

應用無人飛行載具測估植草覆蓋面積

鍾文貴^{[1]*} 蔡俊緯^[2] 王裕民^[3] 楊樹榮^[4]

摘要 植生工程中種植覆蓋草類是防止沖蝕保育土壤資源的重要方法之一，植草覆蓋率是判定植生工程成敗的評估指標。本研究主要目的在於應用無人飛行載具(Unmanned Aerial Vehicle, UAV)測估大範圍植生工程的植草覆蓋面積，進而計算得植草覆蓋率。選擇屏東科技大學運動場為試驗場地，首先應用無人飛行載具分別以三種航高(10m、20m、30m)拍攝得試驗場地的時間序列影像，再應用 Microsoft ICE 全景影像拼接軟體，拼接運動場的全景影像。最後，再用 ImageJ 影像分析軟體辨識與計算得運動場全景影像的植草覆蓋面積與覆蓋率。試驗過程分別驗證了三種航高全景拼接計算結果的精準度。試驗結果顯示，三種航高測估得的大範圍植草覆蓋面積，平均絕對誤差均小於 6%，其中以航高 10m 量測得數值最準確。因此，本研究應用無人飛行載具測估大面積植草覆蓋率的作法，具有一定程度的準確度與可靠性，可作為工程單位進行綠美化工程品質管理與驗收之參考。

關鍵詞：無人飛行載具、UAV、ImageJ、影像拼接、植草覆蓋面積。

Using Unmanned Aerial Vehicle for Evaluating Grass Covered Area

Wen-Guey Chung^{[1]*} Chun-Wei Tsai^[2] Yu-Min Wang^[3] Shu-Rong Yang^[4]

ABSTRACT The planting construction of vegetation cover grass is one important way to prevent the erosion of soil resources conservation, and the coverage rate of grass vegetation is an indicator to evaluate the success or failure of the planting project. The main purpose of this study is to apply a UAV (Unmanned Aerial Vehicle) for estimating the coverage area of a large-scale grass vegetation for an engineering construction, and then calculating the grass coverage rate. The playground at Pingtung University of Science and Technology was selected as a test site. Firstly, the application of UAV in three aircraft heights (10m, 20m, 30m) was shooting time-series images upon the test site, and then used a panoramic image stitching software, Microsoft ICE, carried stadium panorama stitching images. Finally, using the ImageJ analysis software identified and calculated the covered area of grass coverage within the stadium panoramic images. The test results showed that three kinds of aircraft height to estimate the grass coverage area of playground are reliable, and the average absolute error is less than 6%, in which measured 10m height is the most accurate. Therefore, for an engineering construction applying the UAV estimating a large area of cover grass, with some degree of accuracy and reliability, can be used as green landscaping works solely for reference and acceptance of construction quality management.

Key Words : Unmanned aerial vehicle, UAV, ImageJ, stitching, grass covered area..

[1] 國立屏東科技大學土木工程系副教授 (* 通訊作者 E-mail: wenguey@mail.npust.edu.tw)
Associate Professor, Dept. of Civil Eng., National Pingtung University of Science & Technology, Pingtung 912, Taiwan
[2] 國立屏東科技大學土木工程系研究生
Graduate student, Dept. of Civil Eng., National Pingtung University of Science & Technology, Pingtung 912, Taiwan
[3] 國立屏東科技大學土木工程系教授
Professor, Dept. of Civil Eng., National Pingtung University of Science & Technology, Pingtung 912, Taiwan
[4] 國立屏東科技大學土木工程系助理教授
Assistant Professor, Dept. of Civil Eng., National Pingtung University of Science & Technology, Pingtung 912, Taiwan