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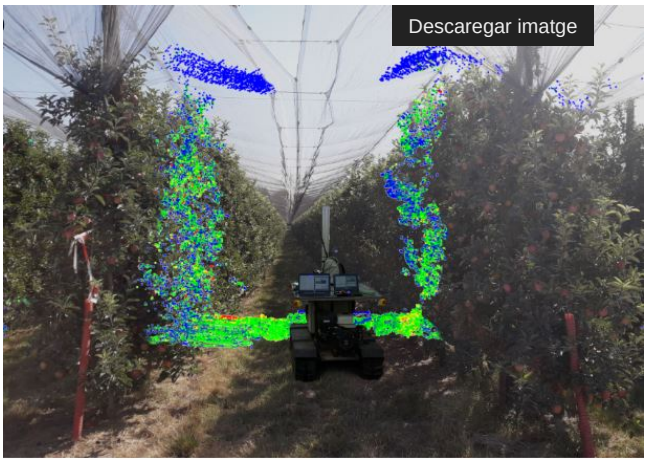
"3D Spectral Graph Wavelet Point Signatures in Pre-Processing Stage for MLS Point Cloud Registration in Unstructured Orchard Environments": Research article of PAgFRUIT project



A new article by Guevara et al. (2021) [https://doi.org/10.1109/JSEN.2021.3129340] has been published in IEEE Sensors Journal (https://doi.org/10.1109/JSEN.2021.3129340 [https://doi.org/10.1109/JSEN.2021.3129340]). The use of three-dimensional registration techniques is an important component for sensor-based localization and mapping. Several approaches have been proposed to align three-dimensional data, obtaining meaningful results in structured scenarios. However, the increased use of high-frame-rate 3D sensors has lead to more challenging application scenarios where the performance of registration techniques may degrade significantly. In order to improve the accuracy of the procedure, different works have considered a representative subset of points while preserving application-dependent features for registration. In this work, we tackle such a problem, considering the use of a general feature-extraction operator in the spectral domain as a prior step to the registration. The proposed spectral strategies use three wavelet transforms that are evaluated along with four well-known registration techniques. The methodology was experimentally validated in a dense orchard environment. The results show that the probability of failure in registration can be reduced up to 12.04% for the evaluated approaches, leading to a significant increase in the localization accuracy. Those results validate the effectiveness and efficiency of the spectral-assisted registration algorithms in an agricultural setting and motivate their usage for a wider range of applications.

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