PIX4Dfields

The fast in-field drone solution enabling digital agriculture

Use drone mapping to quickly and reliably digitize crops, eliminate guesswork, and enable in-field decision-making

In-field results

Create maps rapidly (no internet connection required) for faster decision making and action, without leaving the field.

Reliable maps

Always get maps of your fields and crops at any critical stage regardless of satellite availability and cloud cover.

Trusted results

Eliminate guesswork by analyzing crop health maps and measure issues using calibrated multispectral or full resolution RGB images.

PIX4D

Applications
Using drone mapping in agriculture

Scouting

Trial plot management

Insurance

Fertilization

Drainage and irrigation

Crop protection

FEATURES

Features		Advantages
Field and Farm project organization	🖥	Organize your projects around the industry standard of Field and Farm, and include key information such as crop type and crop variety, etc
Fast mapping	🖥	Generate high-resolution orthomosaics and RGB composites, directly after flying. Offline and local
Rig relative calibration	🖥	Optional recalculation of the rig relatives to improve band alignment for supported multispectral cameras
Field boundary editor	🖥	Create your own field boundary, or import an existing one, and trim other layers based on the boundary
Index generator	🖥	Automatically generate predefined indices (BNDVI, GNDVI, LCI, MCARI, NDRE, NDVI, SIPI2, TGI or VARI)
Index calculator	🖥	Create your own custom indices by inputting an index formula, save and reuse with Data Sync
Zonation tool	🖥	Create custom zones based on information from vegetation index maps using the normal or high quality level and between 2 and 7 classes
Prescription tool	🖥	Create comprehensive application rate maps for a more targeted input with the prescription tool
Comparison tool	🖥	Compare different maps side-by-side using split or double screen
Annotations tool	🖥	Annotate crop focus areas, add descriptions, attach images or import geolocated images for additional context
Measurement tool	🖥	Measurement tools to quickly measure distances and areas for analysis in the field
Statistics	🖥	DSM, index layers, and their area annotations display mean and standard deviation. Point annotations display DSM and index layer values.
Radiometric correction	🖥	Generate orthomosaics / indices that can be compared in different weather conditions when using multispectral imagery
Data synchronization	🖥	Synchronize your projects between multiple devices, so you can work with them on different computers and / or tablets
PDF report generator	🖥	Share your maps with all project stakeholders for seamless collaboration using the PDF report export tool
Export tool	🖥	Select some or all layers in your project and export them into a predefined folder on your computer
Advanced layer visualization	🖥	Adjustable histogram value ranges including equalization to provide control over data values of interest

HARDWARE SPECS

CPU: Intel® Core™ i3 or AMD Phenom processor (or faster recommended)

GPU: NVIDIA GeForce 2 GB RAM (or better recommended)

HD: Approximately 4GB HDD free space

OS: Windows 10 / macOS Catalina (10.15) or above

RAM: 4GB RAM (or 8GB recommended)

Try for free at **pix4d.com/fields**

Enhance your agriculture workflow with Pix4Dfields in less than 30 minutes

Thanks to Pix4Dfields instant processing and analysis tools, timely and focused decisions on site are a part of this farm's every day workflow.

CALIFORNIA CASH CROP

California produces 96% of the prunes grown in the US. Depending on the sugar quantity and fruit quality the price of these European plums varies from 1,300USD up to 2,000USD per ton with an expected yield of three tons per acre. In other words, each tree matters and having stable tools that produce accurate and fast results bring immediate value through enhancing agriculture workflows.

Pinpoint Aerial Solutions (PAS), teamed up with Pix4D to analyze the crop health on a Magenheimer prune farm in Yuba City, California. Part of their role as service providers is assisting farmers or agriculture advisers in crucial management decisions.

THE FIVE MINUTE CROP PROTECTION ASSESSMENT

PAS used the DJI Matrice 600 Pro with a MicaSense RedEdge-M to capture the data. The drone was flown at 110 meters at 8 m/s with a 80% overlap. After the 20 minute flight, 2,771 image were collected (around 6.35GB of data). Once the data was captured, it was transferred from the drone's SD card to a laptop on site equipped with Pix4Dfields.

Because Pix4Dfields image processed all 2,771 images in 5 minutes, PAS was able to do the image analysis on site, discuss the results and immediately scout the focus areas with the farm manager.
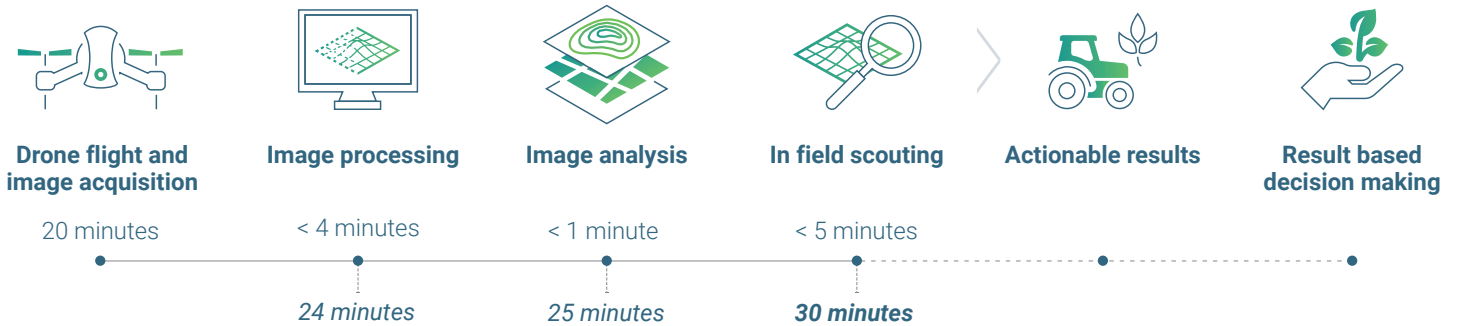

Prunes farm.

EACH TREE MATTERS

| Drone flight and image acquisition	Image processing	Image analysis	In field scouting	Actionable results	Result based decision making
20 minutes	< 4 minutes	< 1 minute	< 5 minutes		
	24 minutes	25 minutes	**30 minutes**		

CROP PROTECTION ANALYSIS

With the help of the NDRE index map generated in Pix4Dfields, PAS highlighted potential trouble spots with the annotation tool:

- A water leak, which was immediately confirmed with the farm manager
- A new irrigation pipe was identified as a potential area of concern
- An area with the significantly less dense growth was identified

Once arriving at the identified area the issues were confirmed: around 28 trees were growing less densely than their neighbors. The farmer immediately began the process of gathering soil and leaf samples to figure out what exactly was causing the issue.

CONCLUSION

Pix4Dfields enables service providers like PAS to do their jobs in a faster and more accurate manner while at the same time providing farm managers with actionable data in the field. Pix4Dfields has a direct impact on farm management – and consequently on farm's profit.
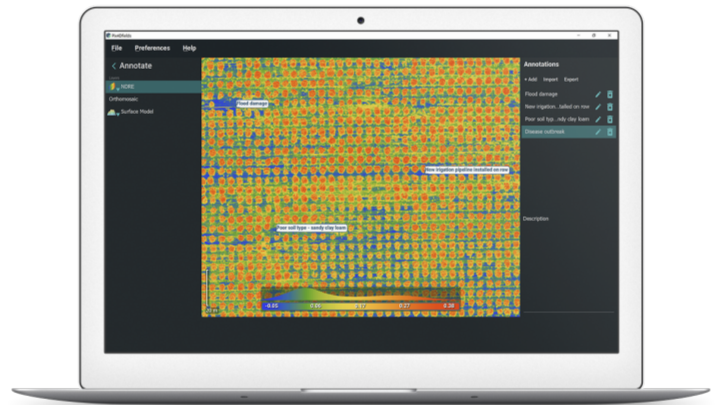
Pix4Dfields NDRE index map used with annotation tool to highlight the problem areas

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Identifying drainage tiles with Pix4Dfields

A laptop and Pix4Dfields let one service provider present results to their client immediatly after a flight, and take action without leaving the field.

PROTECTING AN INVESTMENT: THE IMPORTANCE OF DRAINAGE TILES

Drainage tiles help control soil moisture levels - but are also a significant investment. Knowing where existing pipes are can save growers a lot of time and money while ensuring optimal crop growth.

A soybean farm in Northwest Iowa hired HeartWood Labs, a part of Arrowmaker Group Inc. to identify where existing drainage tiles were located in some of their fields. For this particular job, HeartWood Labs flew a DJI Matrice 100 equipped with the MicaSense RedEdge and analyzed the results in Pix4Dfields.

FASTER DATA: PROCESSING WITH PIX4DFIELDS

Processing is usually the most intensive and costliest part of the services HeartWood Labs provides and with Pix4Dfields they were able to cut down on their processing time by a very large margin. By using Pix4Dfields, they are able to spend much more time out in the field collecting data, instead of sitting in the office processing. Including preflight checks, flying and processing, the total time from start to finish was approximately 1 hour for a 160 acre field.

DIGGING UP DATA WITH PIX4DFIELDS ANALYTICS

After processing the imagery in Pix4Dfields, the team was able to analyze the resulting data in the same platform and while still in the field. They were able to identify the drainage tiles using the NDRE index, an index that can only be calculated if the red edge band is available. Since the RedEdge sensor captures the red edge band, the team was able to spot the differences in the vegetation growing along the field. The plants over the tile lines were healthier than the plants not directly over the lines.

Soybean farm.

Soybean site.

With the tiles identified, the team presented the results to the customer using the split-screen tool in Pix4Dfields to highlight the differences between layers. Comparing the RGB orthomosaic in real time against the NDRE index really helped HeartWood Labs demonstrate the benefits of the multispectral data. The RGB orthomosaic was unable to show the tile lines, while the calibrated multispectral NDRE results showed them perfectly.

Then they used the zonation tool to delineate areas of the field that were experiencing more stress, and ground-truthed those areas to determine where new tile should be installed. Most of the stress was occurring where water drainage was not being handled sufficiently. Using the annotation tool, they marked the spots where the tile lines were located throughout the field for future reference.

"A TREMENDOUS ASSET"

By using RedEdge and Pix4Dfields, the HeartWood Labs team was not only able to identify the drainage tiles, but to fly and deliver these results all in the same day and while still in the field.

"Previously we have used Pix4Dmapper and achieved great results, however the decision to use Pix4Dfields was a no brainer once it became available. The ability to process RedEdge data very quickly (under 8 minutes) and at the fields edge is a tremendous asset to us."

Adam Batschelet, Business Manager of Ag Technology, at Heartwood Labs.

Pix4Dfields comparison tool (split screen) showing a NDRE index map on the left and an orthomosaic on the right.

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FEATURE LIST

Features		Advantages
INPUTS		
Multispectral images	🖥	Import nadir images from multispectral sensors in TIFF or JPEG format
RGB images	🖥	Import nadir images from standard RGB sensors in JPEG format
Pre-processed maps	🖥	Import orthomosaics or vegetation index maps already processed in other Pix4D products (import as geoTIFF)
Field boundaries	🖥	Import field boundaries (single or multipolygon) to focus analysis on an area of interest (import as GeoJSON, KML or Shapefile)
Geotagged images	🖥	Import GPS tagged images as geolocated annotations directly on a layer (import as JPEG or TIFF)
Annotations	🖥	Import annotations (point, line, polygon) directly on a layer (import as GeoJSON, KML or Shapefile)
TOOLS AND FUNCTIONS		
Easy to use interface	🖥	An easy to use and intuitive interface developed for agriculture users
Lightweight and robust	🖥	Lightweight to work on a mid-range computer in the field without requiring an internet connection or the cloud for processing
Dashboard project organization	🖥	Organize your projects (Farm, Client, Organization), and include key crop information
Fast mapping	🖥	Generate high-resolution 2D maps from aerial images in minutes, offline and locally processed
GPU enhanced fast mapping	🖥	Improve processing speeds significantly when suitable GPU is available compared to standard CPU (currently only for RGB datasets)
Rig relative calibration	🖥	Optional recalculation of the rig relatives to improve band alignment for supported multispectral cameras
Radiometric correction	🖥	Generate orthomosaics / indices that can be compared in different weather conditions when using multispectral imagery
Field boundary editor	🖥	Create or import a field boundary to trim layers to a specific area of interest
Index generator	🖥	Automatically generate predefined indices e.g. LCI, NDRE, NDVI, TGI, VARI
Index calculator	🖥	Create custom indices by inputting an index formula which can be saved and reused
Zonation tool	🖥	Create custom zones based on information from vegetation index maps with between 2 and 7 classes
Prescription tool	🖥	Create application rate maps for targeted precision agriculture applications
Comparison tool	🖥	Compare different maps side-by-side using split or double screen
Annotations tool	🖥	Annotate areas of interest with a title, description and option to attach images including geolocated images
Measurement tool	🖥	Measurement tools to quickly measure distances and areas for analysis in the field
Statistics	🖥	Layer and annotation statistics including area size, mean height or index value and standard deviation
Advanced layer visualization	🖥	Adjustable histogram value ranges including equalization to provide control over data values of interest
PDF report generator	🖥	Share your maps with all project stakeholders for seamless collaboration using the PDF report export tool
Export tool	🖥	Export projects or individual layers with adjustable control for image size and format to your computer for further use
Share to PIX4Dcloud	🖥	Upload PIX4Dfields outputs (orthomosaic, surface model, index layers) directly to PIX4Dcloud for sharing

OUTPUTS			
	Orthomosaic	🖥	A visual map of the field for crop scouting and assessment with options to set map resolution and quality (export as geoTIFF)
	Digital surface model	🖥	See elevation data to help with irrigation, drainage and erosion management (export as geoTIFF)
	Vegetation index maps	🖥	A map which helps indicate plant stress areas and can assist with crop protection and crop production workflows (export as geoTIFF)
	Zonation maps	🖥	A zoned map based on information from vegetation index maps for agricultural operations (export as GeoJSON, KML or Shapefile)
	Prescription maps	🖥	A zonation map where each of the zones has a value for variable rate application (export as GeoJSON, KML or Shapefile)
	Field boundaries	🖥	Field boundaries help focus analysis to only your areas of interest (export as GeoJSON, KML or Shapefile)
	Annotations	🖥	Adding annotations to areas of interest helps convey more valuable and actionable information (export as GeoJSON, KML or Shapefile)
	PDF report	🖥	An easy to share aggregated project report which can be customized with a logo and contact details (export as PDF)
	Statistics	🖥	Layer and annotation statistics can be exported as a standalone file (export as a CSV)
	Snapshot	🖥	A quick snapshot of the current map view which can include annotations (export as JPEG or PNG)

LANGUAGE			
	Language options	🖥	English, Chinese, French, German, Italian, Japanese, Korean, Spanish, Portuguese, Russian, Ukrainian

HARDWARE SPECS

CPU: Quad-core or hexa-core Intel i5 (or faster)

GPU: Integrated or dedicated GPU 2 GB RAM (GeForce GTX GPU 6GB RAM recommended)

HD: SSD recommended

OS: Windows 10 / macOS Catalina (10.15) or above

RAM: 8 GB RAM (or more)

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