

# **Humanitarian AI**

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## Humanitarian AI

- ▶ How can we ensure that AI benefits everyone?
- ▶ ... and not just those with power, wealth, or lots of data

## Augmentation and Amplification

- ▶ Augmentation: AI tools can make people more effective about reasoning about problems
  - Often gets lost amid the hype about cognitive machines
  - See Vannever Bush's "As We May Think" or Michael Jordan's "The AI Revolution hasn't Started Yet"
- ▶ Amplification: "what people get out of technology depends on what they can do and want to do even without technology"
  - Context and intent are crucial
  - See Kentaro Toyama's "Geek Heresy"

## We are not the first!

- ▶ We should learn the most effective strategies from history adn from adjacent domains
  - Internet Communication Technology for Good
  - Data Science for Social Good
  - ...
- ▶ I have been building some summaries
  - Distillation
  - Catalog

## Sensing and Acting

- ▶ **Sensing:** How to make all this data accessible and comprehensible?
- ▶ **Acting:** How to inform small and large decisions?

## Sensing: Traffic in Jakarta



Figure 1: On the left, detection/classification with YOLOv3. On the right, motion detection with Lucas-Kanade Optical Flow.

**Figure:** Automatically parsing traffic camera images can help with traffic management.

## Sensing: Conservation through Land Use Maps



**Figure:** Enhanced land use maps let conservation organizations manage ecosystems.

# Sensing: Humanitarian Open Street Map

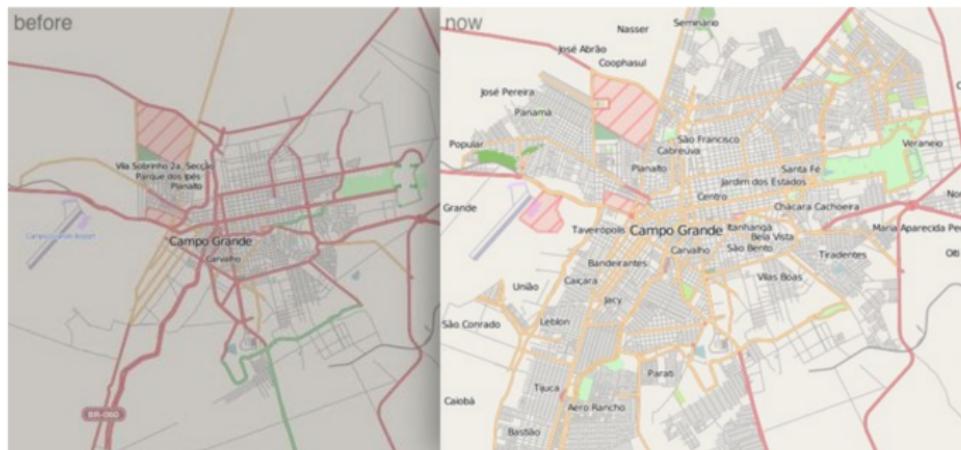


Figure: Accurate maps help relief workers know what resources are available where.

## Acting: White Fly Prediction



**Figure:** Quickly counting white flies on cassava plants helps agricultural extension workers protect crops.

# Acting: Detecting Asphyxia

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## Ubenwa: Cry-based Diagnosis of Birth Asphyxia

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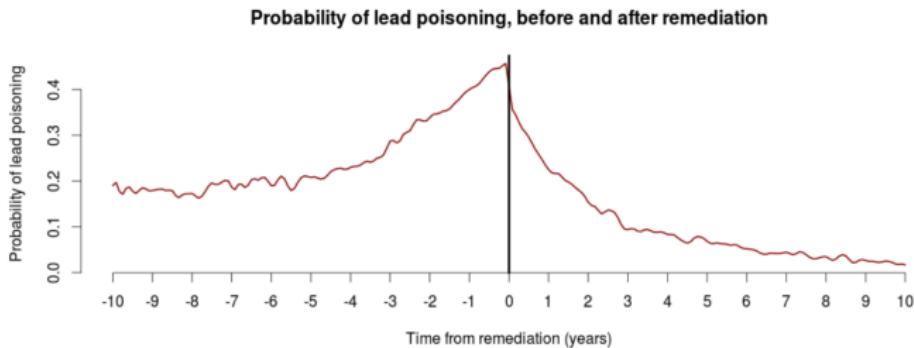
Charles C. Onu<sup>1,2</sup>, Innocent Udeogu<sup>2</sup>, Eyenimi Ndiomu<sup>2</sup>, Urbain Kengni<sup>2</sup>, Doina Precup<sup>1</sup>,  
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### Abstract

Every year, 3 million newborns die within the first month of life. Birth asphyxia and other breathing-related conditions are a leading cause of mortality during the neonatal phase. Current diagnostic methods are too sophisticated in terms of equipment, required expertise, and general logistics. Consequently, early detection of asphyxia in newborns is very difficult in many parts of the world, especially in resource-poor settings. We are developing a machine learning system, dubbed Ubenwa, which enables diagnosis of asphyxia through automated analysis of the infant cry. Deployed via smartphone and wearable technology, Ubenwa will drastically reduce the time, cost and skill required to make accurate and potentially life-saving diagnoses.

**Figure:** A smartphone app that detects asphyxiated cries can make sure parents seek medical treatment.

## Acting: Lead Paint Inspection



**Figure:** Data on historical inspection results can guide the best places to send health inspectors in the future, since it's impossible to reach every household all the time.

## Humanitarian AI

Our topics reflect the challenges of these types of problems,

- ▶ **Bayesian Deep Learning:** Probabilistically informed actions
- ▶ **Metalearning:** Work with smaller sample sizes
- ▶ **GANs:** Work in the absense of labels
- ▶ **Interpretability:** Make sense of decisions

## Humanitarian AI

- ▶ How can we ensure that AI benefits everyone?
- ▶ We need the development of AI research and applications to be *inclusive*.