

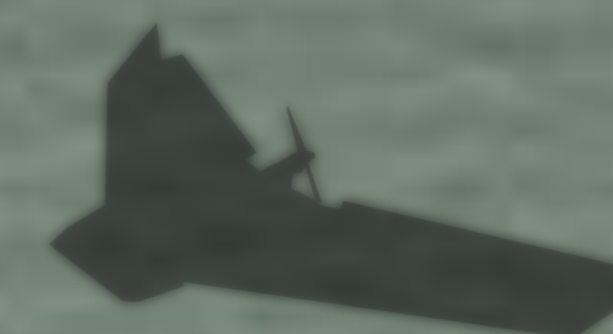


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# How simple and complex is the drone technology: agriculture opportunities



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## Introduction

The UAV technology (unmanned aerial vehicle), also called drone (or VANT in portuguese), was created for military purposes. Currently, with the electronic miniaturization and evolution of radio systems, global positioning systems and sensors (cameras), it has been used for civil use in various applications worldwide. These uses varies since from photo and videos amateur until agricultural applications with the use of specific bands of the electromagnetic spectrum and complex applications in engineering using laser sensors, radar and thermal band.

Amateur use of UAV's, came up with the aeromodeller using radio control model airplanes; but these focus only on the quality of the aircraft, flight and pilot control. The applied use begins when the UAV becomes a tool for remote sensing applied. The diversity and availability of this tool currently allows a wide range of services. RGB digital cameras for only air landscapes views is practically popularized owing to easy access because of low prices and the simplicity of use.

In Brazil, the sector that can most benefit from this technology is agriculture. The use of satellite imagery is already widespread in large agricultural companies such as sugar and ethanol mills and large farms grain. But access is quite complex to small and medium producers, from image acquisition to processing. Thus, a simple, objective and easily accessible, UAV as the agricultural tool can be used by agricultural cooperatives, farm workers for monitoring farm crop health, or just for viewing (erosion, problems with frost, sugarcane flattened, planting/budding and generation of vegetation index).

The objective is to demonstrate that the technological innovation of UAV's, although technologically complex, it is simple to access and gives an evolution in the agricultural sector, optimizing the process since the preparation of the soil until whole crop cycle and monitoring the farm.

## Methodology

Despite the technological complexity embedded in a UAV, with sensors like inclinometer, magnetic, barometric, global positioning system, information processing and autonomous decisions, the entire process of image acquisition by the tool is simple for the end user. Image processing in the cloud, it makes easier access to this technology, requiring less time, complex learning and expensive PCs with high performance.

Figure 1 shows the flow of information is presented, from image acquisition to the final map for decision making. The conditions of use refers to the user's attention to the schedule of collecting the images, the presence of clouds, wind, and the proper functioning of the equipment.

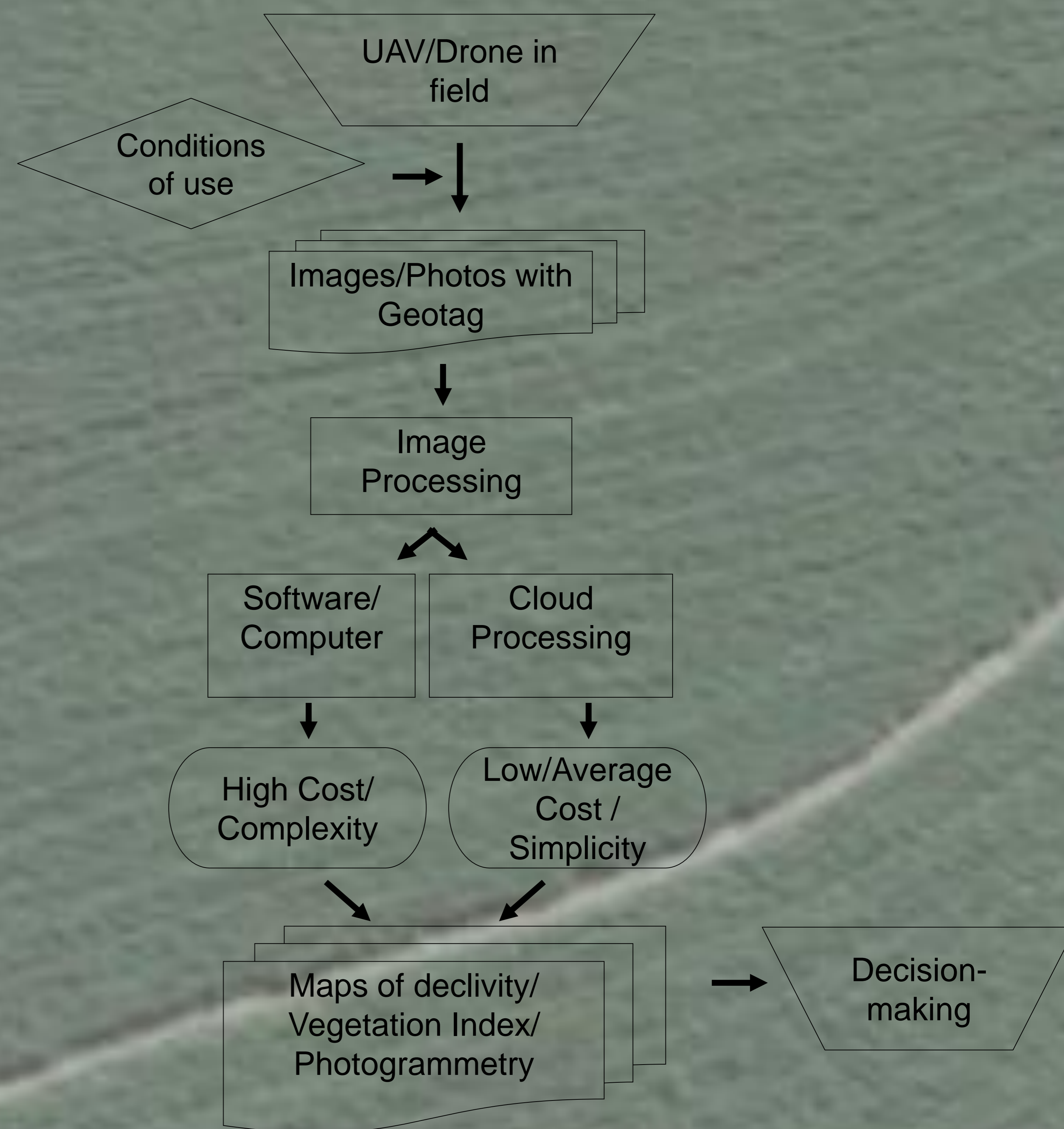


Figure 1 – Flowchart of information's.

## Results and discussion

It is found that, although it is possible the use of high end computers and complex software, the presence of a flow of information easily accessible to the agricultural user, makes clear the power of revolution this tool for brazilian agriculture, and the creation of new opportunities for many areas. Below are two images (Figs. 2 and 3) processed from the simplified information flow.



Figure 2 – Sugarcane, forest and pasture.

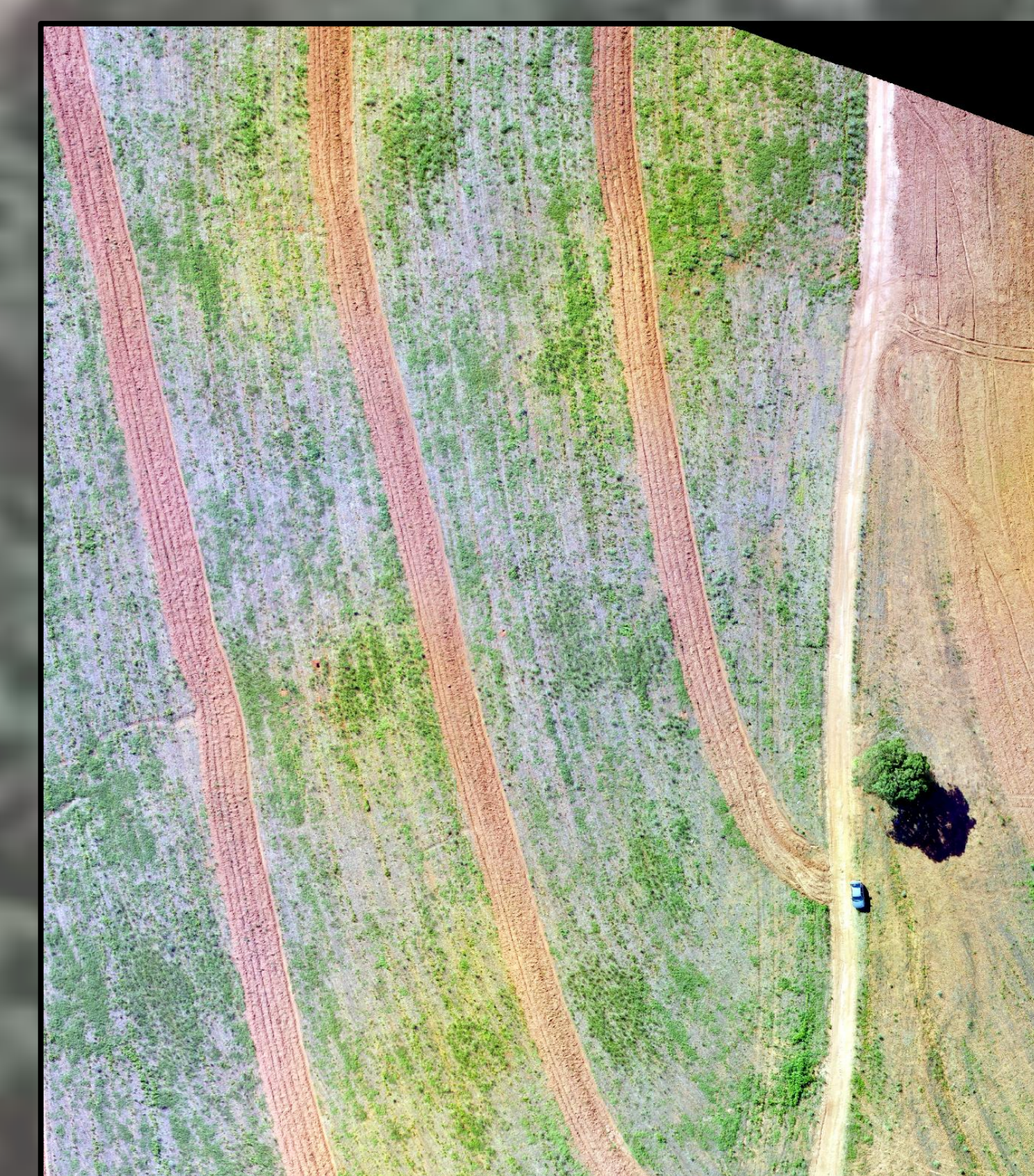


Figure 3 – Exposed soil.

## Conclusions

From the discussion of the work, was possible analyze that the UAV technology, though complex and recent, the current facilities of internet and purchase equipment enable its use in a simple way, which currently allows unprecedented decisions at a technical level, and to the future a full automation of the entire process.