Containerized development environments for large sensor data

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TERRAPHENOTYPING
REFERENCE PLATFORM

High Throughput Phenotyping

Phenotyping: Measuring Plant Properties

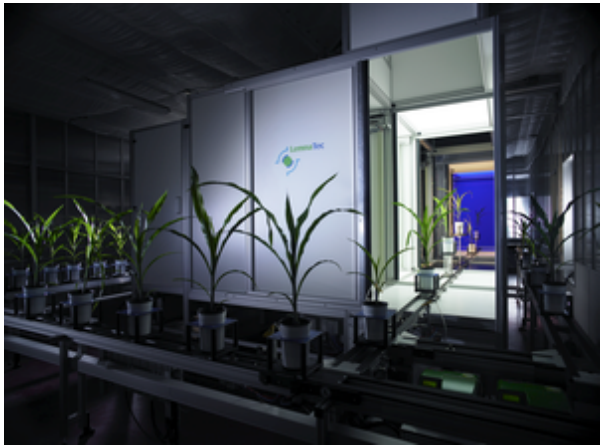
High Throughput: automating measurements with sensors robots, drones, etc

Approach: Open Access Reference Data

- Modern Sensor Suite
- Unprecedented Resolution (~daily @mm)
- Open Data, Accessible Computing

http://bulletin.ipm.illinois.edu/print.php?

TERRA Reference Data Sources



Lemnatec Scanalyzer
Danforth, St. Louis

1TB / month
5 TB total

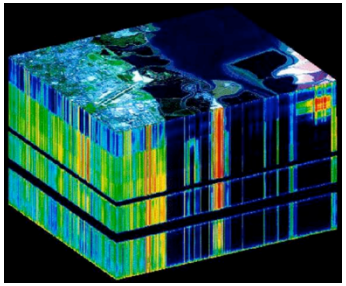
Lemnatec Field System
USDA ALRC, Maricopa, AZ

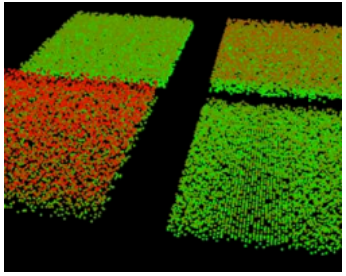
~1-5 TB/d
1-10 PB
total

Tractor and UAV
Kansas State

1 TB / month
100 TB total

Lemnatec Field Sensors





VNIR Imaging Spectrometer 380-1000nm

SWIR Imaging Spectrometer 900-2500 nm

IR Temperature Sensor

NDVI (1 down, 1 up) 650, 800 nm

PRI Sensor 531, 570 nm

PAR Sensor 410-655 nm

Color Sensor 410-655 nm

3D Scanners: 2 Side View, 1 Down

RGB: 2 Side View, 1 Down (1)

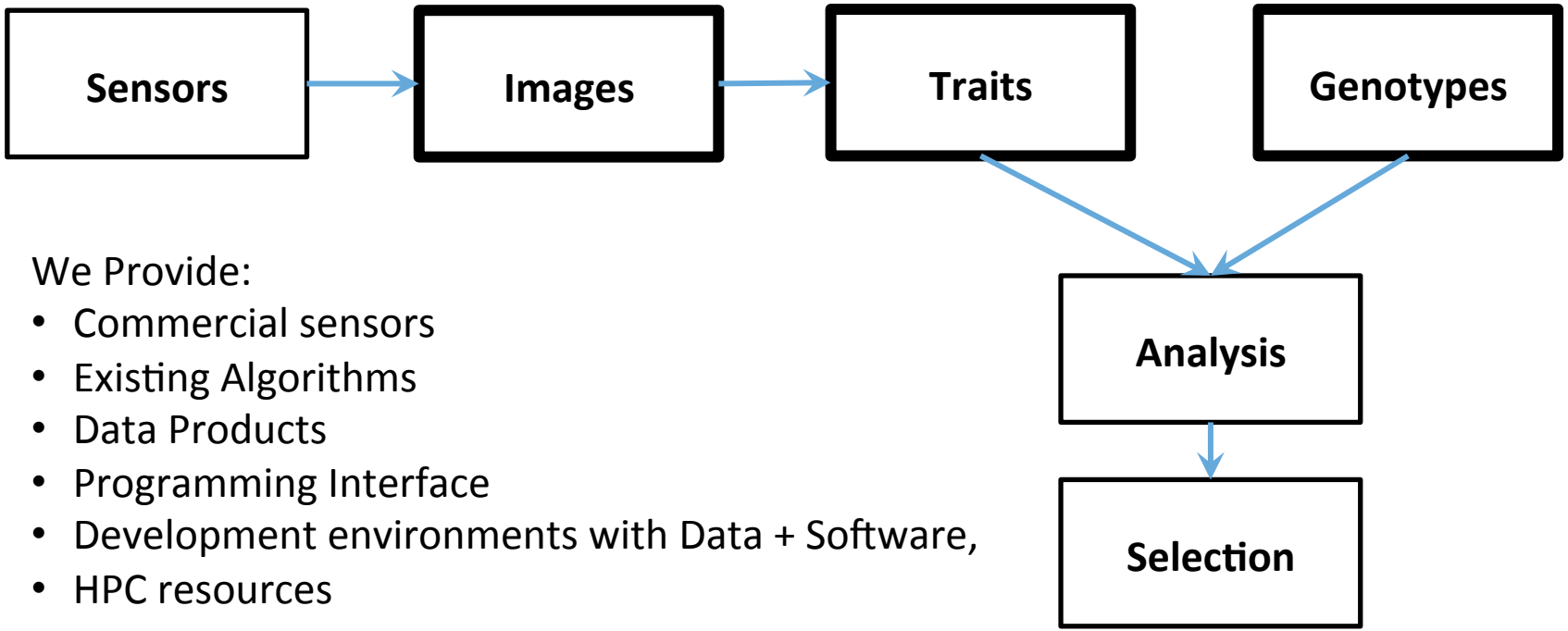
Active Reflectance 670, 730, 780 nm

Fluorescence

Environmental: **wind, temperature, humidity, pressure, light, rain, CO2**

terraref.org/articles/lemnatec-scanalyzer-field-sensors/

Computing Pipeline and Data Products



We Provide:

- Commercial sensors
- Existing Algorithms
- Data Products
- Programming Interface
- Development environments with Data + Software,
- HPC resources

TERRA Reference Design Principles

- Open [Science, Data, Software]
- Useable, Useful, Familiar: Scientists, Breeders, Precision Ag
- Modular, Extensible, Distributed
- Reproducible, Collaborative
- Scalable: From Mobile Devices to High Performance Computers

Technical Challenges

- Individual files commonly 10-100s GB; a single day ~TB
- Data and software is heterogeneous
- Large training and collaboration component
- Reproducibility

How Containers Help

Development

- NDS Workbench provides a primary portal to large data
- Researchers can prototype algorithms before deployment

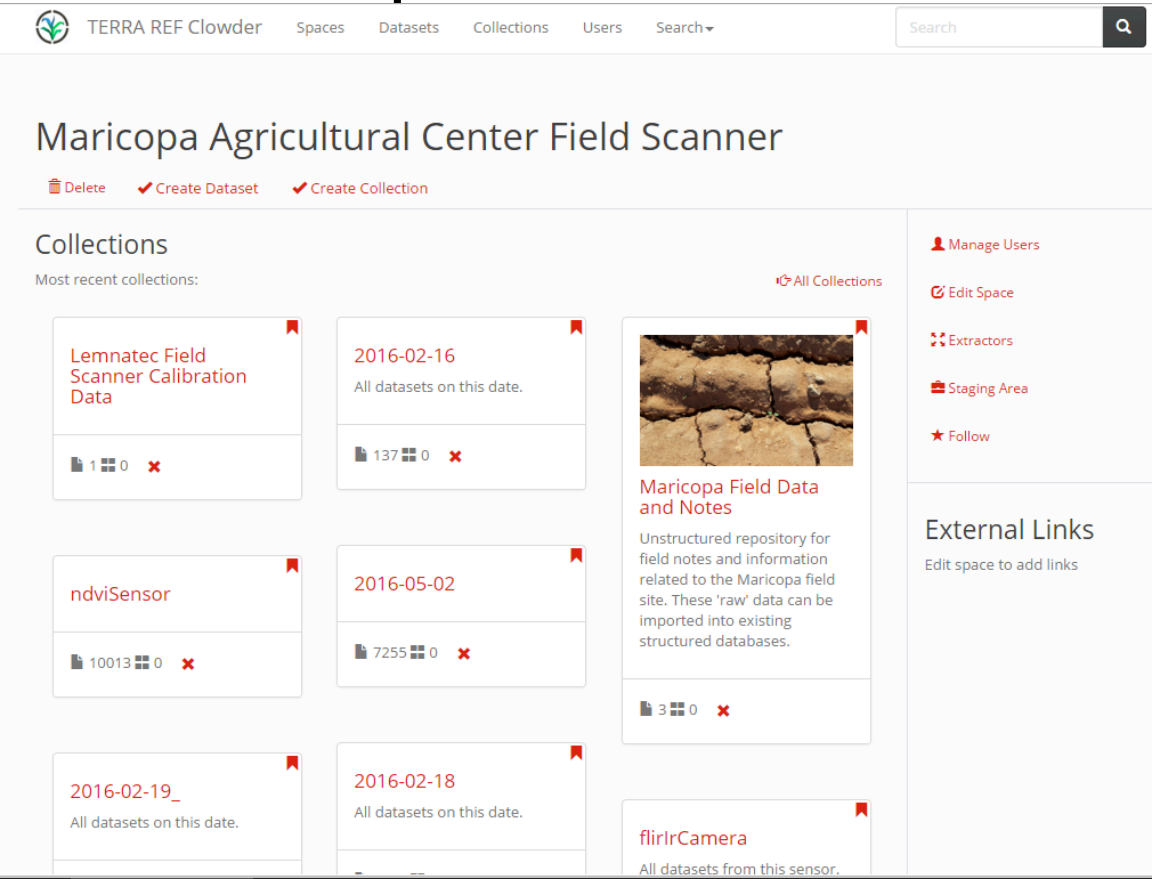
Training

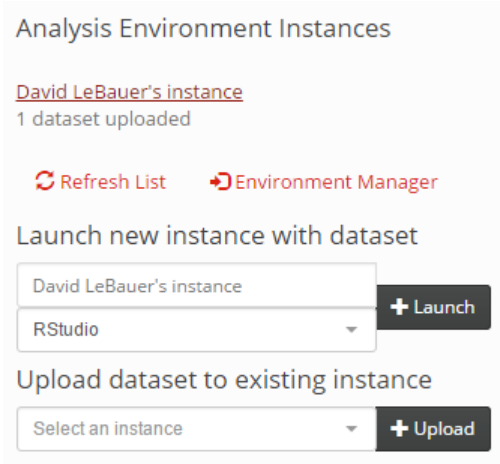
- Workshops & Hackathons
- Tutorials: interactive documentation

Version Control and Archiving

- Publication and reproducible science
- Dataset provenance

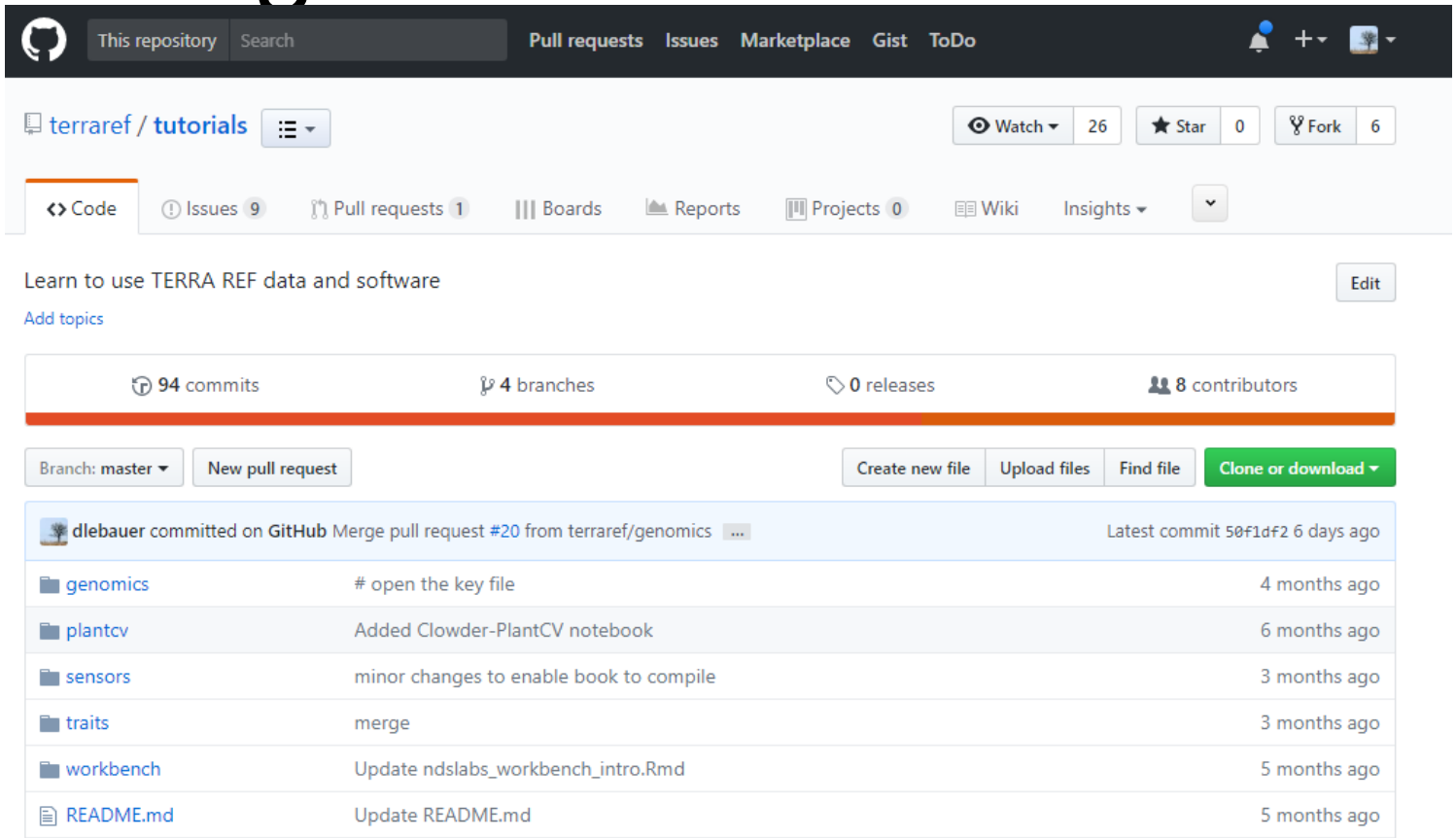
Development: Find and Use Data



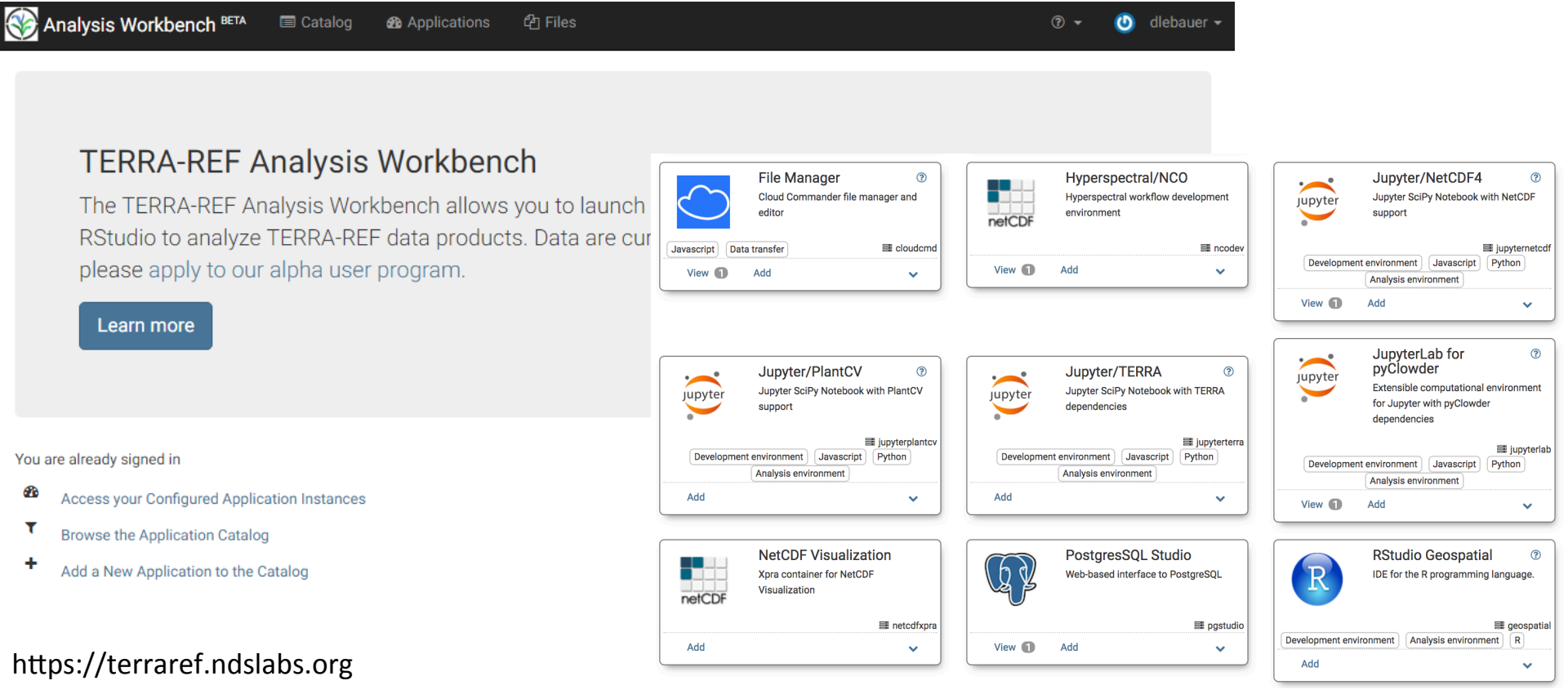


https://terraref.ncsa.illinois.edu/clowder/

Training


This repository
Search
Pull requests
Issues
Marketplace
Gist
ToDo
terraref / tutorials
Watch 26
Star 0
Fork 6
Code
Issues 9
Pull requests 1
Boards
Reports
Projects 0
Wiki
Insights
Learn to use TERRA REF data and software
Edit
Add topics
94 commits
4 branches
0 releases
8 contributors
Branch: master
New pull request
Create new file
Upload files
Find file
Clone or download
dlebauer committed on GitHub Merge pull request #20 from terraref/genomics
Latest commit 50f1df2 6 days ago
genomics # open the key file 4 months ago
plantcv Added Clowder-PlantCV notebook 6 months ago
sensors minor changes to enable book to compile 3 months ago
traits merge 3 months ago
workbench Update ndslabs_workbench_intro.Rmd 5 months ago
README.md Update README.md 5 months ago

NDS Workbench



https://terraref.ndslabs.org

Collaborators & Contact

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