1.1   Scope of the Project and Study

The proposed project involves the development of a web-based mobile application software designed for local farmers, growers, and other agricultural agencies and entities. Its purpose is to assist them in administering, managing, and maintaining local agricultural crops effectively. This mobile application aims to detect and classify pests and diseases affecting local agricultural products. Once problems are identified, the application will suggest the best possible solutions based on reliable information from various resources and references. Integrated with image processing technology, the application utilizes CNN algorithms for the detection, classification, and identification of diseases and pests in vegetable crops. To enhance the CNN's capabilities in detecting, identifying, and classifying objects, improvements to different architectures such as YOLO, ResNet, and VGG have been made. Filters and hidden layers are optimized to ensure more reliable, efficient, and effective detection and classification. Additionally, other modules have been developed to ensure the feasibility and success of the project in managing, administering, and maintaining local agricultural crops. The succeeding sections will discuss modules and the various features of the web-based mobile application, providing a clear definition of its uses and functions.

About Module. This module is designed to provide information about the mobile application. It includes descriptions of the application's origin, intended use, capabilities, and features. Additionally, it covers details about the application's design, user profiles, and developer information. Furthermore, the module features a help button aimed at assisting users in navigating through the functions, modules, submodules, and features of the application. Users of this module will benefit greatly

from the wealth of ideas and information it provides.

Detection and Classification Module. This module serves as the central feature of the mobile application software, focusing on the detection and classification of pests and diseases. Therefore, the quality of the mobile devices' camera, as well as the specifications and camera quality of the mobile devices, are crucial elements. The detection and classification processes commence when a photo of a specific pest or disease is captured or scanned using the camera. Utilizing a improved Convolutional Neural Network architectures process, the captured or scanned image is stored in the software's databases as a new dataset. It's essential to note that the quality of the results from the detection and classification module is heavily dependent on the quality of the loaded and scanned images. Upon completion of the detection and classification phases, the module proceeds to identify the results. This functionality proves highly beneficial to local farmers and growers, aiding them in effectively managing and addressing pest and disease issues in their crops.

Result Module. This module showcases the outcomes of the detection and classification process, providing detailed information about the detected disease or pest. For the identified pests, it presents information including the pest's name, scientific classification, description, management strategies, and additional relevant details. Similarly, for identified diseases, the module offers details such as the disease's name, description, management techniques, and other pertinent information. Overall, this module serves as the culmination of the detection and classification process, presenting valuable insights into the identified issues and suggesting optimal solutions to address the encountered problems or challenges.

e-Agricultural Manuals Module. This module is an essential part of the mobile application, offering access to various agricultural manuals related to farming crops. These manuals are stored in the database, allowing users to browse and reference them conveniently. Users can acquire diverse knowledge and ideas about managing, maintaining, and administering local agricultural crops through this module. Equipped with a search bar, the module enables users to effortlessly find and explore specific terminologies related to farming. These e-manuals are sourced from different agencies involved in farming, particularly the Department of Agriculture and the Municipal Agriculture Office, ensuring the reliability of the data and information provided. Farmers, growers, and even members of the community stand to benefit significantly from this module, as it offers valuable resources and guidance for effective farming practices.

History Module. This module within the mobile application facilitates the handling and archiving of detected, classified, and identified data or information. Its primary objective is to monitor the performance of the mobile application, identify recurring issues, and provide convenient access to past information when needed. Farmers and growers will find this module particularly beneficial, as it enables them to track the performance of the application, identify common problems, and easily retrieve previous data as required.

Settings Module. This module encompasses the configuration of the mobile application environment, including options for adjusting color schemes, application modes, font styles, and performance settings. Providing users with the ability to customize these settings according to their preferences enhances their overall experience with the mobile application. By allowing users to tailor the settings to their

liking, this module ensures that individuals can personalize the application to suit their specific needs and preferences, ultimately enhancing usability and satisfaction for all users.

CNN Architecture Improvement and Optimization of Process. The main goal of CNN architecture improvement and optimization of process is to enhance the efficiency, accuracy, and performance of image processing tasks, particularly in the context of detecting and classifying vegetable crops' diseases and pests. By improving CNN architectures, it aims to address existing limitations such as computational complexity, memory usage, and training time. Additionally, optimizing the process involves streamlining workflows, reducing redundancy, and increasing the speed and scalability of CNN-based systems. The ultimate goal is to create CNN models that can accurately and efficiently handle real-world tasks, even in challenging conditions such as low-quality images, variable lighting conditions, and complex backgrounds.

1.2   Limitations of the Project and Study

In every technological implementation across different domains, there certainly exist limitations, stated by the scope of the study and the availability of resources such as data, devices, and users. Given the multitude of agricultural products cultivated in the country, the focus of the web-based mobile application software is primarily directed towards detecting and classifying pests and diseases affecting local agricultural products commonly grown in rural areas, such as Talong, Pechay, Sitaw, Mustasa, and Kalabasa. When employing image processing technology and various techniques within the project, the quality of images and photos of agricultural crop products can significantly influence the analysis and interpretation outcomes.

Thus, ensuring a high quality of data is paramount for producing reliable and accurate results. The enhancement of the convolutional neural network algorithm is limited to three architectures, namely YOLO, ResNet, and VGG, to explore the potential for more effective and precise detection and classification. The web-based mobile application is compatible with mobile devices featuring good specifications and high-quality cameras. Lower specifications may encounter difficulties when using the application. While the software functions both offline and online, it delivers more accurate detection and reliable information when connected online, especially when using the e-Manuals Module. However, in online mode, the live scanning of diseases and pests may not function optimally due to platform constraints. However, loading images of specific diseases and pests from the gallery ensures the application operates effectively. These limitations represent opportunities for improvement in subsequent research and project developments related to the topic.