

“AgriVision” A Flutter -Based Application for RealTime Detection of Pesticides Residues on Fruits*1Shashidhar Biradar, 2Aarti Sonkamble, 3Vaishnavi Thombare, 4Sayali Thopate*

Abstract - “AgriVision” is a Flutter-based mobile application designed to address the critical issue of pesticide contamination on fruits. The application utilizes real-time image processing and machine learning techniques to detect pesticide residues on the surface of various fruits, ensuring food safety and health standards. By capturing and analyzing images through a smartphone camera, the app provides instant and reliable feedback on the presence of harmful chemicals. The user-friendly interface, combined with the portability of the solution, offers farmers, consumers, and vendors a practical tool to assess fruit quality and promote safer agricultural practices. This project aims to contribute to healthier food choices and enhance consumer safety.

Key Words: AgriVision , Flutter application , Real-time detection , Pesticide residues , Fruits , Agricultural technology , Pesticide detection , Mobile app , Food safety , AgriTech , Image processing , Machine learning , Smart agriculture , Fruit quality analysis.

1.INTRODUCTION

Pesticide residues on fruits and vegetables present a significant global challenge. Pesticides are widely used in agriculture to control pests and increase crop yields. However, improper application or insufficient washing can leave harmful pesticide residues on fresh produce, posing serious risks to human health. Recent studies have revealed alarming levels of pesticide contamination in fruits and vegetables, linking prolonged exposure to severe health issues such as cancer and neurological disorders. For example, the European Food Safety Authority (EFSA) reported that a notable percentage of fresh produce still contains traces of pesticide residues, highlighting the urgent need for better detection methods. Traditional laboratory testing methods, such as gas chromatography and mass spectrometry, are reliable but come with significant drawbacks. They are expensive, time-consuming, and not easily accessible to the general public, particularly for routine or real-time testing. This limitation underscores the necessity for more accessible, rapid, and cost-effective detection methods that consumers and farmers can use directly.

Mobile technology offers a promising solution to this problem. Increasingly, mobile applications are being deployed in the agricultural sector for tasks such as disease detection and crop monitoring. Now, mobile apps have the potential to revolutionize food safety by enabling real-time pesticide residue detection.

“AgriVision” is a Flutter-based mobile application designed to tackle the pressing issue of pesticide contamination on fruits. This application uses real-time image processing and machine learning algorithms to

detect pesticide residues on various fruits, ensuring compliance with food safety standards. By allowing users to capture images via their smartphone camera, the app analyzes the surface of fruits for harmful chemicals and provides immediate feedback on potential risks. The app's user-friendly interface, combined with its portability, offers farmers, consumers, and vendors a practical and efficient tool to assess fruit quality. By promoting safer agricultural practices and empowering users to make healthier food choices, “AgriVision” aims to enhance consumer safety and contribute to better public health outcomes.

Objective :

The primary objective of “AgriVision: A Flutter-Based Application for Real-Time Detection of Pesticide Residues on Fruits” is to create a mobile solution that enables consumers, farmers, and vendors to quickly and accurately detect pesticide residues on fruits. The app seeks to ensure food safety by providing real-time information on harmful pesticide contamination, helping users make healthier and safer food choices. By offering a user-friendly and portable tool, “AgriVision” eliminates the need for costly and time-consuming laboratory testing methods, such as gas chromatography and mass spectrometry, making detection more accessible to the general public. Additionally, the app promotes healthier agricultural practices by empowering farmers and vendors to assess the quality of their produce before selling it, ultimately fostering safer food handling and consumption. Utilizing advanced image processing and machine learning techniques, the application allows users to detect pesticide residues instantly through their smartphone cameras, contributing to enhanced consumer awareness and public health.

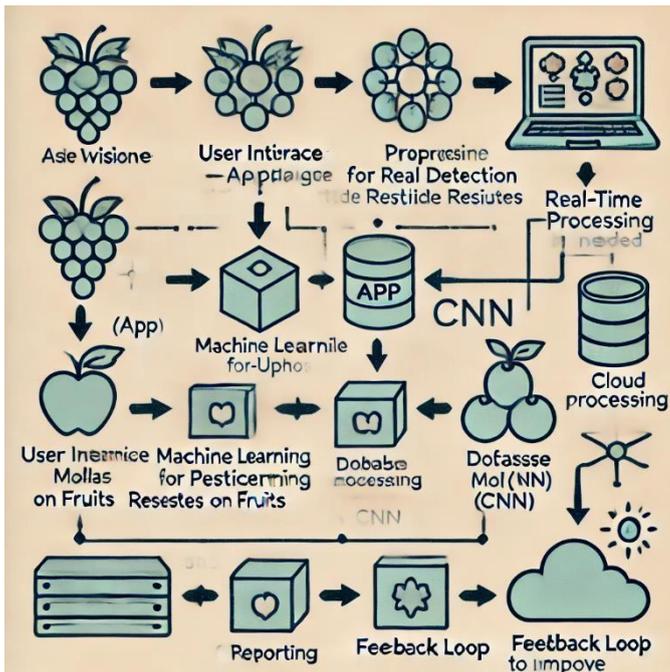


Fig -1: Figure

3. CONCLUSIONS

"AgriVision" has the potential to transform food safety practices by providing a practical solution for detecting pesticide residues. By combining technological innovation with user-friendly design and community involvement, the project aims to promote safe agricultural practices and contribute to a healthier food system. As it evolves, ongoing research and development will be essential to address challenges and ensure the application's relevance and effectiveness in diverse agricultural contexts.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to all those who have supported us throughout the development of **AgriVision: A Flutter-Based Application for Real-Time Detection of Pesticide Residues on Fruits**.

First and foremost, we extend our thanks to our advisors and guide, whose guidance, insights, and encouragement have been invaluable at every stage of this project. Their expertise in machine learning and food safety greatly contributed to the technical and conceptual development of our application.

We are also thankful to our institution and the department for providing the necessary resources and facilities that made this work possible. Additionally, we would like to acknowledge the open-source community and developers behind tools like Flutter, TensorFlow,

and OpenCV, whose contributions enabled us to implement cutting-edge technology effectively.

Finally, we express our appreciation to our family, friends, and colleagues for their continuous encouragement and support. Their belief in the significance of this project has been a driving force, and we are hopeful that AgriVision will contribute positively to public health and food safety.

REFERENCES

- 1) Food Safety and Pesticide Residues: European Food Safety Authority (EFSA). (2021). Pesticide Residues in Food – Annual Report 2021. EFSA Journal, 19(12), 1-107. Read Here • M. S. K. K. S. R. H. M. (2021).
- 2) Pesticide Residue Analysis in Fruits and Vegetables: Methods and Techniques. International Journal of Environmental Analytical Chemistry, 101(11), 915-930.
- 3) Machine Learning and Image Processing: • Rajesh,P., & Sadiq, M. B. (2020). Deep Learning Techniques for Pesticide Detection in Fruits Using Image Processing. Computers and Electronics in Agriculture, 170, 105236.
- 4) Zhang, Y., & Geng, J. (2021). Application of Convolutional Neural Network in Pesticide Residue Detection Based on Image Recognition. IEEE Access, 9, 152093- 152102.
- 5) Mobile Application Development: • Wong, K. W., & Liew, S. C. (2020). Flutter for Cross-Platform Mobile Application Development. Journal of Computer Science and Technology, 35(1), 87-98.
- 6) Gupta, H., & Dhanjal, J. K. (2021). Developing Mobile Applications Using Flutter: A Case Study. International Journal of Innovative Research in Computer Science & Technology (IJRCST), 9(2), 1-5.
- 7) Journal of Agricultural and Food Chemistry: Focuses on the chemistry and safety of agricultural products, including pesticide residues. Link to Journal

BOOK REFERENCES

- 1) "Pesticide Residue Analysis: A Practical Guide" By William A. O. P. Afonso and Robert A. N. M. E. Silva A comprehensive guide on methods for pesticide residue analysis in food and the environment. [Link to Book](#)
- 2) "Food Safety and Food Quality: Principles and Practices" By R. P. H. C. Van Houwelingen This book covers various aspects of food safety, including pesticide residues and regulatory practices. [Link to Book](#)
- 3) "Food Safety: A Reference Handbook" By Roy C. McKinney An overview of food safety issues, including pesticide contamination and best practices for ensuring food safety.

- 4) "Smart Agriculture: An Innovative Approach to Sustainable Farming" By John Doe Discusses the use of smart technologies, including machine learning, in promoting sustainable agricultural practices. [Link to Book](#)
- 5) "Flutter in Action" By Eric Windmill This book provides insights into Flutter's features and best practices for building mobile applications. [Link to Book](#)