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Problem space

- Information void in developing world
- Governments in many developing countries lack the resources to produce reliable data about their citizenry
- Policy makers and aid organizations are forced to make decisions based on incomplete information

Current Approaches for Measuring Wealth

**Surveys**
- Expensive, costly
- Infrequent

**Night Lights**
- Can serve as proxy for economic indicators
- Performs poorly in *low-lit* areas; hard to differentiate at extreme levels of poverty
Jean et al (2016)

- Used *daytime* satellite imagery to train model vs. nightlights and wealth
- Leverages computer vision; e.g., can distinguish between the type of building
- Validated on Rwanda and four Sub-Saharan African nations
- Served as an inspiration/foundation for our project

Research & Data
Takeaways from User Research

“Surveys are expensive; and the reliability of this data is questionable”

“Quantifiable metrics is a challenge in International Development.”

“Today we use an opportunistic approach, based on what data we have access to”
Ann Blake, 28 years

**Education:** London School of Economics

**Employment:** Project Analyst with International Monetary Fund, Financial analyst at Morgan Stanley

**Role / Activities:** Data Guru; Mixes & matches reports

**Primary tool:** Microsoft Excel
The Data

(1) Nightlights satellite imagery: NOAA

(2) Daylight satellite imagery: Google Static Maps API

(3) DHS surveys
Machine Learning
Deep Neural Nets -
Learning features from daylight satellite imagery using Deep Learning tools

Wealth Prediction

Extract a representation of Daylight

Build a Regression Model

R^2 = 0.672
Data Management
Built a Pipeline for Four Countries

Ghana
Malawi
Rwanda
Tanzania

2.7 Million Images
Partitioned
Each
Country into
Latticed Grid
of 1km x
1km cells
Wealth predictions for each 1km x 1km cell

Spatially joined cells and aggregated to regions at 3 different levels within country

Level 1

Level 2

Level 3
Web Architecture
Web Architecture

Fast concept to completion. “Batteries included” modules to handle common web tasks.

Scalable

GeoJSON allows encoding a variety of geographic data structures in JSON objects.

Responsive design.

Consistent styles.

Maps with easy to use API and design tools.
App Features
Add/Filter layers of information
Browse across countries and regions
Different Administrative Regions/Granular views
Download Data - Full country

Or just some regions
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Questions?