

**Ghaf Tree Detection from Unmanned Aerial Vehicles Imagery Using YOLO-V5****Guoxu Wang<sup>1</sup>, Gregory Simkins<sup>2</sup>, Umar Yahya<sup>3</sup>, E.A. Edirisinghe<sup>1</sup>**<sup>1</sup>*School of Science, Department of Computer Science, Loughborough University, United Kingdom, LE11 3TU*<sup>2</sup>*Dubai Desert Conservation Reserve, Dubai, United Arab Emirates*<sup>3</sup>*Motion Analysis Research Laboratory, Islamic University in Uganda, P.O Box 7689, Kampala, Uganda***Abstract**

In the UAE, the Ghaf is a national tree, regarded as a symbol of stability and peace due to its historical and cultural importance. Due to increased urbanization and infrastructure development in the UAE, the Ghaf tree is currently considered an endangered tree requiring protection. Utilization of aerial surveillance technologies in combination with Artificial Intelligence (AI) can particularly be useful in keeping count of the Ghaf trees in a particular area, as well as continuously monitor their health status thereby aiding in their preservation. In this paper, we utilize one of the best Convolutional Neural Networks (CNN) based object detection methods, YOLO-V5, to effectively detect the Ghaf tree in images taken by onboard cameras on unmanned aircraft vehicles (UAV) in some areas of the UAE. We utilize a dataset of over 3200 images partitioned into the training (60%), validation (20%), and testing (20%) dataset subsets. Four versions of YOLO-V5 CNN are trained using the training dataset subset. The validation dataset subset was used to fine tune the trained models in order to realize the best Ghaf tree detection accuracy. The trained models are finally evaluated on the reserved test dataset subset not utilized during training. The results of Ghaf tree detection obtained by the different four versions of YOLO-V5 are compared quantitatively and qualitatively. YOLO-V5m model produced the highest average detection accuracy of 96.33%. In addition, YOLO-V5m can detect and locate Ghaf trees of different sizes moreover in complex natural environments and in areas with sparse distributions of Ghaf trees.

**Biography**

Guoxu Wang received a B.S. degree in digital media technology from Northeastern University, Shenyang, China, in 2018. He received an M.S. degree in Advanced Computer Science from Loughborough University, UK, in 2019. He is currently working toward a Ph.D. degree in computer science with the department of computer science, Loughborough University, UK. His research interests include deep learning, object detection, and computer vision.