

基于颜色特征与多层同质性分割算法的麦田杂草识别

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摘要: 针对杂草与小麦叶子交叠的情况,提出了一种利用改进的多层同质性分割算法,并结合颜色与形态特征的杂草识别方法。在颜色空间YIQ,选取I作为特征量并用改进的最大类间方差法分离植物与背景;在颜色空间HSI,选取I的同质性和S作为特征量进行多层同质性分割分离小麦与杂草;最后结合形态学特征开闭运算滤波及二值逻辑与运算获得杂草图像;通过模拟化学除草系统,从理论上评价整个系统的除草效率。试验结果表明,杂草正确识别率达92.6%,单幅图像除草剂的减少率在35%~50%,小麦田的除草剂减少率超过78.7%。Aiming at the severe occluding of leaves of weed and wheat, a weed identification method that applied to improved hierarchical approach to color image segmentation by using homogeneity and combines color and morphological features was presented. Color feature has been utilized to distinguish plants and background: using a method that took YIQ as color-space and I as characteristic variant and improved method of maximum classes square error as criterion; color feature has been utilized to distinguish wheat and weed: using a method that took HSI as color-space and homogeneity of I and S as characteristic variant separately and hierarchical homogeneity segmentation as criterion; ultimately morphological feature has been utilized to obtain weed: using a method that combined morphological opening and closing filter and AND operation algorithm. The proposed methods together with a chemical weeding system were simulated and the efficiency of the overall systems was evaluated theoretically. Experiments on a serial of weed images were conducted. The experimental results showed that the correct identification ratio exceeds 92.6%, the herbicide reduction rate of single image ranged from 35% to 50%, the herbicide reduction rate of the whole wheat field exceeded 78.7%.

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