

TOWARDS AN INTELLIGENT FARMLAND INTRUSION DETECTION AND VANDALIZATION PREVENTION SYSTEM USING DEEP LEARNING AND RASPBERRY PI

Abdullahi, I.M¹, Olaniyi, O. M², Maliki D³, Ayansina, E. A⁴, Ijah, J. U⁵

¹⁻⁵*Department of Computer Engineering, Federal University of Technology, Minna, Nigeria*

¹mikail.olanivi@futminna.edu.ng, ³danlami.maliki@futminna.edu.ng

ABSTRACT

Farming is one of the most lucrative business in the world and one of the largest employers of labour worldwide. In addition, farming has been able to guarantee food security and increase the GDP of many countries. However, this sector in recent times have been threatened by conflicts between farmers and herders especially in developing countries such as Nigeria where loss of lives and properties have been recorded in many states. This emerging problem has brought to the fore the need for efficient intelligent farmland intruder detection and vandalization prevention system. Existing intruder detection and vandalization prevention systems do not have the capability to detect, recognize, prevent and alert the farmer in real time of an intrusion. Hence, this paper proposes the development of an intelligent intruder detection, recognition and vandalization prevention system using a Faster Regions with Convolution Neural Network (faster R-CNN) for efficient intruder recognition, IR sensors for intruder detection and Raspberry pi as hardware for efficient deployment. The successful development and deployment of this system will not only prevent vandalization of crops, minimize clashes between farmers and herders, but also, save lives and properties and guarantee food security.

Keyword: *Farmland, Intelligent System, Artificial Neural Network, Deep Learning, Raspberry pi, Food Security*

INTRODUCTION

Agriculture is one of the most important sectors in worlds' economy and a major employer of labour in most countries of the world. Agriculture contributes more than 50% of national income in developing countries (Koutoudis, 2018). In Nigeria's economy for example, Gross Domestic Product (GDP) from agriculture increases from 3487312.92 million Naira to 3789720.12 million Naira in the second quarter of 2018 (Trading Economics, 2018). Hence, there is the need to protect these farmlands and crops from being vandalized. In developing countries like Nigeria, the second major threat to crop production after drought is vandalization by animals, majorly cattle, goats and sheep. This has led to one of the major challenges in sub-Saharan Africa, the farmers-herdsmen crises. This problem is so pronounced

that not just crops are being vandalized but also human lives and properties are lost as witnessed in some major cities in Nigeria of recent. Some factors such as weather conditions, density, distribution of problem species, availability of off-farm and on-farm habitat and type of production to mention a few are responsible for the migration of animals into farmlands to destroy crops.

Surveillance plays important role in security in many areas such as at home, schools, farmlands, banks, and public places. It helps us to monitor a given area against theft and provide evidence when they eventually occur (Chinmaya *et al.*, 2017). In the case of farmlands, surveillance is important in detecting unauthorized humans and animals and possibly inform or alert the farm owner of intrusion. Gophika *et al.*, (2018) carried out a research on comparative analysis