FOCUS ON PRECISION CONFERENCE 2018

ARTIFICIAL INTELLIGENCE FOR AGRICULTURE

Introductions

1. Background
2. Artificial Intelligence in Agriculture
3. Convolutional Neural Networks
4. Image Classification
5. Object Detection
6. Complementary Technologies
7. Benefits and Opportunities

Agricultural Intelligence

Pocket Agronomist Demonstration

Agricultural Intelligence Datasets

Plant Disease

Nutrient Deficiency

Insect Pressure

Weeds

Impact | *Corn Loss Attributed to Plant Disease*

2016 Corn Loss (USA/CA)

- 817 million bushels

2016 Corn Loss (USA/CA)

- $3 billion

Overall $Value Loss/Grower

- $6,000

How It Works

Convolutional Neural Network

- Machine Learning
- Mimics Visual Cortex
- No Pre-Programmed Answers
- Educates Itself based on User-Provided Information

Training based on Data-Sets

- Data-Set
  - Categories – Apples, Bananas, Oranges
    - Images – Green Bananas, Peeled Bananas, etc.
      - Learning
- Validation-Set
- Cumulative and Categorical Accuracy

Technology Comparisons

Server-Based

Internet | WIFI | Data-Connection Required

- Software requires a data-connection – Processing is done via servers
- Agricultural examples: PlantSnap and Plantix

On-Device

Internet | WIFI | Data-Connection **NOT** Required

- Software is usable 24/7 – only requirement is power
- Promotes availability and provides enhanced data-privacy
- Agricultural examples: Pocket Agronomist

Technology Comparisons

Image Classification

Identification using best “Learned” Label

- Level 1 Identification – Good for imagery displaying low complexity

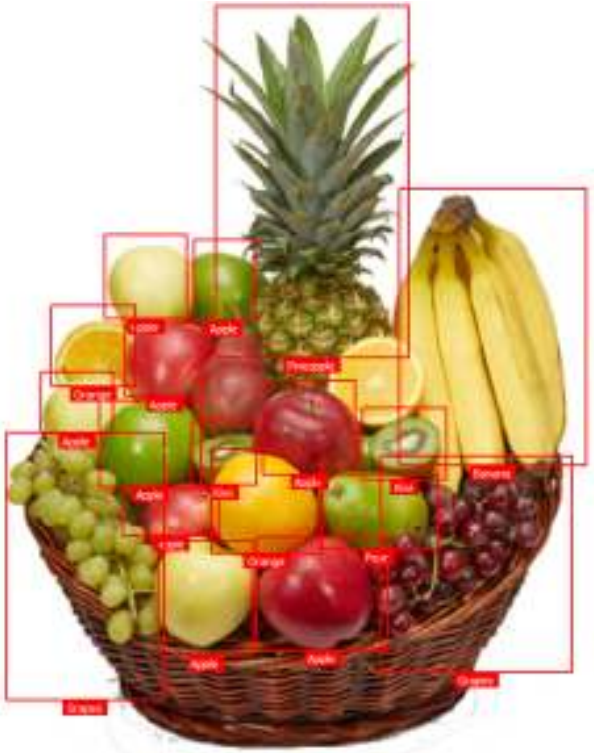
Object Detection

Identification of multiple objects is one scene

- Level 2 Identification – Good for increasingly complex imagery

Technology Comparisons

VS



Technology Considerations

Rapid Advancement Turnaround on datasets

- Deploy > Capture > Label > Train > Deploy

Optimized Small Network Engines

- Efficient deployment and limitless dataset opportunity

Wild Datasets Real-World Imagery

- Lab accuracy translate to real-world accuracy

Flexible Design Any Image-based dataset

- Easy integration of new crops, plants, and agronomic issues

Distracted Driving Demonstration

Airborne Damage Assessment

Cargill™

JOHN DEERE

Complementary Technologies – Augmented Reality

Complementary Technologies

Small Autonomous Vehicles

Opportunities: Ag Virtual Assistants

Available — Assistant in your pocket 24/7

- Pocket Agronomist delivers agronomist-level identification abilities to the untrained eye
  - Available on-demand, 24/7, anywhere in the world

Knowledgeable — Trained on real-world imagery from the field

- Datasets used to train the software is comprised of in-field images of actual disease cases
  - Contributes to Real-World Accuracy

Opportunities: Ag Virtual Assistants

Leverage

Leverage Workforce

- Untrained employees become more valuable – Farmers/Farmhands/Interns/Applicators/Agronomists/Scouts
  - Trained-eye assessing more acres

Questions

Agricultural Intelligence

Artificial Intelligence for Agriculture

Agricultural Intelligence LLC
3030 Laura Lane, Suite 120
Middleton, WI 53562 USA
Website: http://agriculturalintel.com/
Email: zach@agriculturalintel.com
Phone: 1 (608) 370-2858