfer learning techniques. The system performs real-time image processing on cotton plants, enabling early disease identification via low-power devices like smartphones. By leveraging transfer learning, the model achieves high accuracy and operational efficiency, reducing the need for large labeled datasets. This solution increases agricultural productivity, reduces losses, and minimizes labor dependency.*

Keywords: YOLO, image processing, transfer learning, cotton disease detection, and agricultural automation

I. INTRODUCTION

Cotton is a critical raw material in agriculture, yet its production is often hampered by diseases. Traditional detection methods rely on manual inspection, which is time-consuming and prone to errors, particularly in large scale farming. Automated methods using deep learning, such as YOLO and transfer learning, are gaining traction for their efficiency and scalability. This study proposes a real-time cotton disease detection system, combining the YOLOv5 architecture for object detection with VGG16 for disease classification, optimized for low powered edge devices.