

MOBILEPLANT VIT-LDA

**EMPOWERING MOBILE INTELLIGENCE FOR A
SUSTAINABLE AGRICULTURAL FUTURE.**

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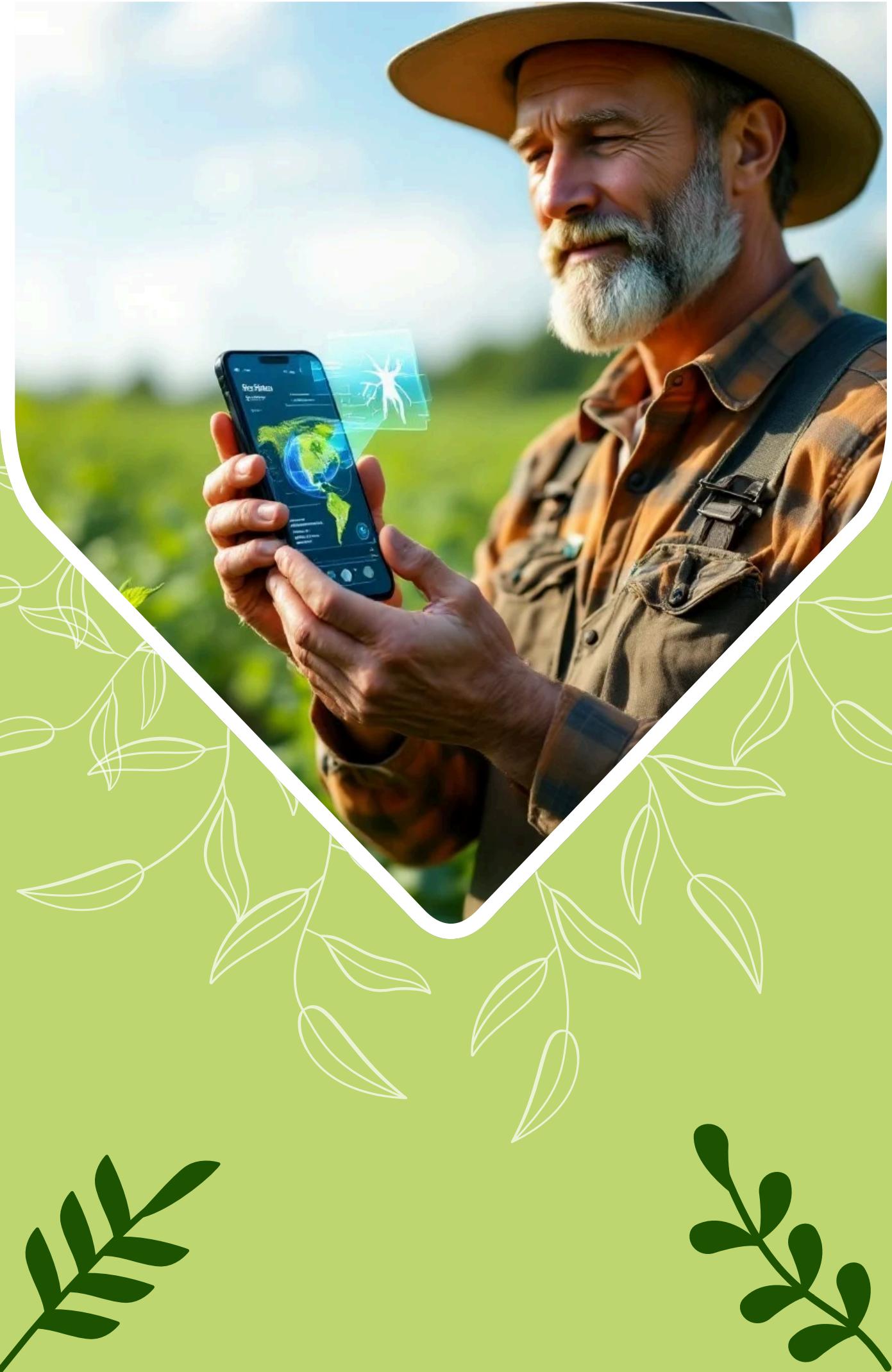
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INTRODUCTION

- Plant diseases significantly threaten global agriculture, affecting crop yield and quality.
- Rapid and precise disease detection is vital to ensure plant health and reduce economic loss.
- Current deep learning models are complex for mobile deployment.
- They struggle with noisy or low-resolution real-world images.
- Goal: Develop a lightweight, robust, and efficient Vision Transformer for real-time plant disease detection on mobile devices.





BASE PAPER

- MobilePlantViT combines MobileNetV2 and Vision Transformer (ViT) for mobile-based plant disease detection.
- Uses MobileNetV2 for efficient local feature extraction.
- Integrates lightweight transformer modules to capture long-range dependencies.
- Achieves high accuracy with low computational cost, ideal for real-time mobile use.

HIGH COMPUTATIONAL COST

- Most deep learning models are too large for mobile devices.
- MobilePlantViT employs a lightweight hybrid design to cut parameters and computation.

LIMITED CONTEXT AWARENESS

- CNN-based models miss global context in images.
- Vision Transformer blocks capture long-range dependencies effectively.

PROBLEM DEFINITION



01 AGRICULTURAL CHALLENGE

- Manual detection is slow and unreliable threatening crop yield and food security
- 40% of crop yield is lost annually due to diseases.

02 TECHNICAL LIMITATION

- CNNs detect only local features, missing overall patterns.
- Vision Transformers improve accuracy but are computationally expensive.

03 PRACTICAL LIMITATION

- Farmers in rural areas lack affordable and accessible AI tools.
- No real-time, on-field diagnosis available.

04 WHY IT MATTERS

- Ultra-lightweight, energy-efficient, and mobile-optimized.
- Designed for real-world deployment.

SCOPE OF PROJECT

- MobilePlantViT is a lightweight AI model designed to detect plant diseases from leaf images.
- The upgraded version aims to be faster, more efficient, and more accurate than the original.
- It processes images through an optimized architecture to identify plant diseases with high precision.
- The improved model will be tested on multiple plant image datasets to evaluate its accuracy and performance.
- The ultimate goal is to enable real-time, on-device disease detection for smartphones and other low-power devices.

IN-SCOPE

- Enhance MobilePlantViT to achieve faster and more accurate plant disease detection.
- Integrate multilingual TTS for spoken results.
- Provide real-time weather updates within the app.

OUT-OF-SCOPE

- Real-time video detection, deferred due to computational and time constraints.
- Pest and nutrient deficiency detection, excluded for lack of suitable labeled datasets.
- Treatment recommendation module, omitted due to unavailability of validated agronomy data.

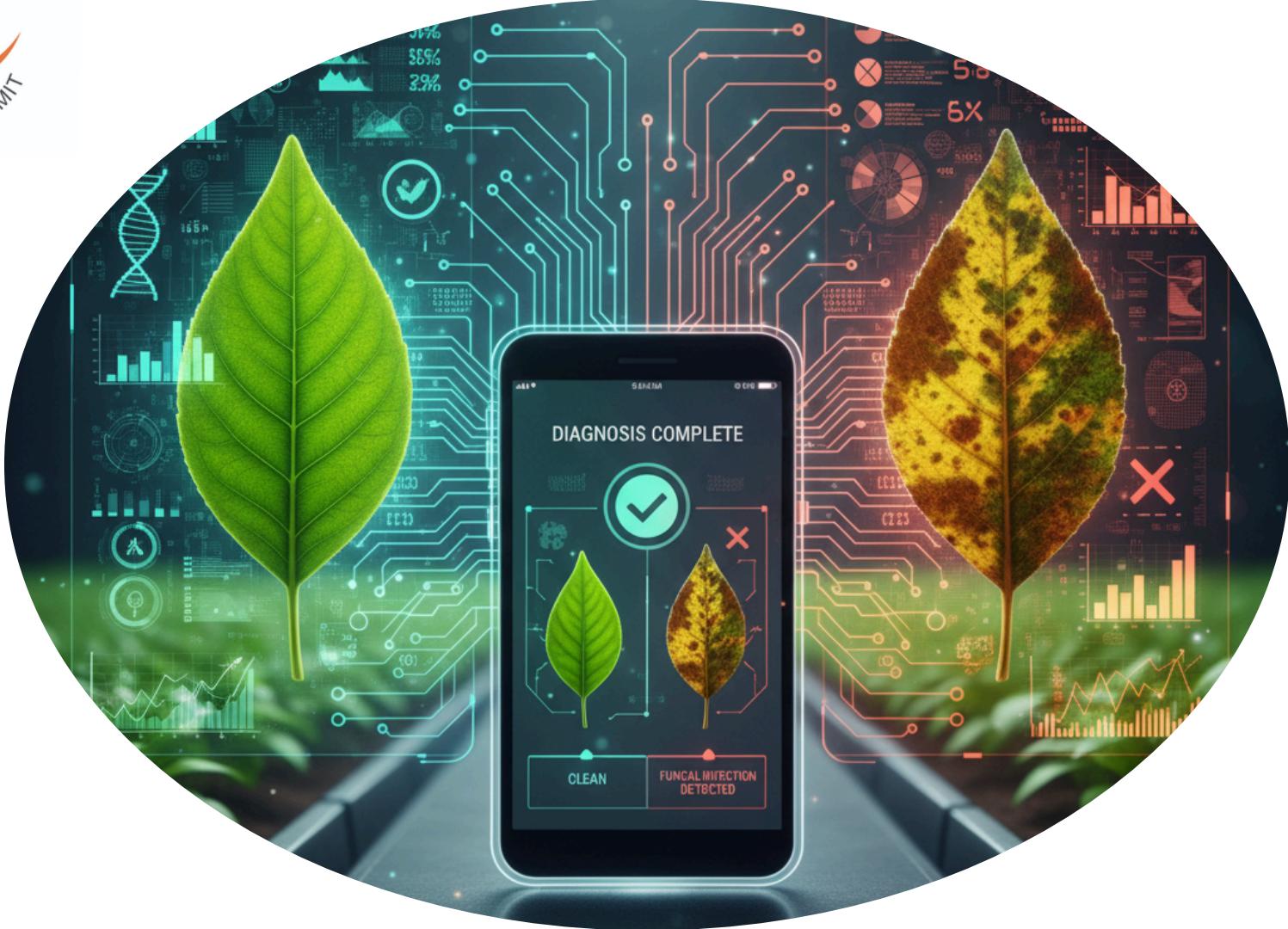


PROPOSED SOLUTION

We propose an upgraded version of MobilePlantViT by replacing key blocks with more advanced modules for better performance on real-world, noisy images:

- DepthWise Convolution → **GhostConv**
- CBAM → **Coord Attention**
- Group Conv → **Fused-Inverted Residual Block**
- Linear Self-Attention → **Linear Differential Attention**
- FFN → **Bottleneck FFN**

These upgrades aim to improve feature extraction, reduce computational overhead, and maintain high accuracy for mobile deployment.



EXPECTED OUTCOME

- Multi-crop disease classification
- Robust to noisy/real-world images
- Lightweight for mobile devices
- Quick and reliable diagnosis



ACCURATE DISEASE DETECTION

- Accurately identifies diseases across various crops.
- Performs reliably on noisy or imperfect images.

MOBILE-FRIENDLY DEPLOYMENT

- Lightweight and optimized for mobile devices.
- Enables farmers to capture images and receive instant results anywhere.

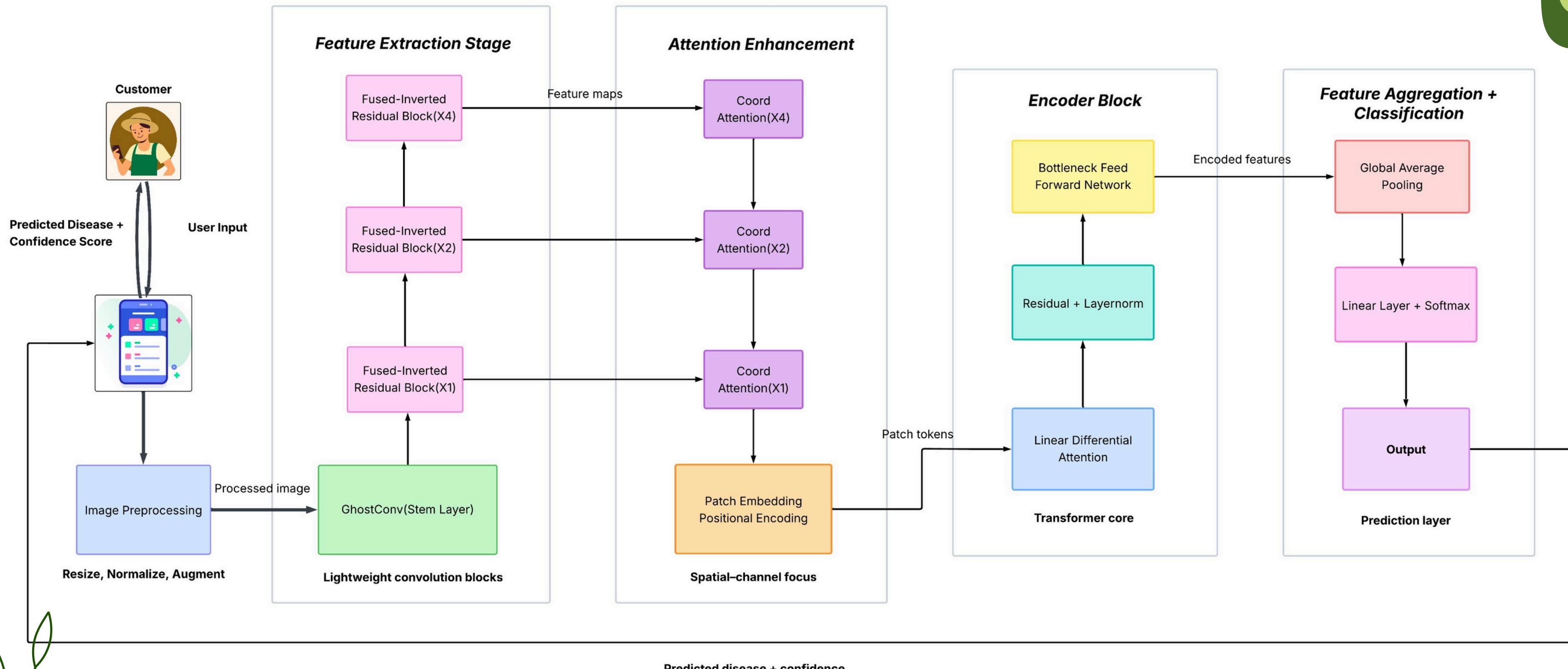
FASTER AND RELIABLE DIAGNOSIS

- Automated detection saves time and avoids manual errors.
- Provides farmers with timely, actionable insights to protect crops.

ARCHITECTURE DIAGRAM



MobilePlantViT-LDA Architecture





RECAP

QUICK RECAP

- Analyzed MobilePlantViT to identify existing limitations.
- Selected replacement blocks to improve performance and robustness.
- Planned mobile-friendly, multi-crop disease detection using upgraded architecture.

BY NEXT MILESTONE...

- Begin implementation of the new architecture with the selected replacement blocks.
- Test basic functionality and run preliminary experiments on sample datasets.

THANK YOU!!!