Open Source Tools for Drone Data Management

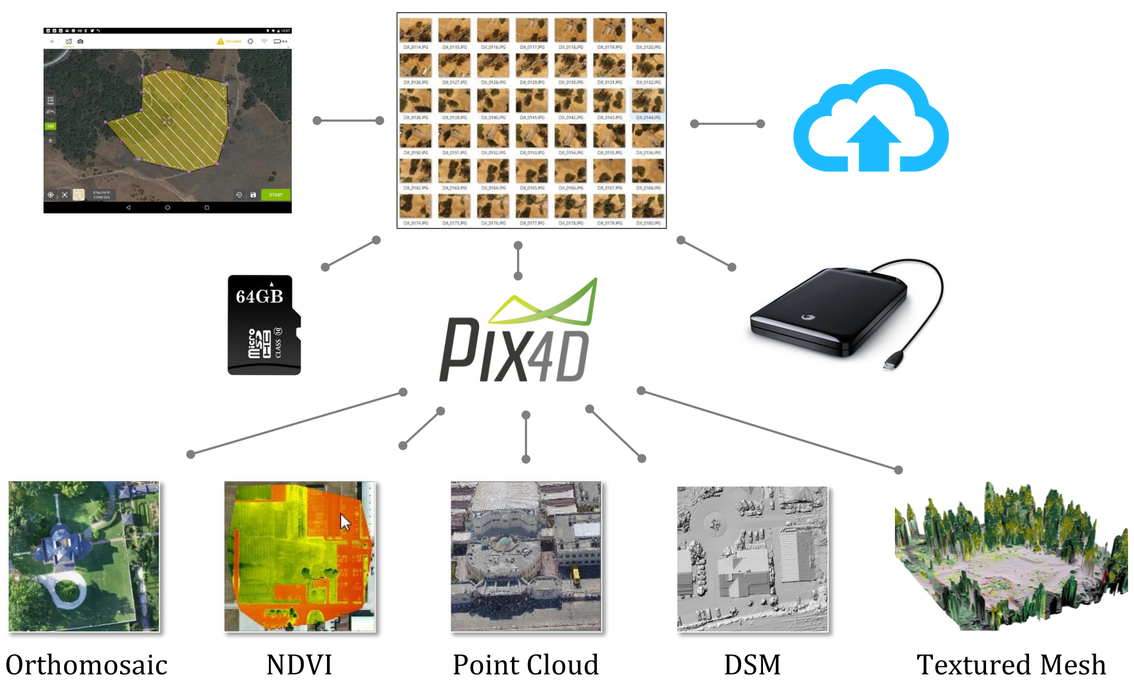
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Introduction

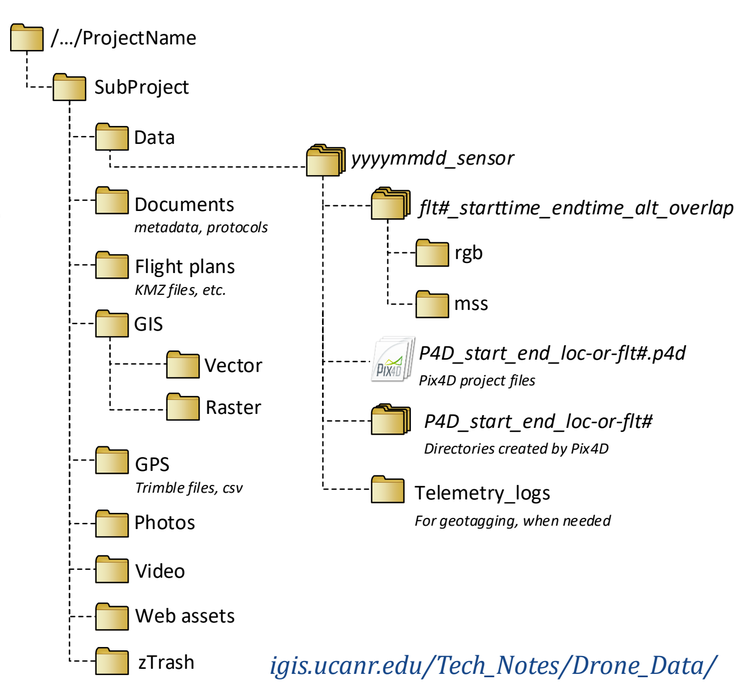
Modern photogrammetry software has dramatically improved the quality and speed of generating 2D and 3D data products from drone imagery, however a significant amount of data management remains before and after the stitching process. To address the increasing demands of managing data for a busy drone program within in a team environment, we developed a series of tools using open source software.



mission plans • images • ground control points • trajectory • flight log • GIS layers

Foundations: Standard Directory Structure

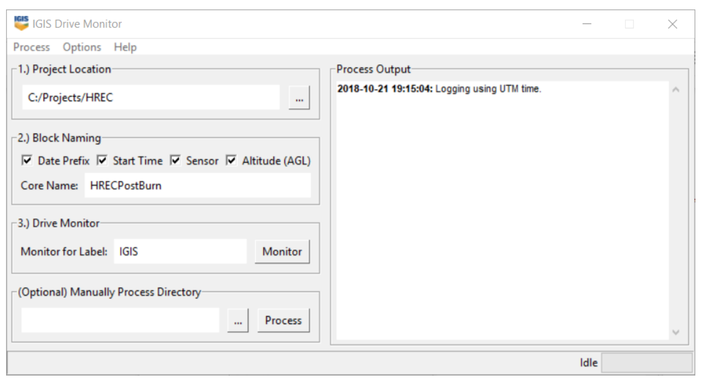
The initial step was to develop a project directory structure and set of naming conventions that were flexible, extensible, and portable. Thru trial and error, we developed a generic directory tree that accommodated nearly all drone projects.



igis.ucanr.edu/Tech_Notes/Drone_Data/

IGIS Drive Monitor

The *IGIS Drive Monitor* is designed for field use. It copies drone data from SD cards to a backup location in an autonomous way. It will search for drives with a user specified label and automatically find all images, consolidate, copy and rename them according to a block naming scheme.



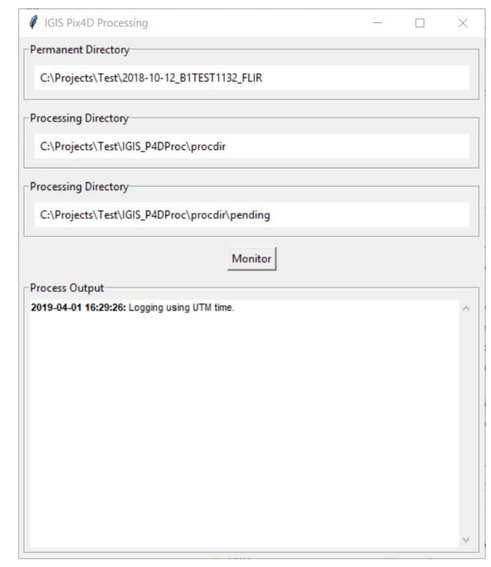
github.com/jacobflanagan/IGIS-Drive-Monitor

Through this, it creates a standardized data structure that is portable and can be easily processed on a remote computer (i.e., server).

IGIS Drive Monitor is written completely in Python 3 and uses open source libraries for reading image Exif and monitoring for external drive insertion. Optionally, it can also interact with external software via command scripts and create processing instructions for a remote processing computer for data verification and processing (ex: Pix4D), respectively.

IGIS Pix4D Controller

Intended to be installed on a server, the *IGIS Pix4D Processing Controller* software ingests newly added drone data from a specified directory given a processing flag and instructs an instance of Pix4d (it is assumed a working copy of Pix4d is installed on the same machine) to automatically process project data. A data structure in the form given by the *IGIS Drive Monitor* allows the software to automatically find all the images belonging to flight block and a build in customizable sensor library relays which processing template Pix4D should use for processing. In addition, if human interaction is necessary during the processing (i.e., applying Ground Control Points), the software will place these data sets into a "Pending Directory" and wait until instructed to continue through processing.



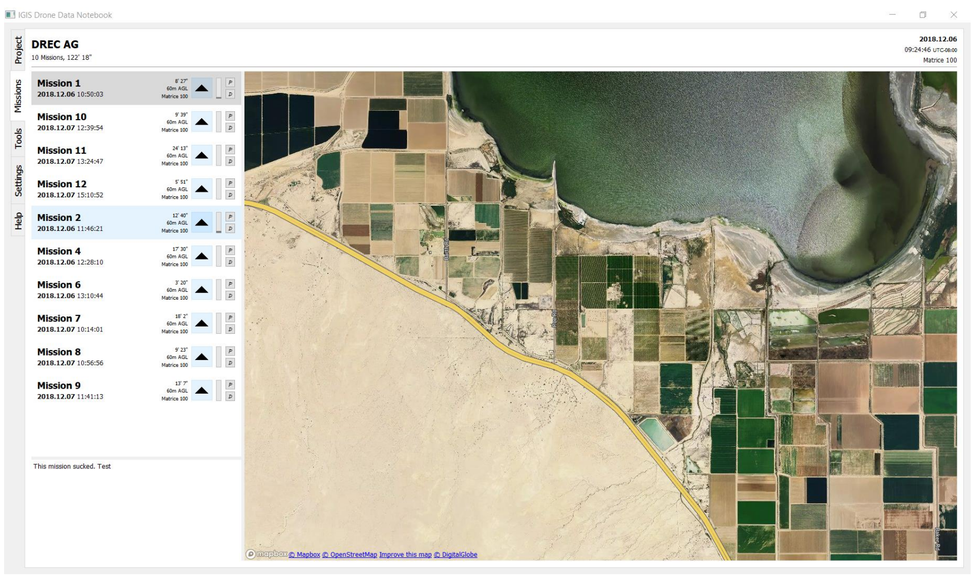
github.com/jacobflanagan/IGIS-Pix4D-Controller

IGIS Pix4D Processing Controller was written in Python 3 with open source libraries for reading exif information from images. In addition, it uses command scripts to interact with Pix4D (a working copy of Pix4D should be installed on the same machine as this scripting software).

IGIS Drone Data Management Logbook

The *IGIS Drone Data Management Logbook*, written in C++, is an interactive data manager that aids a drone pilot and field crew in syncing data from SD cards, creating standardized data structures, visualizing image positions and mission footprints and automatically create processing instructions (i.e., *.pix4d). The data structure allows for larger projects that are made up of multiple missions to follow an ideal workflow of partial processing of individual missions and then combining them for a larger result.

A sensor pairing feature allows multiple sensors to be flown at the same time - Additional sensor imagery are trimmed to the same footprint and time frame as the main sensor. Additionally, field notes can be recorded for each mission and kept together within the data structure.

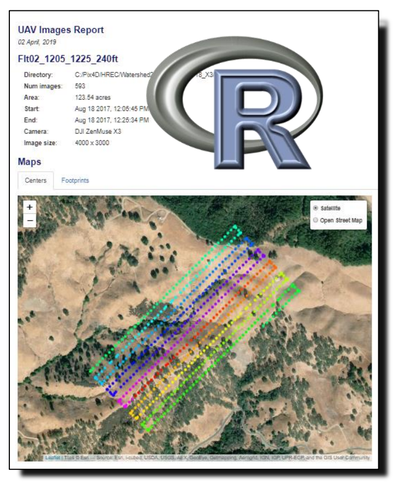


The *IGIS Drone Data Management Logbook* is a work in progress and written in C++ using libraries from Qt, libtiff, libexif and WPD Application Programming Interface.

R-package: `uavimg`

The **`uavimg`** package for R contains functions to:

- create HTML catalogs for a folder of images
- estimate actual overlap, GSD, & mission area
- compute and export image centroids, footprints, and the mission MCP
- move images into folders by flight
- launch functions from the context menu in Windows Explorer



github.com/UCANR-IGIS/uavimg

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