GEOSPATIAL WORLD FORUM
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UAVs – A crucial link for Technology Integrated Farming

To enable an effective decision support system

Ankit Mehta,
CEO-ideaForge Technology Pvt. Ltd.

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Inspire the surge of Unmanned Systems

Agenda

- Introduction
- Decision Dilemma
- Decision Dependency Factors
- Present Vs. Proposed Solution
- How ideaForge Can Contribute
- Indices Measured
- Challenges in Implementation
- Case Study

Introduction

- Technology - A crucial lever for every industry
- India already has the required technology footprint for agriculture
- Technology integration - new method of farming
- Availability of premium agriculture input and machinery
- Missing link - “WHAT, WHEN, WHERE and HOW?”
- Our aim is to answer the “WHAT, WHEN, WHERE and HOW?”

Decision Dilemma

Decision Dependency Factors

Cropping cycle	Decision to be taken	Dependency Factors
Sowing / Planting	What to Sow/Plant?	Soil type, Soil nutrition content, Climatic factors
	When to Sow/Plant?	
Nutrition Management	When to apply?	Level of crop growth, Crop growth stage, Climatic Factors
	Any nutritional deficiency?	
Irrigation Management	When to irrigate?	Soil type, Soil moisture content
	Critical growth stages for irrigation	
Pest and Disease Management	Any infestation of pests and diseases?	Crop growth stage, Climatic conditions, level of Infestation, historical data
	Level of infestation?	
	Area specific presence of infestation	
Intercultural Operations	When to de-weed?	Weed growth, Plot history, Type of crop, Crop growth stage
	Impact of herbicide application	
	Other intercultural operations required?	
Harvesting	When to harvest?	Maturity indices, Harvesting purpose
	decide harvesting intervals?	

Present Vs. Proposed Solution

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Present

Soil	Irrigation	Nutrition	Crop Care	Intercultural Ops	Harvesting
Soil Analysis in Lab, Visual inspection	Visual inspection, Historical Knowledge	Visual inspection, Historical Knowledge	Visual inspection, Expert Advice, Historical Knowledge	Visual inspection	Visual inspection, Historical Knowledge

Proposed

Soil	Irrigation	Nutrition	Crop Care	Intercultural Ops	Harvesting
Soil Mapping using hyper spectral images	Soil moisture content by moisture sensors	Soil and crop mapping to know nutrition requirement	Infestation analysis using hyper spectral images	Crop mapping to propose intercultural operations	Identify and analyze maturity indices

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How ideaForge Can Contribute

Data

Processing

Decision Support

Soil Type?

Soil Moisture?

Infestation?

Intercultural operations?

Harvesting?

Indices measured using UAV

Indices	Description	Use
NDVI-Normalized Difference vegetation Index	It is general indicator of **canopy density**	• **Plant Vigor**, Foliar nutrient content (When water is not limiting), Yield Potential
NDRE- Normalized Difference Red Edge	NDRE is sensitive to **chlorophyll content** in leaves	• **Leaf Chlorophyll Content**, Plant Vigor, Stress Detection, Fertilizer demand, nitrogen uptake
Chlorophyll Map	It indicates the areas **deficient in chlorophyll**.	• **Detect chlorotic crops, stress detection**, identify healthy/vigorous crops
OSAVI- Optimized Soil-Adjusted Vegetation Index	OSAVI maps **variability in canopy density** and it is not sensitive to changing soil brightness	• Differentiate soil pixels, Accounts for **non-linear interactions between soil and vegetation**
CIR Composite (Color Infrared)	This **is color composite** and not index. (Combining NIR, Red and Green Bands)	• **Assessing plant health**, Identifying water bodies, variability in soil moisture, assessing soil composition
DSM-Digital Surface Model	DSM represents the **elevations of above sea level** of the ground and all features on it.	• **Estimate relative crop volume**, Identify surface properties, model water flow and accumulation

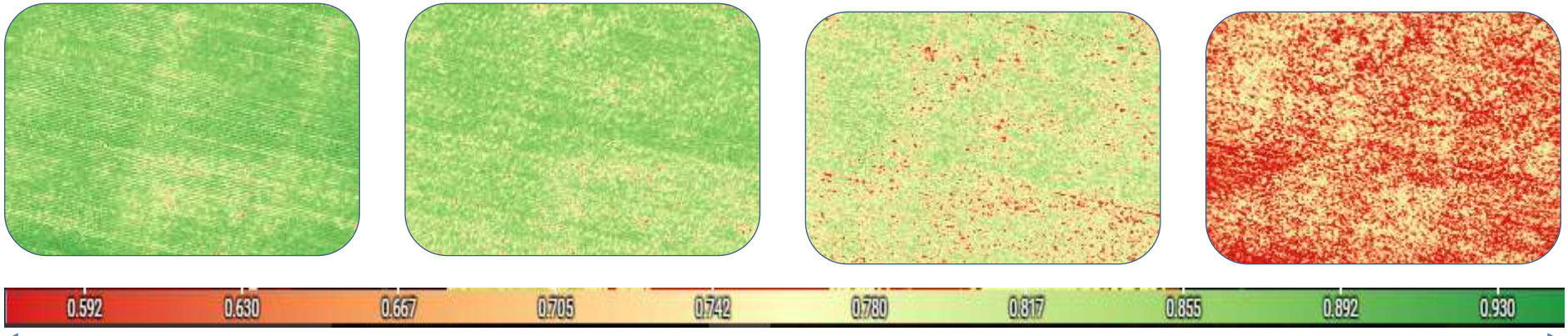
Challenges in Implementation

- To establish scientific principles and facts from Indian perspective
- Technology adoption
- Small land holdings per farmer
- Availability of skilled resources
- To develop yield estimation model in different contexts (i.e. Draught, flood, heavy rainfall etc.)
- To develop crop specific solutions

Case Study-1

- NDVI for Cotton

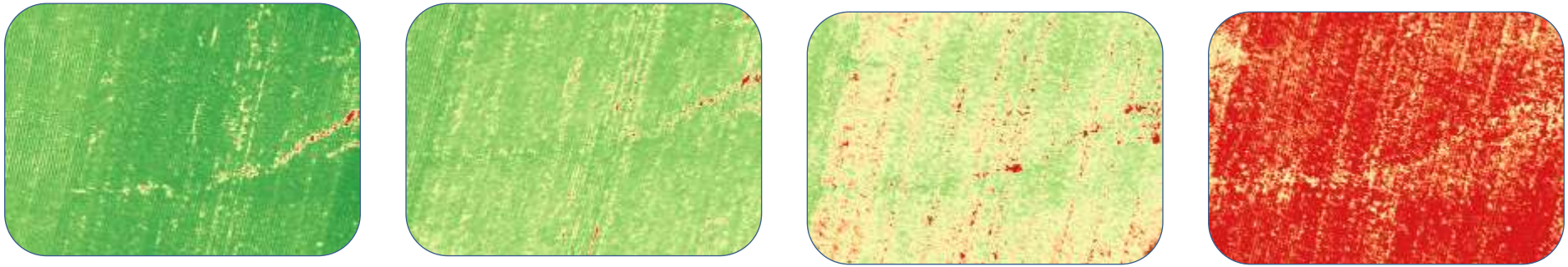
Crop-Cotton (**20th Oct**) Ball Development Stage	Crop-Cotton (**8th Nov**)	Crop-Cotton (**23rd Nov**)	Crop-Cotton (**8th Dec**)



Case Study-2

- NDVI for Red gram

Crop-Red Gram (**20th Oct**) Flowering Stage	Crop-Red Gram (**8th Nov**)	Crop-Red Gram (**23rd Nov**)	Crop-Red Gram (**8th Dec**)



Question and Answers

THANK YOU!