FREE TO WANDER, BUT EMPOWERED TO IMPACT

September 27, 2018

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Expanding the Multidisciplinary Research and Innovation Ecosystem through Universities

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Current models of universities (and science)
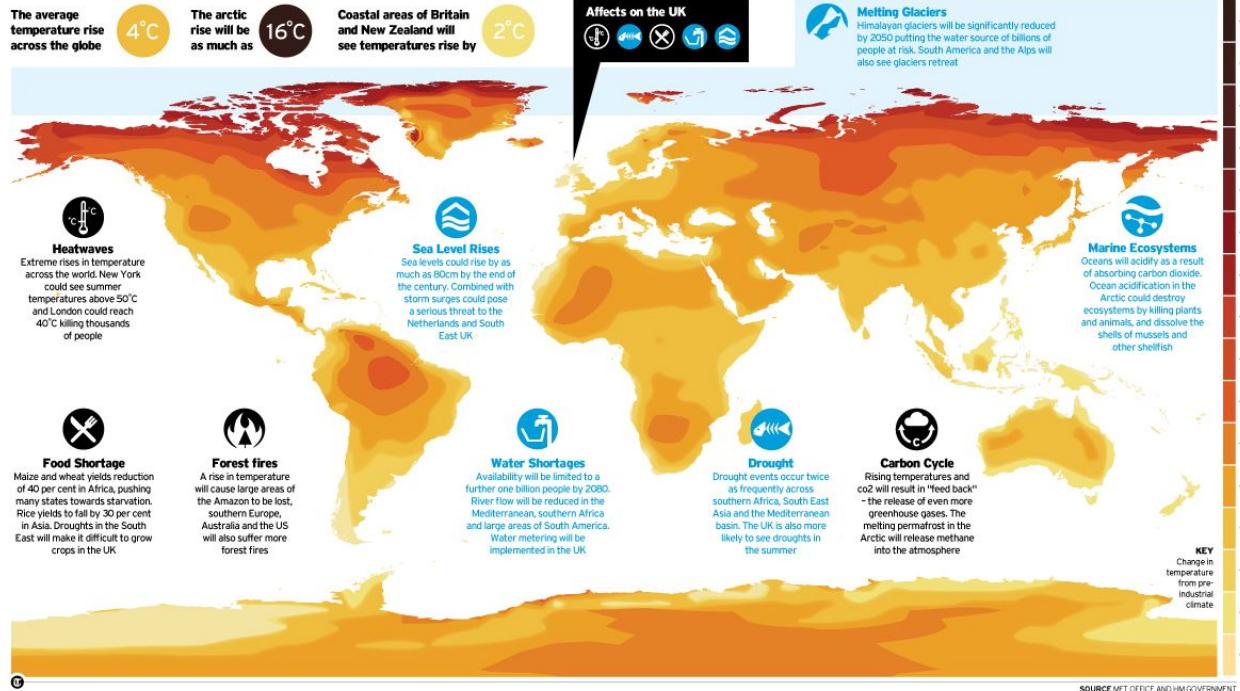
...but modern day challenges require us to go beyond borders and sectors.

What is the future of "innovation"?

Who is included?

Grace Nakibaala, Uganda

One of Three Africa
Innovation Challenge Winners

Project **PedalTap** will help
improve Community Health and
Family-Well Being

Johnson&Johnson

ML & AI in Development
Exploring with eyes wide open

Agenda

- What are Artificial Intelligence (AI) and Machine Learning (ML)?
- How are they currently being used in global health and development?
- Potential benefits of using ML/ AI in development and Global Health
- Potential risks of ML/ AI
- Moving forward: <u>Guiding principles</u> and <u>capacity building</u> for effective and responsible ML/ AI integration

"Cartoon" Machine Learning

Traditional coding

Imagery

Rules

Locations

Machine learning

Imagery

Locations

Rules
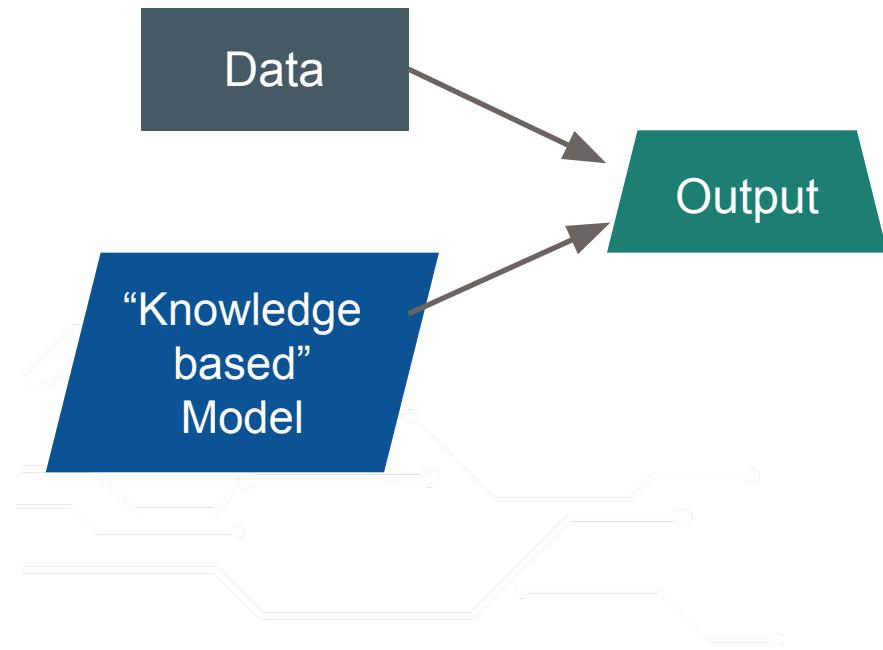
"Cartoon" Machine Learning
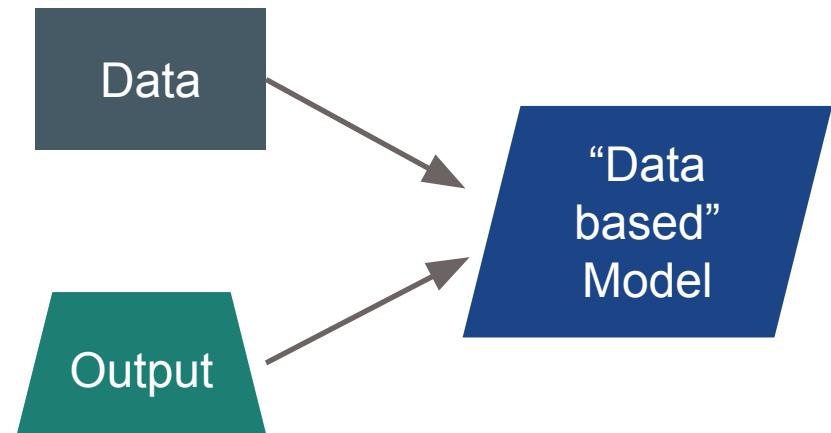
AI and ML

- Allow computers to make data-derived predictions and automate decisions

Machine learning =
data-driven predictions

Computers recognize patterns in data and use these patterns to make future predictions.

Artificial intelligence =
smart automation

Computers enable automated decision-making that is meant to mimic human-like intelligence.

- Becoming ubiquitous in our lives (interactive maps, tailored advertisements, voice-activated personal assistants, etc), but it's only the beginning!

Supervised Machine Learning: Classification

Dogs?
Or fried chicken?

Supervised Machine Learning: Classification
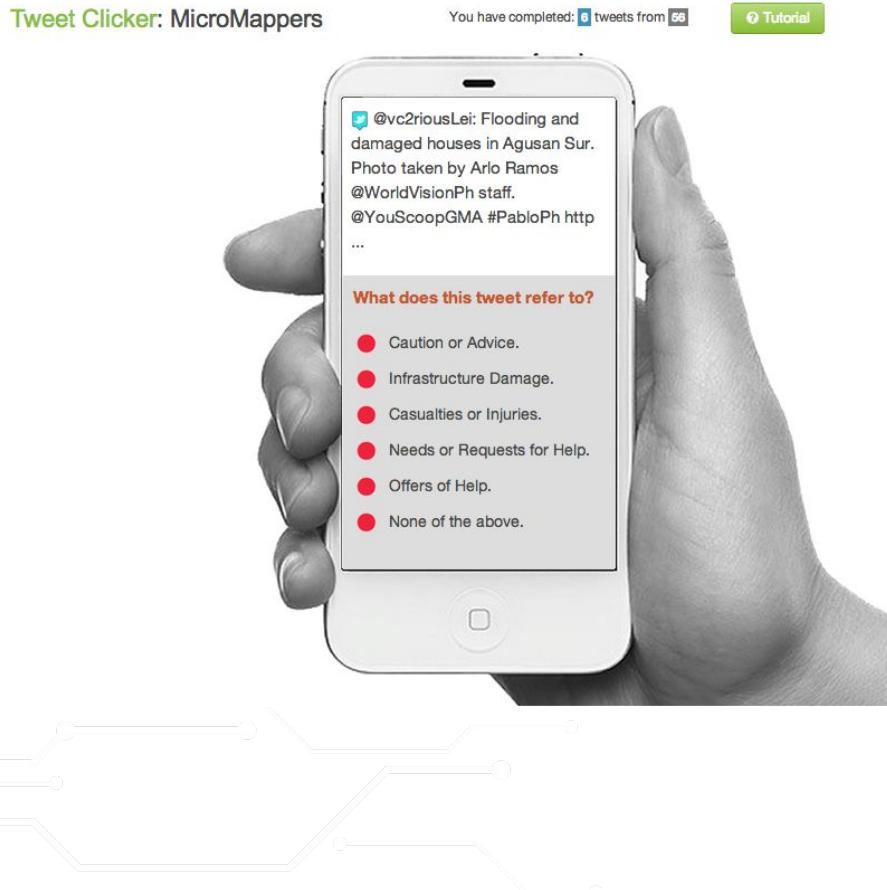
Using social media to guide disaster response

Supervised Machine Learning: Classification

Tagging tweets by emotional content
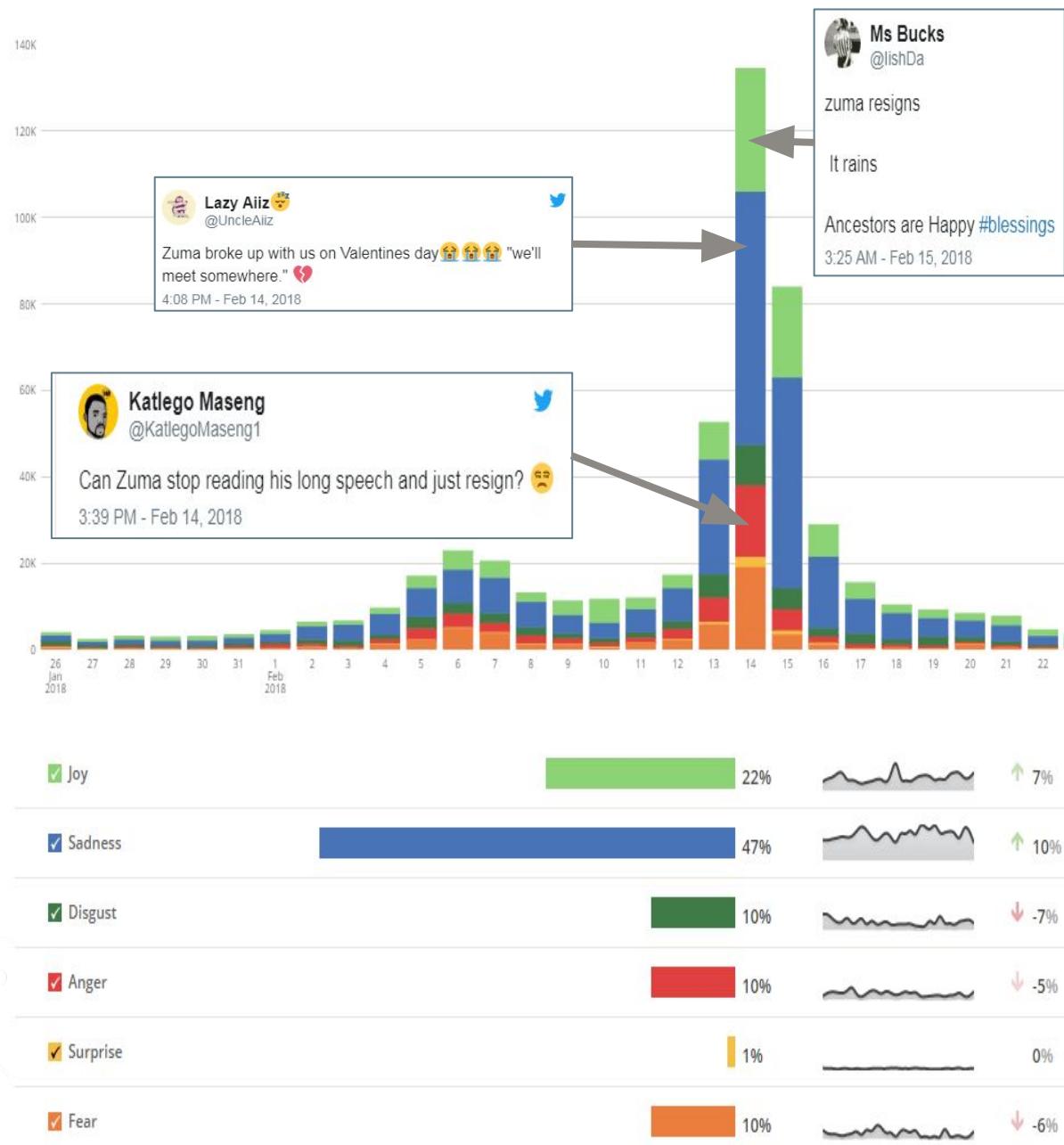
Point-of-Care Diagnostic Testing

ParaSight
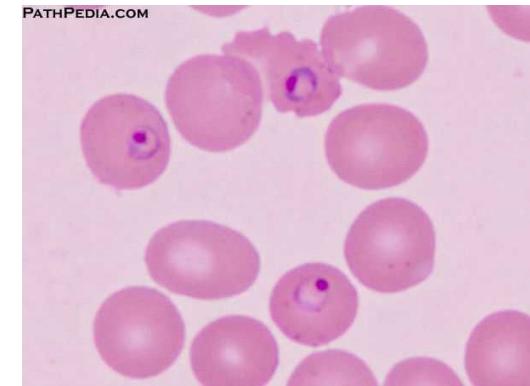
Image: Sight Diagnostics
https://www.sightdx.com

❏ Malaria diagnosis, species identification, parasite quantification based on analysis of digital photos
❏ Offers an alternative to traditional diagnostic tools (manual microscopy, PCR, etc), which tend to be expensive and time-consuming
❏ Inexpensive, rapid, and highly accurate (Eshel et al. 2016, J Clin Microbiol)
❏ Similar platforms in use for hookworms and schistosomiasis

Content Generation to Improve Health Outcomes

Mental Health Chatbots

❏ Allow people to talk through depression, anxiety, fear, etc. with a computer

❏ Improved **access** to care (large caseloads, available 24/7)

❏ May help mitigate effects of **stigma**

https://www.wittysparks.com/ai-chatbots-trends-dominating-in-2018/
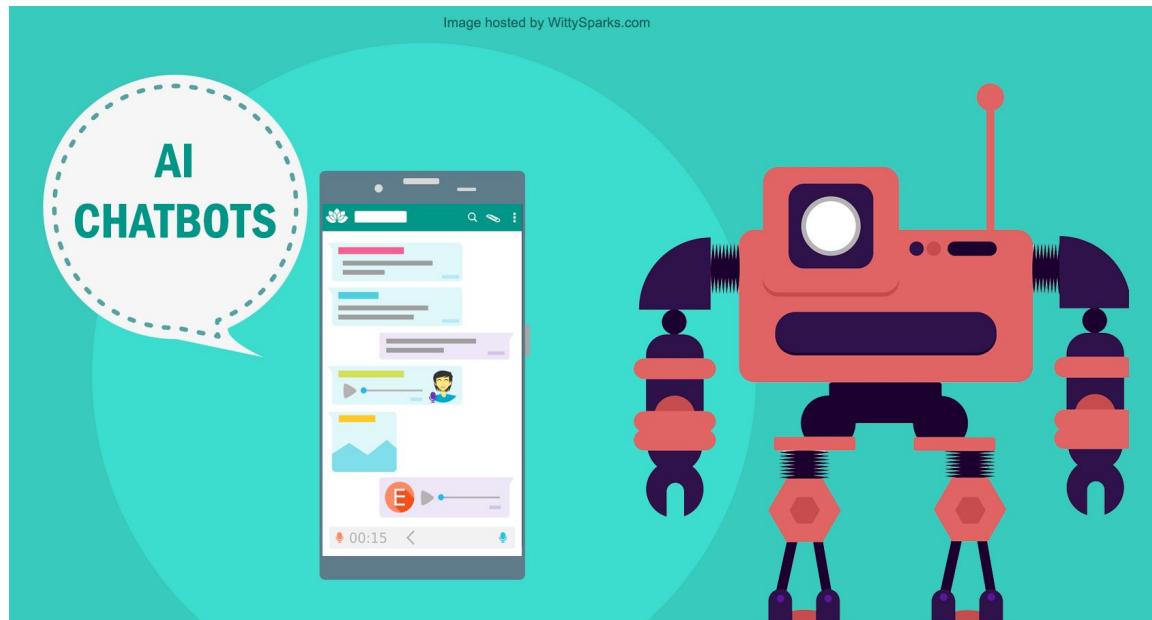
Content Generation to Improve Health Outcomes

Karim

- ❏ Developed to combat mental health issues among Syrian refugees
- ❏ Personalized text message conversations in Arabic to help refugees with emotional problems
- ❏ Uses natural language processing to analyse the person's emotional state and return appropriate comments, questions, recommendations.
- ❏ Any clear indication of self-harm or intent to harm others prompts human intervention
- ❏ Interest from Lebanon's Ministry of Public Health and United Nations World Food Program

https://www.businessinsider.com/psychotherapy-bot-in-middle-east-2016-3

Other bots currently being developed to help people affected by gang violence (Brazil) and H.I.V. (Nigeria)

Possible Benefits to AI/ ML in Development

- ❏ Discover new relationships
- ❏ Design better interventions
- ❏ Improve targeting (i.e. sending the right message to the right person at the right time)
- ❏ Enhance efficiency through tailored services and early action

Possible Applications for AI/ ML in Global Health

- Improve patient access to, engagement with, and ownership of their healthcare
- Enhance supply chain with 'smart' components
- Replace clinical trials with real world evidence generation
- Precision public health - tailor interventions to specific populations
- Improve accountability and performance management
- Train new health workers with AI-enabled learning approaches

https://www.mastersdegree.net/masters-degree-global-health-career-options/

ML and AI in development: What can go wrong?

ML can contribute to:

❏ Creating unfair exclusion

❏ Reproducing existing inequities

❏ Obscuring accountability

❏ Premature automation
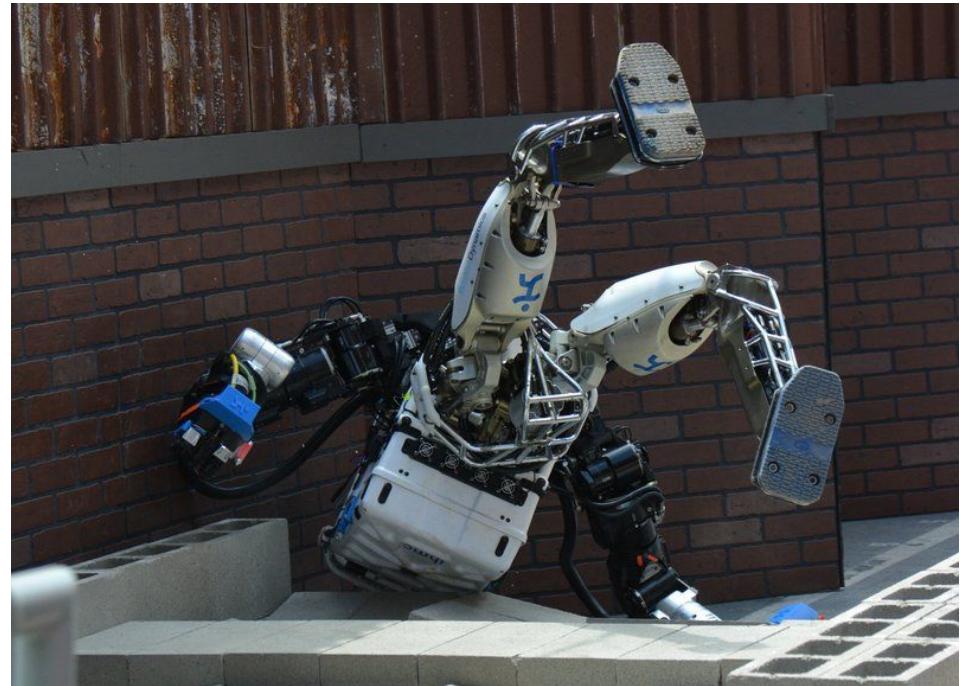
Image credit: DARPA Robotics Challenge

Creating unfair exclusion: Invisible minorities

Possible Causes:

❏ Training data comprises majority population samples; limited or no representation of minority populations

❏ Model development teams lack diversity to prompt minority-sensitive evaluation
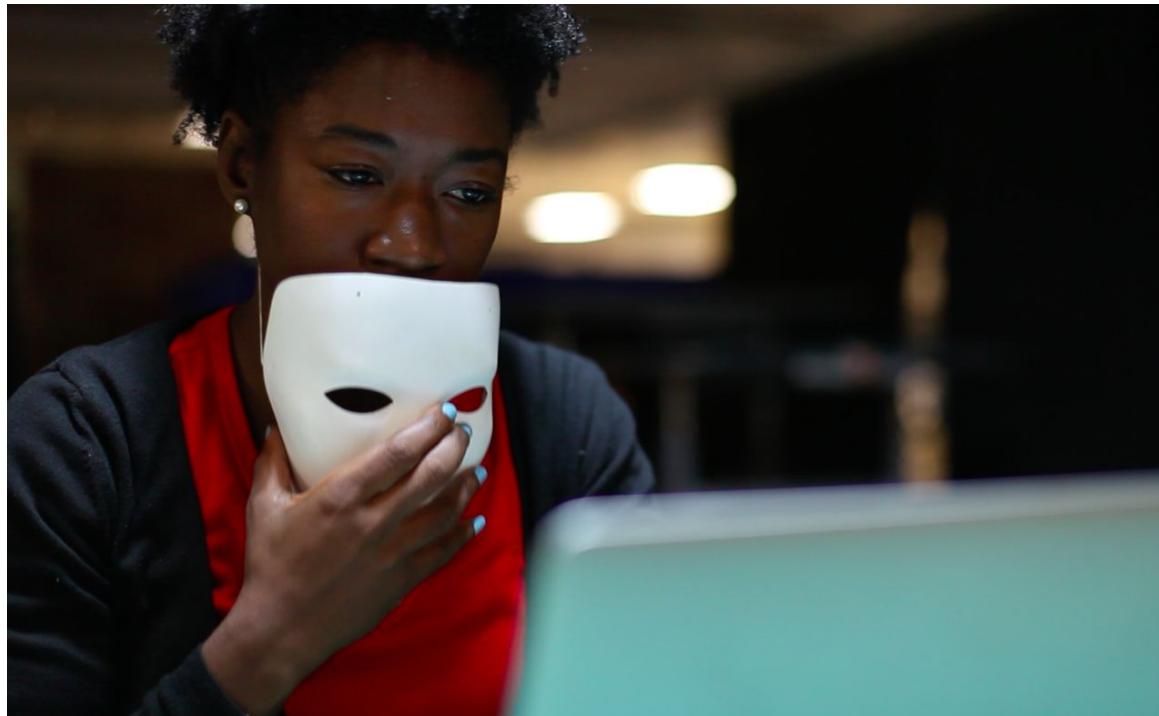
https://medium.com/mit-media-lab/the-algorithmic-justice-league-3cc4131c5148

Reproducing existing inequities: Bias in training data

Turkish | English | Cebuano | Detect language | ▾

o bir hemşire
o bir doktor
o bir mühendis
o bir aşçı
o bir arkadaşım
o bir sevgili

83/5000

Reproducing existing inequities: Bias in training data

How do we amplify the good & minimize the bad?

Development actors have a role to play!

We can and we must:

- ❏ Advocate for our development problem
- ❏ Leverage local expertise
- ❏ Speak up for context
- ❏ Critically assess tools with end users in mind

Capacity Building
for effective and Responsible AI/ ML in Development
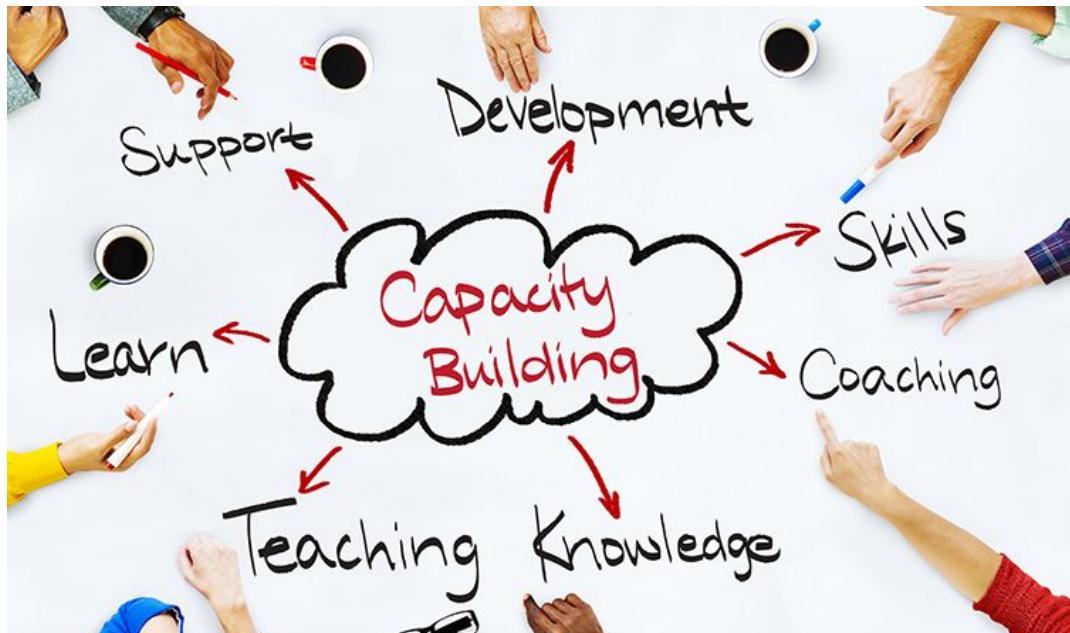
- ❏ Strengthen local technical capacity
- ❏ Strengthen local governance structures
- ❏ Ensure responsible data practices
- ❏ Ensure responsible, shared learning
- ❏ Track workforce implications

Guiding Principles
for effective and Responsible AI/ ML in Development
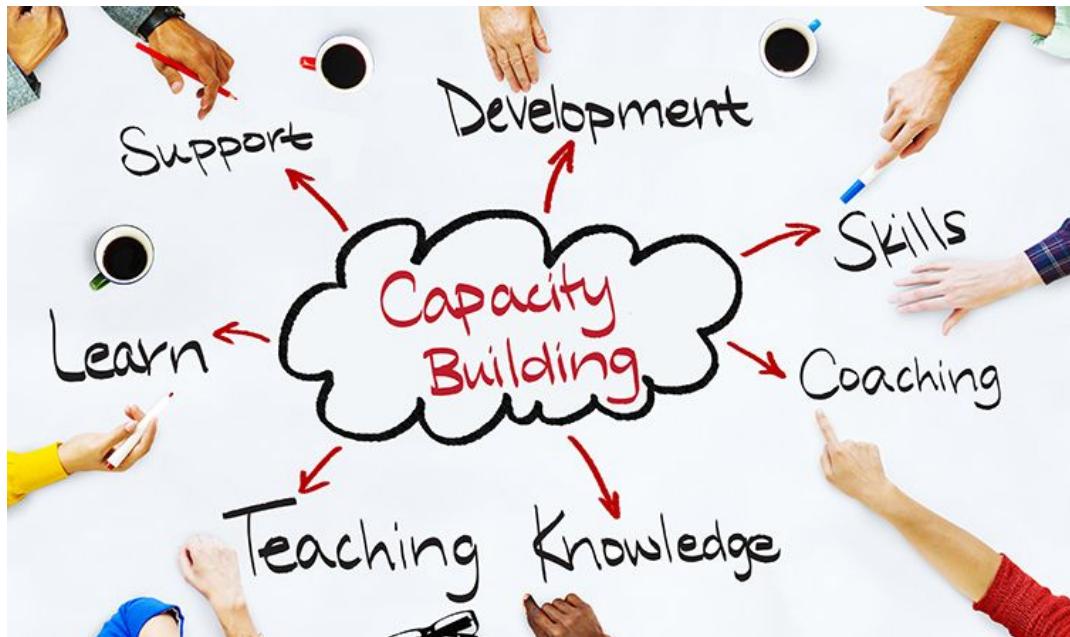
- ❏ Ensure tech application is effective, inclusive, and fair
- ❏ Determine when ML/ AI offer a suitable solution
- ❏ Understand the limitations and know when and how it can do harm
- ❏ Commitment to addressing and mitigating potential harms

Questions & Guidance:
Ensuring Fair, Inclusive Use of AI and ML in Development

Strategy & Research has a Newly Released Long-form Report

❏ Highlights promising **use-cases** of ML in development, and how some innovative organizations are getting it right

❏ Explores **fundamental issues** around ML and AI

❏ Offers **guidance** on how to mitigate harms and help establish safeguards as we explore AI and ML in our work

Reflecting the Past, Shaping the Future:

Making AI Work for International Development

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FROM THE AMERICAN PEOPLE