

The Use of Images in Digital Agriculture:

Current Limitations and Examples

The digital revolution is reaching the different sectors of our society, broadening the possibilities in the near future. Nonetheless, not all sectors are characterized by the same features. The current limitations of each sector must be considered when digital solutions are proposed. In agriculture, the use of images from different sources is crucial for monitoring the status of the crops and their environment, such as the soil or the presence of other living beings. Several authors have described the application of artificial intelligence for object recognition in gathered images. Although the substantial advantages of these techniques, in many cases, the sector's limitations do not allow to use them in real cases.

In this tutorial, we are going to identify the limitations of agriculture to face the digital revolution. We will focus not only on the big farmlands but also on the stallholders of developing countries. Once the current limitations for the digital revolution, specifically for images, are established, we will analyze some examples. The examples are based on using simple image processing aimed to study different aspects of agriculture. These simple image processing techniques consist of tailored solutions that can be applied regardless of the existing limitations.

Among the presented examples, we will include some of the more relevant and traditional aspects of digital agriculture, such as yield prediction and weed detection. Moreover, other issues, such as the establishment success or the identification of alternative crop management options, will be addressed. The studied cases include both rainfed and irrigated crops, the use of images from different sources (satellite, drone, and on-ground cameras), and different processing techniques.