Measuring Indicators for Resilience Analysis (MIRA)

Helping Communities Identify and Plan for Risk

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What problem are you trying to solve?

The goal of the Measurement Indicators for Resilience Analysis (MIRA) study was to develop a resilience measurement platform to measure how effective our programs are at increasing the resilience capacities of participants to shocks and stresses.

*Resilience concept - “the capacity that ensures adverse stressors and shocks do not have long-lasting adverse development consequences” (FSIN, RM-TWG, 2014, p. 6).
How is the problem being addressed today?

• In the first few months of 2015, flooding displaced an estimated 230,000 people, damaged about 64,000 hectares of land and destroyed the asset wealth of many.

• Proof of concept by CRS and Cornell University with 580 households in Chikwawa District. Expanded to 2200 household in two adjacent districts in phase II (entire DFAP project area).

• Approach was developed to focus specifically on the resilience building aims of the UBALE project and explain variations in recovery from shocks.
Why is AI better than the current solution?

• In terms of analytics for the study we used several different approaches such as regression analysis & machine learning;

• Initially, we did not include any aspects of ML or AI, this occurred after we had implemented the protocol and realized that we could employ ML techniques;

• A comparison of predictive performance between using a standard linear model vs. the random forest model, shows a net improvement using the latter
What is the solution?

Evaluated two machine learning algorithms (LASSO and Random Forest) to predict responses to shocks & inform targeting.
Predictive Capacity

Good predictors include
• location of fields
• proximity to flood plains
• sex of household head
• previous shocks experienced
Targeting using Machine Learning
What kinds of data does your solution need?

Focus of variables
1. Well-being outcomes (e.g., food security indicators)
2. Shocks experienced that have adverse effects
3. Capacities and characteristics that may prevent adverse effects and/or enable recovery

Data Collection Process
1. MIRA involves first a baseline survey and then monthly data collection using a Computer Assisted Personal Interviewing (CAPI) platform
2. Trained enumerators embedded in the communities
3. Panel data collected from same households over time (2100 HHs across 3 districts in Southern Malawi)

Empirical challenge
- Resilience focus
- Low burden
- Generalizable
- Accessible and useful
What resources do you need to support the development, implementation, and maintenance of the solution?

**Technical**

- Cornell University: Supports current research and analytics, quantifying households’ resilience for the purpose of impact evaluation, targeting and forecasting

- University of Illinois and University of Texas: test the reliability of these solutions and how this data can be used to make out of sample predictions

**Non-technical**

- Field Supervisor
- Community Engagement - Community leaders, Village Development Committee & Village Civil Protection Committee Members
- Embedded Enumerators
What potential biases could AI introduce or amplify in your context?

- The amount of rainfall received from 2016 and 2018 was far less than the amount of rain received in 2017, 2019, and the first month of 2020 (possibly an outlier).
- Results may be biased if we use 2016 – 2018 data to train the model and predicting outcomes for the 2019 – 2020 seasons considering that the district has experienced max rainfall for these two years compared to previous years.
What is your approach to maintaining the solution?

- CRS has been awarded a Microsoft AI for Humanitarian Action grant.

- Currently working with Microsoft to develop a plug and play machine learning solution that any project which implements the MIRA protocol can utilize to identify household characteristics driving food insecurity and predict future shock outcomes using a comprehensive set of algorithms.

PARTNERSHIPS

- Microsoft is providing technical support (e.g. data scientists)
- Will also maintain relationships with the aforementioned research institutions to guide the associated learning
Next Steps

Opportunities

• Expanded and established a cohort in the Grand Sud in Madagascar in 2018, implementing the MIRA protocol

• Initiating partnership with USAID, the World Bank, and Concern Worldwide to scale up MIRA in 9 additional districts in Southern Malawi

• GoM has expressed an interest in adopting the MIRA protocol to track progress of its National Resilience Strategy