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Section Information:

The "Agricultural Science and Technology" section of *Applied Sciences* welcomes the submission of high quality, multidisciplinary, original research and review articles related to all aspects of Agricultural Science and Technology.

Applied agricultural sciences: crop production, crop protection, food sciences and food technology, irrigation, agricultural statistics, and bioinformatics.

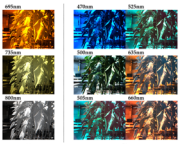
Applied agricultural technology: farm structure, farm power and machinery, irrigation and drainage, engineering of land and water resources, aquaculture and fisheries, renewable energy, agro-industrial engineering, horticultural and greenhouse engineering, pre- and post-harvest engineering, environment and agricultural information technology, etc.

Featured Papers

DOI:10.3390/app11209583

Comparing Performances of CNN, BP, and SVM Algorithms for Differentiating Sweet Pepper Parts for Harvest Automation

Authors: Bongki Lee et al.



Abstract: For harvest automation of sweet pepper, image recognition algorithms for differentiating each part of a sweet pepper plant were developed and performances of these algorithms were compared. An imaging system consisting of two cameras and six halogen lamps was built for sweet pepper image acquisition. For image analysis using the normalized difference vegetation index (NDVI), a band-pass filter in the range of 435 to 950 nm with a broad spectrum from visible light to infrared was used. K-means clustering and morphological skeletonization were used to classify sweet pepper parts to which the NDVI was applied. Scale-invariant feature transform (SIFT) and speeded-up robust features (SURFs) were used to figure out local features. Classification performances of a support vector machine (SVM) using the radial basis function kernel and backpropagation (BP) algorithm were compared to classify local SURFs of fruits, nodes, leaves, and suckers. Accuracies of the BP algorithm and the SVM for classifying local features were 95.96 and 63.75%, respectively. When the BP algorithm was used for classification of plant parts, the recognition success rate was 94.44% for fruits, 84.73% for nodes, 69.97% for leaves, and 84.34% for suckers. When CNN was used for classifying plant parts, the recognition success rate was 99.50% for fruits, 87.75% for nodes, 90.50% for leaves, and 87.25% for suckers.

DOI:10.3390/app12031309

Remote and Proximal Sensing Techniques for Site-Specific Irrigation Management in the Olive Orchard

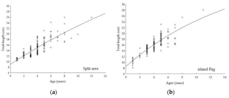
Authors: Giovanni Caruso et al.

Abstract: The aim of this study was to evaluate the potential use of remote and proximal sensing techniques to identify homogeneous zones in a high density irrigated olive (Olea europaea L.) orchard subjected to three irrigation regimes (full irrigation, deficit irrigation and rainfed conditions). An unmanned aerial vehicle equipped with a multispectral camera was used to measure the canopy NDVI and two different proximal soil sensors to map soil spatial variability at high resolution. We identified two clusters of trees showing differences in fruit yield (17.259 and 14.003 kg per tree in Cluster 1 and 2, respectively) and annual TCSA increment (0.26 and 0.24 dm^2, respectively). The higher tree productivity measured in Cluster 1 also resulted in a higher water use efficiency for fruit (WUEf of 0.90 g dry weight L–1 H^2O) and oil (WUEo of 0.32 g oil L–1 H^2O) compared to Cluster 2 (0.67 and 0.27 for WUEf and WUEo, respectively). Remote and proximal sensing technologies allowed to determine that: (i) the effect of different irrigation regimes on tree performance and WUE depended on the location within the orchard; (ii) tree vigour played a major role in determining the final fruit yield under optimal soil water availability, whereas soil features prevailed under rainfed conditions.

DOI:10.3390/app112411919

The Spatial Heterogeneity of the Black Scorpionfish, *Scorpaena porcus* (Scorpaenidae): Differences in Length, Dietary and Age Compositions

Authors: Josipa Ferri et al.

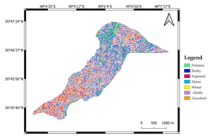


Abstract: The present study assessed spatial variations in several biological characteristics of *Scorpaena porcus* Linnaeus, 1758 and estimated length structure, dietary composition and growth parameters for the species. Sampling was carried out in two areas, about 200 km apart, in the coastal Adriatic Sea, which is the northernmost region of the Mediterranean. A total of 388 specimens of *S. porcus* were caught, 233 from the Split area and 155 from the Pag Island area, and a higher proportion of individuals in the ≤15 cm length classes were found in the Split area. The results of the age, growth and diet analyses demonstrated that the black scorpionfish is a slow-growing and long-lived species that feeds on a wide variety of plant and animal taxa and shows a high selectivity for crustacean decapods. Detailed comparisons and multivariate analyses showed significant fine-scale spatial structuring of the investigated species, as observed length, dietary and age compositions were heterogeneous among the two areas. Fish from the Pag Island area ingested a greater diversity of the prey types, fed to a greater extent on fishes, reached the highest total length and showed a higher growth rate. Such intraspecific variations could reflect adaptations to different environmental conditions and support the geographical scale at which local black scorpionfish populations should be managed.

DOI:10.3390/app112110104

Integration of Sentinel 1 and Sentinel 2 Satellite Images for Crop Mapping

Authors: Shilan Felegari et al.

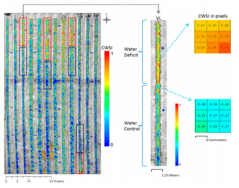


Abstract: Crop identification is key to global food security. Due to the large scale of crop estimation, the science of remote sensing was able to do well in this field. The purpose of this study is to study the shortcomings and strengths of combined radar data and optical images to identify the type of crops in Tarom region (Iran). For this purpose, Sentinel 1 and Sentinel 2 images were used to create a map in the study area. The Sentinel 1 data came from Google Earth Engine's (GEE) Level-1 Ground Range Detected (GRD) Interferometric Wide Swath (IW) product. Sentinel 1 radar observations were projected onto a standard 10-m grid in GRD output. The Sen^{2}Cor method was used to mask for clouds and cloud shadows, and the Sentinel 2 Level-1C data was sourced from the Copernicus Open Access Hub. To estimate the purpose of classification, stochastic forest classification method was used to predict classification accuracy. Using seven types of crops, the classification map of the 2020 growth season in Tarom was prepared using 10-day Sentinel 2 smooth mosaic NDVI and 12-day Sentinel 1 back mosaic. Kappa coefficient of 0.75 and a maximum accuracy of 85% were reported in this study. To achieve maximum classification accuracy, it is recommended to use a combination of radar and optical data, as this combination increases the chances of examining the details compared to the single-sensor classification method and achieves more reliable information.

DOI:10.3390/app12031047

A Comprehensive Survey of the Recent Studies with UAV for Precision Agriculture in Open Fields and Greenhouses

Authors: Muhammet Fatih Aslan et al.



Abstract: The increasing world population makes it necessary to fight challenges such as climate change and to realize production efficiently and quickly. However, the minimum cost, maximum income, environmental pollution protection and the ability to save water and energy are all factors that should be taken into account in this process. The use of information and communication technologies (ICTs) in agriculture to meet all of these criteria serves the purpose of precision agriculture. As unmanned aerial vehicles (UAVs) can easily obtain real-time data, they have a great potential to address and optimize solutions to the problems faced by agriculture. Despite some limitations, such as the battery, load, weather conditions, etc., UAVs will be used frequently in agriculture in the future because of the valuable data that they obtain and their efficient applications. According to the known literature, UAVs have been carrying out tasks such as spraying, monitoring, yield estimation, weed detection, etc. In recent years, articles related to agricultural UAVs have been presented in journals with high impact factors. Most precision agriculture applications with UAVs occur in outdoor environments where GPS access is available, which provides more reliable control of the UAV in both manual and autonomous flights. On the other hand, there are almost no UAV-based applications in greenhouses where all-season crop production is available. This paper emphasizes this deficiency and provides a comprehensive review of the use of UAVs for agricultural tasks and highlights the importance of simultaneous localization and mapping (SLAM) for a UAV solution in the greenhouse.

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