無人機空拍及人工智慧應用於判定植生覆蓋率

Applications of Drone Aerial Photography and Artificial Intelligence in Determining Vegetation Cover Rate

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摘　要

　　植生覆蓋率是探討環境議題時常會需要觀測計算的指標。例如水土保持計畫驗收時會檢查植生覆蓋率是否達標。傳統的植生覆蓋率測量方法通常需要耗費大量的人力和時間，而無人機具有效率高、機動性高可快速獲取大面積地表資訊等優勢，故本研究藉由無人機快速獲取地表植生分布及覆蓋狀況，再藉由人工智慧準確的判斷植生覆蓋率。無人機拍攝後再以 AI 對可見光照片直接進行辨識與分析該目標區域的植生覆蓋率，並與前人研究常用的 ImageJ 影像分析軟體估算得的植生覆蓋率及 AI 分析 NDVI 的植生覆蓋率進行比較。

　　以 ImageJ、光學照片、NDVI 計算得研究區之植生覆蓋率分別為，65.84%, 69.67%, 63.58%。本研究通過結合無人機空拍和人工智慧技術，提供了一種高效、準確的植生覆蓋率測量方法。

關鍵詞：無人機，人工智慧，植生指標、植生覆蓋率

Abstract

Vegetation cover rate is a crucial indicator often needed for observing and calculating environmental issues. For example, in the acceptance inspection of soil and water conservation projects, the vegetation cover rate must meet the standards. Traditional methods of measuring vegetation cover rate usually require a significant amount of manpower and time. However, drones offer high efficiency, mobility, and the ability to quickly obtain large-scale surface information. Therefore, this study uses drones to rapidly acquire surface vegetation distribution and coverage status, and then employs artificial intelligence (AI) to accurately determine the vegetation cover rate. After drone photography, AI is used to directly identify and analyze the vegetation cover rate of the target area from visible light photos. This result is then compared with vegetation cover rates estimated using the commonly used ImageJ image analysis software and AI-analyzed NDVI (Normalized Difference Vegetation Index) from previous studies.

The vegetation cover rates calculated for the study area using ImageJ, optical photos, and NDVI are 65.84%, 69.67%, and 63.58%, respectively. This study, by combining drone aerial photography and artificial intelligence technology, provides an efficient and accurate method for measuring vegetation cover rate.

Keywords：UAV，artificial intelligence，NDVI，vegetation cover rate