

Abstract

# Enriching Low-Density Terrain Maps from Satellite with Autonomous Robots Data <sup>†</sup>

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**Abstract:** Satellite imagery and remote sensing have been used for some years in agriculture to create terrain maps for different soil features (humidity, vegetation index, etc.). Multichannel information provides lots of data, but with a big drawback: the low density of information per surface unit; that is, the multi-channeled pixels correspond to a large surface, and a fine characterization of the targeted areas is not possible. In this research, the authors propose the enrichment of such data by the use of autonomous robots that explore and sense the same targeted area of the satellite but yielding a finer detail of terrain, complementing and fusing both information sources. The sensory elements of the autonomous robots are in the visual spectrum as well as in the near-infrared spectrum, together with Lidar and radar information. This enrichment will provide a high-density map of the soil to the final user to improve crops, irrigation, seeding and other agricultural processes. The methodology to fuse data and create high-density maps will be deep learning techniques. The system will be validated in real fields with the use of real sensors to measure the data given by satellites and robots' sensors.



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