

中文摘要：

深度學習已證明其在解決各領域的各種挑戰（包括航照影像分析）方面的有效性。為了檢測台灣地區的稻田分佈狀況，我們開發了幾種深度學習模型的方法來分析航照影像資料，並針對台灣北中南東四大區域不同地貌進行研究。在我們過去所發展的深度學習模型中，已經可以對稻田坵塊進行有效的分類，針對不同的航照影像獲得了平均 0.9 以上的高 kappa 分數。然而，由於高內類別差異(high intraclass variance)、低外類別差異(low inter-class variance)以及沒見過的坵塊類型，導致有些影像的預測準確度較低。因此，為了提高模型的性能，我們建議根據水稻的特徵將其劃分為特定的子類別。這將使模型對子類別內的細粒度特徵更加敏感，從而減少水稻類別中的高內類別差異(high intra-class variance)。此外，我們將利用深度學習和基於規則的方法來識別航照影像中的新坵塊(未學習過的坵塊類型)，這些未學習過的坵塊類型以及典型的坵塊將用於水稻分割的訓練過程。這種方法對於解決因具有獨特特徵的訓練資料不足而出現未學習過或異常的坵塊所帶來的挑戰非常寶貴。

英文摘要：

Deep learning has demonstrated its effectiveness in solving a wide range of challenges spanning various domains, including aerial image analysis. To detect paddy fields in Taiwan region, we have developed several approaches using deep learning technologies. These approaches have yielded a high kappa score of above 0.9. However, there are several images that have relatively low classification accuracy due to high intra-class variance, low inter-class variance, and unseen parcel patterns. To improve the model's performance, we suggest dividing the rice class into specific subclasses based on its features. This will make the model more sensitive to fine-grain features within subclasses, thereby reducing high intra-

class variance in the rice class. Furthermore, we will utilize a deep learning and rule-based approach to identify unseen parcel patterns in aerial images. These unseen parcel patterns, along with the typical parcels, will be used in the training process for rice classification. This approach is precious in addressing the challenge posed by new or outlier parcel patterns, which often emerge due to limited training data that carries unique features.