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Using Al to better Understand the drivers of Modern Slavery

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The main goal of insight tiles?

HM Government

Modern Slavery Strategy

Home Secretary Foreword



More than 200 hundred years ago the British House of Cc to make the slave trade illegal. But sadly, the grim reality tc towns, cities and the countryside across the world. And be here in the UK.

Young girls are raped, beaten, passed from abuser to abu Vulnerable men are tricked into long hours of hard labour I sheds or rundown caravans. People are made to work in f

vessels. Women are forced into prostitution, and children systematically exploited. Domestic workers are imprisoned and made to work all hours of the day and night for little or no pay.

In the UK the scale of this hidden crime is significant. New research carried out by the Home Office estimates that in 2013, the number of potential victims in the UK was between 10,000 –13,000. We know that this number not only represents victims trafficked into the UK, but British adults and children too. The National Crime Agency estimates that in 2013, the UK was the third most common country of origin of identified victims.

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The UK's Existing Response

The UK Government published a Modern Slavery Strategy in 2014, based on the 'four Ps' structure, which the Home Office also uses to tackle terrorism and serious and organised crime.

Pursue: Prosecuting and disrupting individuals and groups responsible for modern slavery.

Prevent: Preventing people from engaging in modern slavery.

Protect: Strengthening safeguards against modern slavery by protecting vulnerable people from exploitation and increasing awareness of and resilience against this crime.

Prepare: Reducing the harm caused by modern slavery through improved victim identification and enhanced support.









The Epidemiological Triad







Host

Environment

Epidemiological "Triad"



Agent



The "Slavery" Triad







HIDDEN SLAVERY

?

Host

Environment

Poor Governance? Lack of Resources? Conflict? Inequality? Disenfranchisement?

Gangmasters

Agent





A lack of quantitative information

• There is a lack of *quantitative* information about the factors that generate vulnerability.

- Artificial Intelligence (specifically "Machine Learning") is now providing us methods to use novel data streams to model:
 - \rightarrow Environments at high risk
 - \rightarrow Vulnerable Individuals
- And this is for the first time allowing analysis at scale.





Published on Africa Can End Poverty



Africa's statistical tragedy

SHANTA DEVARAJAN | OCTOBER 06, 2011

This page in: English

Fifteen years ago, Easterly and Levine published "Africa's Growth Tragedy", highlighting the disappointing performance of Africa's growth, and the toll it has taken on the poor. Since then, growth has picked up, averaging 5-6 percent a year, and poverty is declining at about one percentage point a year. The "statistical tragedy" is that we cannot be sure this is true.

Take economic growth, which is measured in terms of growth in GDP. GDP in turn is measured by national accounts. While there has been some progress, today, only 35 percent of Africa's





The AI process for analysing slavery:



Sparse, expensive but accurately labelled examples ("ground Truth") of modern slavery incidence



+

Features extracted from cheap, rapidly updateable PROXY data (e.g. CDR, mobile money, drone imagery).





Machine Learning techniques, that can find the relationship between "ground truths" and our "proxy data" variables.

Risk models that can estimate **vulnerability** in other parts of the country WITHOUT costly surveys

- PREDICTIONS
- **EXPLANATIONS**

Informed policy and interventions

 \checkmark









Many affected regions are infrastructurally poor











Yet often surprisingly DATA RICH







Earth Observation imagery is abundant

Examples of our "Artificial Intelligence" Slavery Projects

Prediction of **Forced Labour** in **Dar es Salaam** (Madeleine Ellis)

Modelling the drivers of Modern Slavery across **Brazil** (Harry Marshall)

Identifying Child **Domestic** Labour in North India (Catherine Waite)

Data Fusion (JIVE) of Al data sources in **East Africa** (Rachel Carrington)

Non-linear AI Explanations of **Global Slavery Figures** (Rosa Lavelle-Hill)

Novel AI Vulnerability Surveying Methods (Rowland Seymour)

Example 3: Prediction of Forced Labour in Dar es Salaam

Growth of African cities

| City | Country | Population (Thousands) | | | | | % change | |
|---------------|---------------|------------------------|--------|--------|--------|---------|----------|-----------|
| | | 2005 | 2010 | 2015 | 2020 | 2025 | | 2010-2025 |
| Dar es Salaam | Tanzania | 2,680 | 3,349 | 4,153. | 5,103 | | | 85.2 |
| Nairobi | Kenya | 2,814 | 3,523 | 4,303 | 5,192 | | | 77.3 |
| Kinshasa | DRC | 7,106 | | 10,668 | 12,788 | 15,041 | | 71.8 |
| Luanda | Angola | 3,533 | 4,772 | 6,013 | 7,080 | 8,077 | | 69.3 |
| Addis Ababa | Ethiopia | 2,633 | 2,930 | 3,365 | 3,981 | 4,757 | | 62.4 |
| Abidjan | Câte d'Ivoiri | . 3,564 | 4,125 | 4,788 | 5,500 | 6,321 | | 53.2 |
| Dakar | Senegal | 2,434 | 2,863 | 3,308 | 3,796 | 4,338 | | 51.5 |
| Lagos | Nigeria | 8,767 | 10,578 | | 14,162 | _15,810 | | 49.5 |
| Ibadan | Nigeria | 2,509 | 2,837 | 3,276 | 3,760 | 4,237 | _ | 49.3 |
| Accra | Ghana | 1,985 | 2,342 | 2,722 | 3,110 | 3,497 | | 49.3 |
| Kano | Nigeria | 2,993 | 3,395 | | 4,495 | 5,060 | | 49 |
| Douala | Cameroon | 1,767 | 2,125 | | 2,815 | 3,131 | | 47.3 |
| Alexandria | Egypt | 3,973 | 4,387 | | 5,201 | 5,648 | 28.7 | |
| Algiers | Algeria | 2,512 | 2,800 | 3,099 | 3,371 | 3,595 | 28.4 | |
| Casabianca | Morocco | 3,138 | | | 3,816 | 4,065 | 23.8 | |
| Cairo | Egypt | 10,565 | 11,001 | 11,663 | 12,540 | _13,531 | 25 | |
| Ekurhuleni | South Africa | 2.824 | 3,202 | 3,580 | 3.497 | 3.614 | 12.9 | |

INSIGHT TILES – Nature of the DATA

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| V/LAB | |
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| 50 / percentage formal residential | 100 |
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| ected region | |
| | |

What do Al models tell us?

Areas with increased use of mobile money have lower likelihood of forced labour → *financial independence is acting as protection against enslavement*

Increased risk is also reflective of areas with *increased pay levels* \rightarrow *economic masking effects*

Risk in particular increases in areas adjacent to industrial land, with *overcrowding* and *lack of mobility* → modern slavery risk "traps"

Example of emergent factors

We used AI to model the number of enslaved people who originated from 3600 of the country's municipalities

Created risk categories = survivors per 100k

- Most data are \bullet available at state and municipality level.
- Data sourced from the Ministry of Economy -Secretariat of Labor.
- Data from 2003 to \bullet 2018, aggregated by year and municipality.

Plau

SmartLab Initiative

Data-Driven Decent Work Promotion

SAFETY AND HEALTH AT WORK

CHILD LABOR

São Paulo

DIVERSITY AND EQUAL OPPORTUNITIES AT WOR

Departamento de

Our ground truths were the number of individuals rescued from across all of Brazil who were born in the location of interest

The focus again was on vulnerability to slavery / trafficking

Risk categories were established, and a range of AI models crossvalidated using >100 variables from novel and offiical datasets

Models immediately achieved 76% accuracy

variable

By developing new explanatory AI techniques we couldsee how our 100 variables (grouped here for clarity) underpin incidence

Importantly "neo-demographics" derived via the novel data streams is far more powerful than traditional census data

But **mobility** measures were also surprisingly important

Understanding areas the model misclassifies becomes key

Example 3: Al analysis of National-Level Slavery Figures

AI modelling of 70 ulletcountry-year data points from Gallup World Poll (GWP) ground truths, regressed against 106 independent measures of national statistics

0.16

- 5 match those theorized by Walk Free Foundation •
- But one new factor is identified, previously overlooked due to "masking" and "non-linear interactions":

Physical Security of Women

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Rights Lab: Data Programme N/LAB: Deputy Director

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