iSDAsoil

Data challenges and future developments

Date:

Background

iSDA is a mission-driven company bringing advanced technology to the small-scale farm sector based on three key principles:

- **Harness the market** to achieve large-scale impact via affordable products and services
- Use **science and technology** to drive deep impact via increased smallholder incomes
- Devise **viable business models** to ensure financial sustainability of all partners

iSDAsoil

A farm level digital soil map for Africa

Main Datasets used

source and number of soil sampling locations

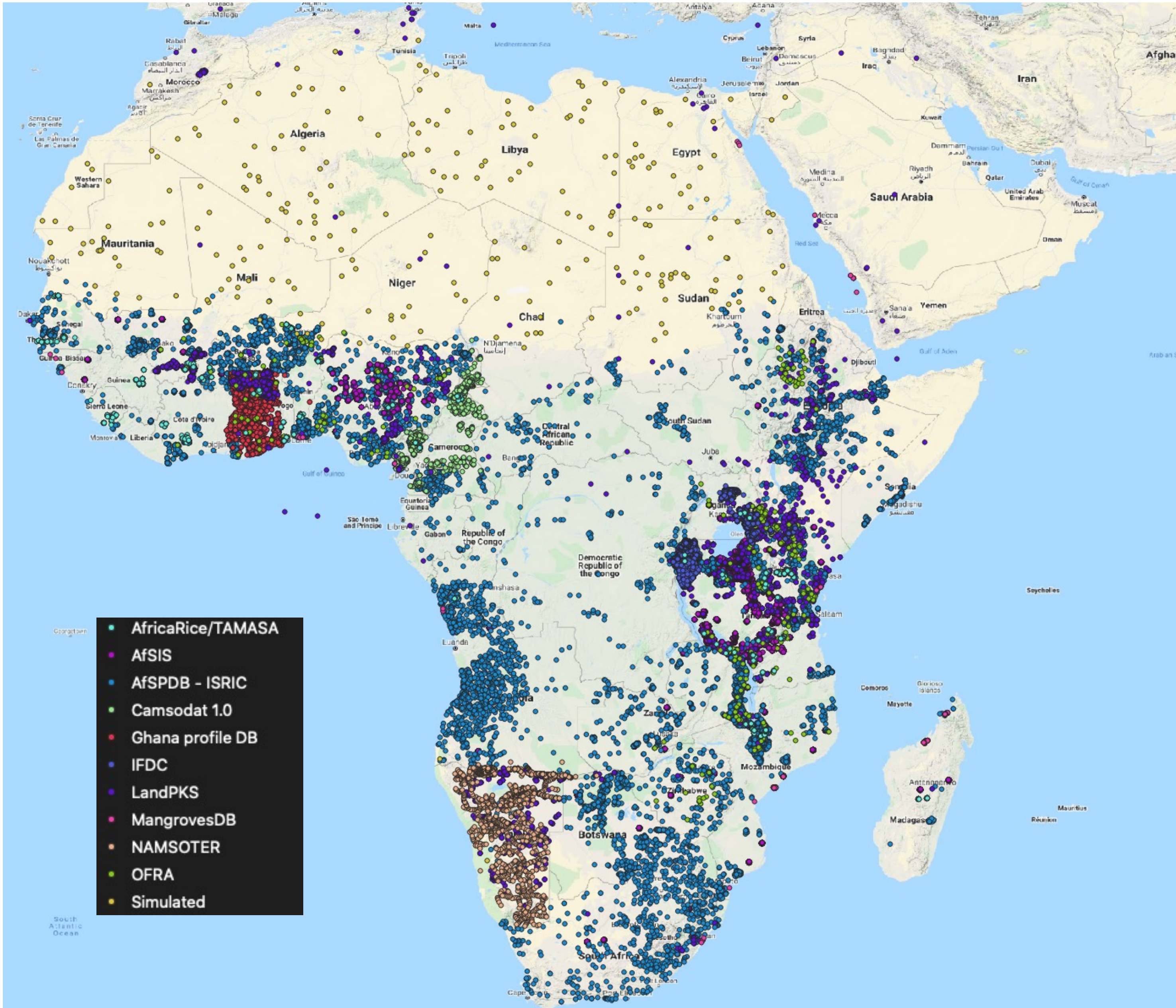
AfSIS I and II:
~40000 locations

Africa Soil Profile Database (ISRIC):
~13000 locations

LandPKS:
~12000 locations

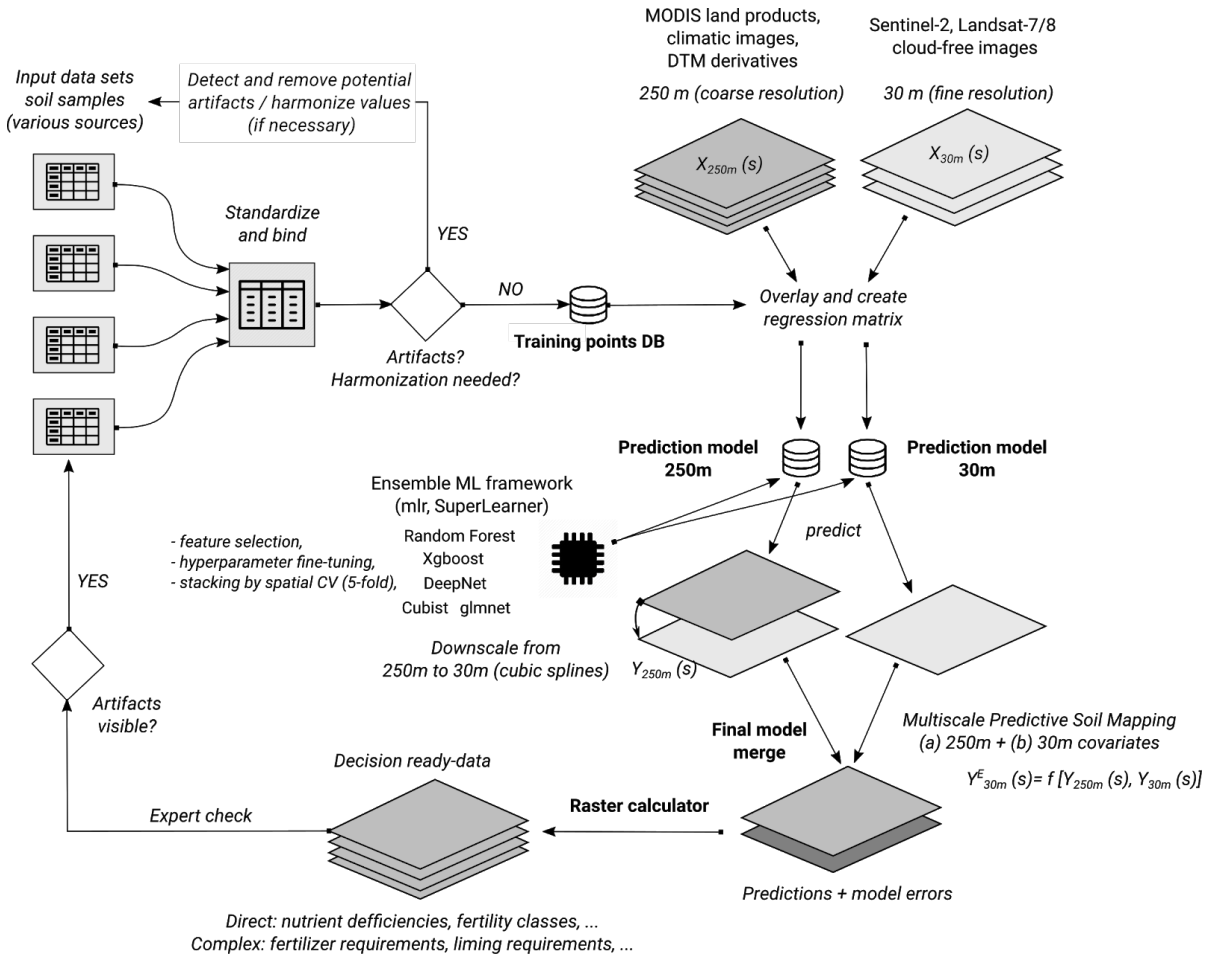
IFDC:
~9000 locations

AfricaRice and TAMASA: >3000 locations



Technical overview

iSDAsoil is a digital soil map of Africa, providing soil properties across the continent at a farm level (30m) spatial resolution



iSDAsoil demonstration

https://isda-africa.com/isdasoil

Data updates

- **IFDC**: ~1500 points in western Kenya
- **CNLS**: ~2000 points across Rwanda
- **One Acre Fund**: 600 points in western Kenya
- **Commercial company with ties to this group**: sampling campaign planned
- **Soils4Africa**: Long-term EU-funded project to collect 20,000 points. Still at the planning phase - data expected in 2-3 years

Data access

- **Open Data**, licensed under CC-BY 4.0
- API for querying point locations
- Entire Datasets available for bulk download via **Zenodo**, access via **Google Earth Engine** and the **AWS registry of open data** will soon be possible
- Recent paper published on the iSDAsoil methodology: https://www.nature.com/articles/s41598-021-85639-y.pdf

iSDAsoil for data scientists

A Jupyter notebook example

https://github.com/iSDA-Africa/isdasoil-tutorial

iSDAsoil for developers

An example using Observable

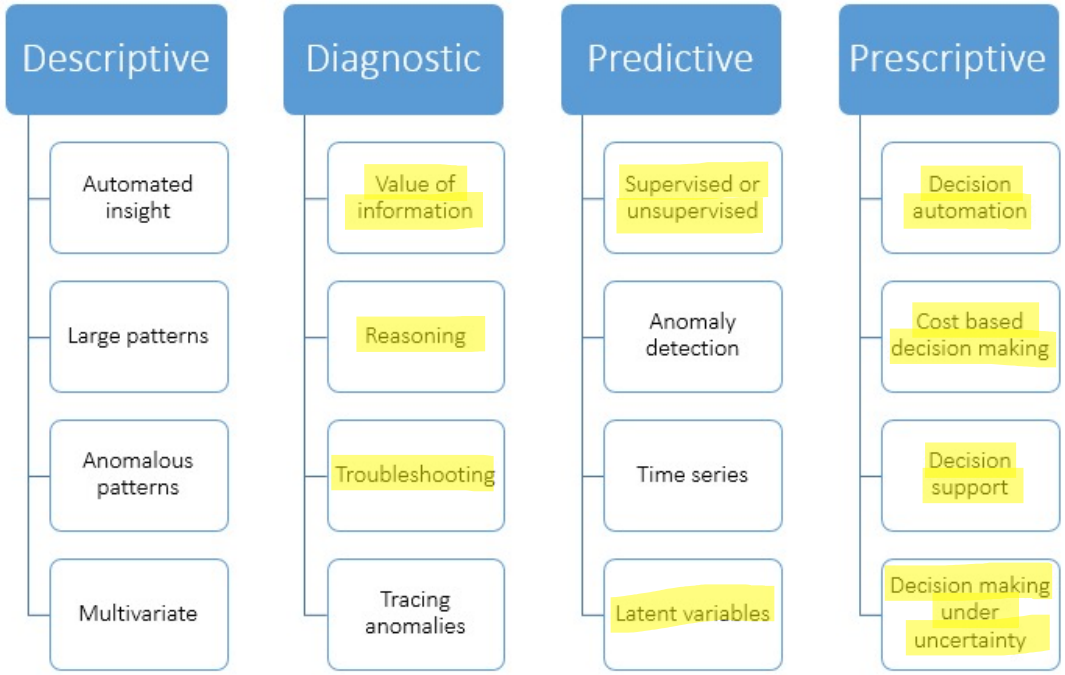
iSDAsoil in the field: Virtual Agronomist

Background on approach

Bayesian Network

A probabilistic statistical model built from data and/or expert knowledge.

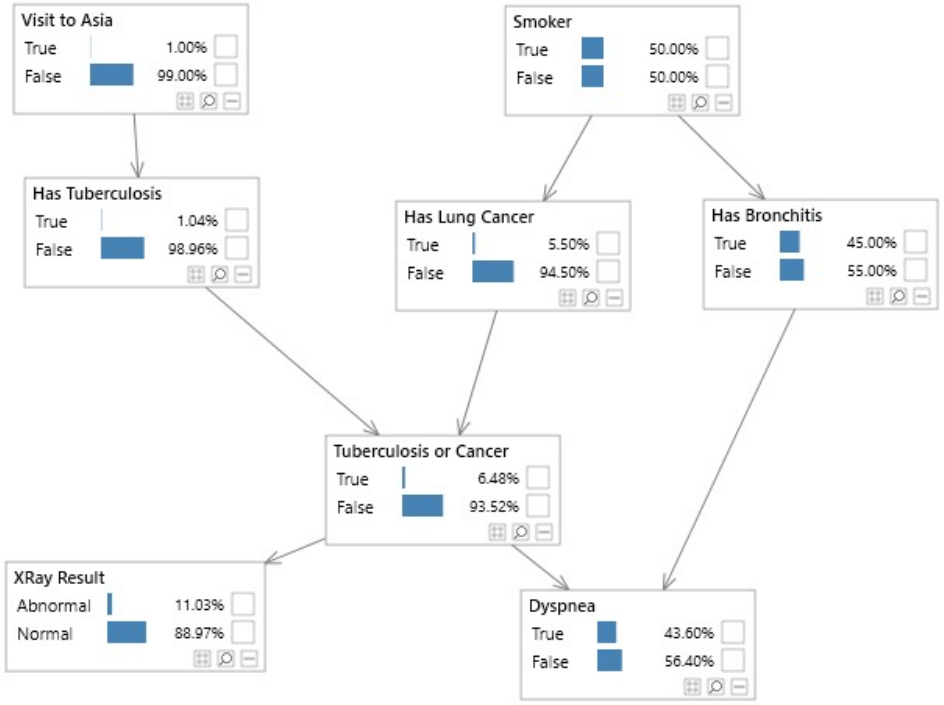
Key features of interest for agronomic advisory ->



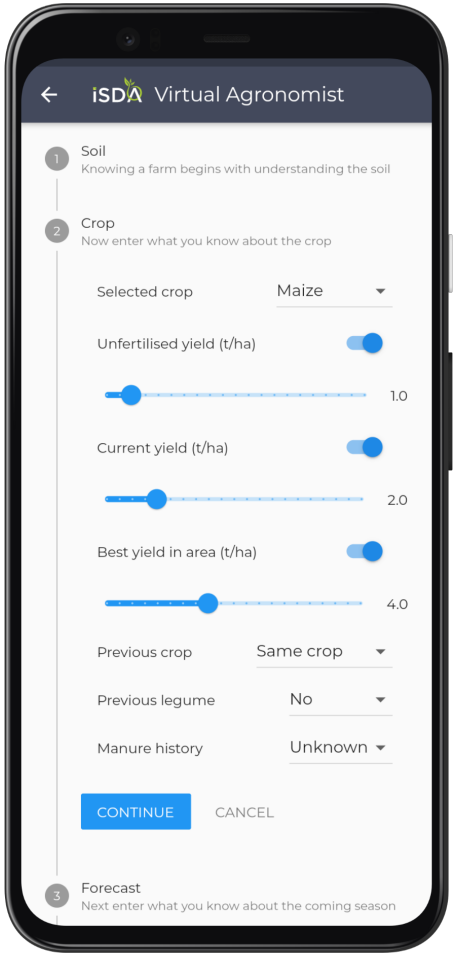
Simple diagnostic example

Network for medical decision support

- Encodes expert knowledge based on empirically observed data
- Robust under uncertainty
- Allows interactive use with feedback as data is entered
- Human-understandable relationships and decisions – not a “machine-learning black box”



1st application - fertilizer recommendation



Virtual Agronomist uses the same principles to encode **expert knowledge** about site specific nutrient management.

- Provides recommendation on **realistic target yield** and balanced fertilizer rate and formulation
- Prime audience: **extension agents**, advisors
- Interactive – farmer can ask “what if” questions

Currently built from expert human knowledge (Keith), in the future can **learn from data** and/or be tailored with local knowledge.

LIVE DEMO

Nutrient omission trial data

Key requirement for Virtual Agronomist calibration and validation

Maize
- iSDA in Ghana (own on-farm trials)
- OFRA in Ghana
- TAMASA in Nigeria, Ethiopia and Tanzania
- One Acre Fund in Kenya

Rice
- pan-Africa

Potato
- CIP/RAB/One Acre Fund

Coffee
- Historical data sourcing in Kenya (ongoing)

Thanks for listening

… and if you have soil data or nutrient omission trial data to share let’s talk ☺