AERIAL IMAGING: A BIRD'S EYE VIEW TO THE FUTURE OF AGRICULTURE

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The role of technology in agriculture has led to various significant changes in agricultural industry, including the advent of equipment that decreased the cost of labour required while increasing production. Aerial photography became an important aspect of the mapmaking practice in the twentieth century because it provides a clear representation of physical and cultural landscape an area at a specified timeframe. The ability to capture an image and saved for future analysis has evolved through time, and the agriculture industry can benefit greatly from this technology as years roll on. However, it is imperative to keep aerial imaging costs low so that small-scale farmers can be benefited from this extraordinary scientific and technological advancement.

INTRODUCTION

With a global population of 9 billion predicted by 2050, the technologies capturing agriculture with time in order to maintain productivity and all related challenges are significant. Global food insecurity, climate change, and overpopulation all are putting tremendous strain on existing agro-food resources. Due to the aforementioned constraints, innovative and result-oriented scientific breakthroughs are required. Aerial imaging is a revolutionary surveying tool since it provides a wide field of view that assists with landscape changes, pest and disease management, hydrological alterations, and road or transportation architecture. The ability to observe a landscape from a "bird's eye view" can prove to be extremely useful while investigating a landscape. The collection of images captured using an airborne camera is known as aerial photography. Photographs are essentially representations of the reflectance properties (relative brightness) of features captured on film. Geology, land use, agriculture management, forestry, water pollution, natural disasters, urban planning, wildlife management, and environmental impact assessments all can be benefitted from it. Aerial images are most frequently captured in panchromatic (black and white), colour, or false-colour infrared; however, various emulsions and filters can be used to record various forms of electromagnetic radiation onto photographic film. Fixed-wing aircraft, helicopters, unmanned aerial vehicles (UAVs or "drones"), balloons, blimps, and dirigibles, rockets, pigeons, kites, parachutes, and stand-alone telescopic and vehicle-mounted poles are all used for aerial photography. Aerial imaging has the potential to improve precision agriculture resource management and decision support systems.

HISTORY AND EVOLUTION OF AERIAL IMAGING:

In the last fifty years, aerial photography has seen a number of technological changes. Historic information from aerial photography can also be useful for monitoring landscape and ecosystem change in the past. In a hot-air balloon over France, Gaspar Tournachon snapped the first aerial photograph in 1858. Long before the advent of photography while during flight, tasks were conducted by drawing sketches during flying or ballooning. It took the Wright brothers until 1909 to take the first aerial photograph from an aeroplane. During World War I, this was critical since it enabled for reconnaissance of the enemy forces' bases and footholds. In the early to mid-2000s, Canon and Nikon introduced their "Full Frame" digital SLR options, claiming that the megapixel count could rival and surpass film. The forest industry can now see stereographic images thanks to film and digital photography; these images can be read with special glasses that give the impression of 3D images. When comparing heights and differentiating different tree species in a stand, this becomes quite useful.

USES OF AERIAL IMAGING IN AGRICULTURE:

Remote sensing satellite images with high resolution can be used to analyse broad areas for pre-harvest crop variations, agricultural land-use mapping, and production estimation of major crops, among other things. For small fields and customised imaging schedules, UAVs with the farmer in charge of the flight may be a preferable alternative. The normalised difference vegetation index (NDVI) can be used as a graphical indication for assessing living green vegetation using aerial imagery. Aerial imaging-based systems can be used to collect data and provide decision assistance for a variety of agricultural tasks. It can handle a wide range of issues, including irrigation and soil variation, as well as pest and fungal infestations (Sharma *et al*. 2016). Aerial photographs are amazing for mapping small ecosystems and fine-scale landscape features like riparian zones and individual trees. As a result, many effective operational choices are frequently based on maps created from aerial photographs.

ADVANTAGES OF AERIAL IMAGING:

- Long-term data (1930s and onward)
- High spatial resolution is common.
- Many maps used by agencies are developed on this framework.
- Height and topography are captured in a stereoscopic vision.
- Capture is relatively simple.
- It is feasible to acquire it at any time or in any location.
- It is easy to customize to specific requirements (photograph scale, spatial, spectral, and temporal characteristics, etc.).
- Because of the lower altitude, there is less atmospheric interference.

DISADVANTAGES OF AERIAL IMAGING:

- The spatial coverage of individual photographs is limited.
- Processing necessitates a significant amount of time (film development and orthorectification)
- Photographs vary a lot between airline lines (environmental and positional variability)
- Image correction and contrast standardisation are difficult to achieve.

- The interpretation of manuals might be subjective.
- The extent of coverage is determined by the needs of the original project.
- Weather has an impact on the quality of the photograph.
- The extent of coverage is determined by the needs of the initial project.
- Incomplete or contradictory met data (specially historic photographs)

CONCLUSION:

Due to aerial imagery we have been able to explore and analyse changes from an aerial view that would otherwise be impossible to survey using typical ground approaches. Aerial imaging has been found to give domain specialists and policymakers with data required for assessment and effective measures in numerous fields covered. Viewing the landscape from a bird's eye viewpoint made it much easier to connect to the information. Many critical management practices are commonly made on the basis of maps acquired from aerial photographs because they are a fantastic source of historical information on vegetation cover and condition. Aerial and multispectral images were superimposed to enable real-time analysis of relevant agriculture field management, resulting in lower agricultural yield losses. Cost reduction and system user familiarity with minimal technical knowledge to operate and obtain actionable data are needed to make the systems appealing to farmers.