

Developing Machine Learning Competence in Africa in the Francophone Sahel Region

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**Robots
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Workshop on Practical ML for Developing Countries (PML4DC)
International Conference on Learning Representations (ICLR 2020)
Poster Session – April 26, 2020

Mali

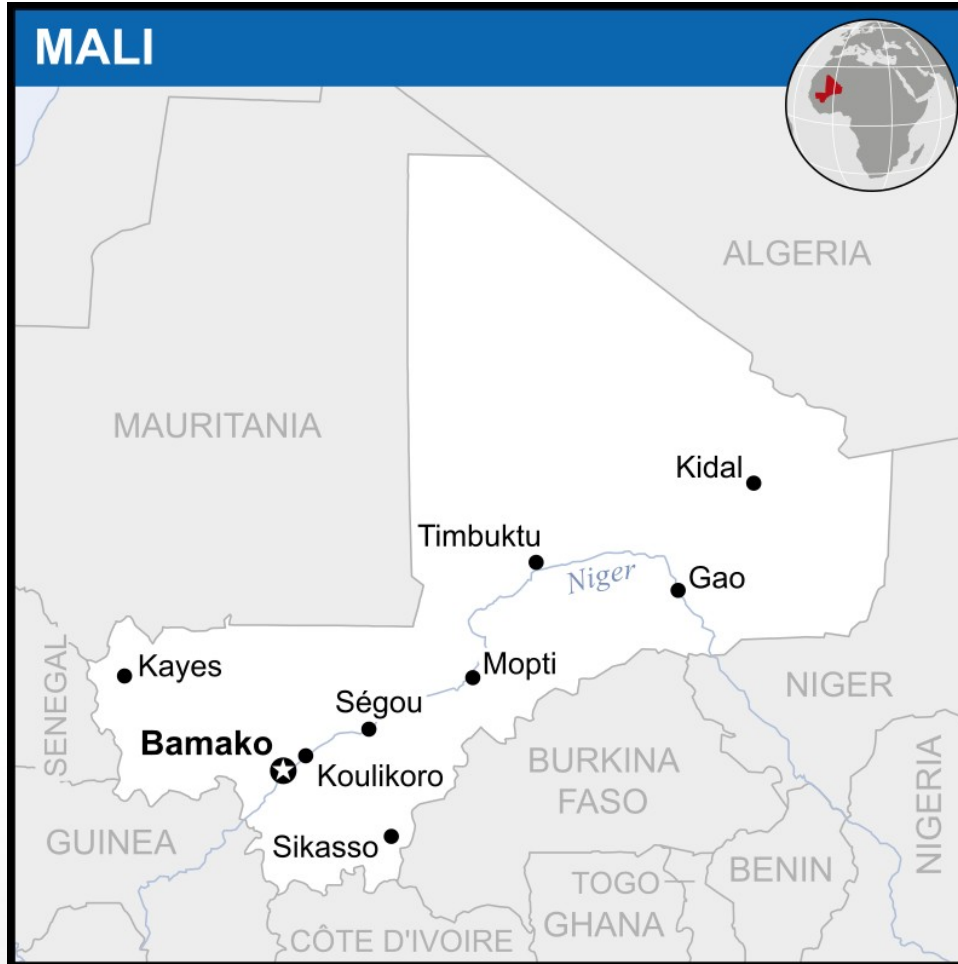
At A Glance

- HDI : 0.427 (2019 184/189 country rank, low human development)
- Population : 19.3M (2018)
- GDP : \$2,271 (PPP) \$891 (nominal)
- Official Language : French (spoken by 21%)
- Primary National Language : Bambara (spoken by 80%)

Education Policy and Development

"The major challenge of higher education is to become and to remain the principal motor of Mali's socio-economic development."

Pr. Mahamoudou Famanta
Minister of National Education, Higher Education and Scientific Research



Scientific Isolation of the Francophone Sahel

- Little Funding in Africa, almost none in the francophone countries

YARDSTICK : \$1.1B to African start-ups (2018), 4 % to francophone countries with 30 % of the population
Partech Venture Partners

- Silicon Valley focuses on anglophone African countries

Google To Train 10m Africans Says CEO In Visit To Nigeria, Following Trips By Facebook, Microsoft

Google has opened its first Africa Artificial Intelligence lab in Ghana



jack  @jack · Oct 4, 2019

Headed to Africa for all of November! Ethiopia, Ghana, Nigeria, and South Africa. Going to spend a lot of time with entrepreneurs, including

- African researchers routinely denied opportunities to study and collaborate

Canada refuses visas to over a dozen African AI researchers

- Sahel countries virtually embargoed by travel advisories due to security issues

Mali - Level 4: Do Not Travel

- English is a poorly taught and rarely mastered 3rd or 4th language

AI in Mali : A Focused Strategy Adapted to a Low Resources Environment



RobotsMali

Centre National Collaboratif de l'Education en Robotique et en Intelligence Artificielle (National Collaborative Center for Robotics and Artificial Intelligence Education)

- The Ministry of Higher Education and Scientific Research created a national center for robotics and artificial intelligence education in 2018
- Lacking professors and researchers in AI, existing academic programs, and funding the program was designed to work collaboratively with the all educational institutions to seed education and research programs
- Activities :
 - Courses in AI and NLP with cross-institutional enrollment
 - Educational programs for middle and high school students aimed to interest students in AI studies
 - Public conferences on AI
 - Incubation of research and entrepreneurial projects using AI focused on Mali's social and economic growth



Yelenkoura

- Yelenkoura "new light" in Bambara
- Developed at RobotsMali with the participation of the Malian Union of the Blind
- Start-up spun-off, first prototype in production
- Using object sensors and vibration to communicate environmental information, it does not pollute audio sensory information
- Second prototype will include camera and (tinymml) neural network trained on scene images taken in Mali and communicate using a 3-character dynamic braille pad with a shorthand language designed with blind users
- Primary design objective : low cost



Bayɛɛmabaga ("Translator" in Bambara)

- Creation of a machine translation system for Bambara, an under-resourced national language spoken by 80 % of Malians
- Less than 20 % of Malians are fluent in French, advancement of use of national languages as a socio-economic development strategy is national policy
- Bayɛɛmabaga has been proposed as national project
- Bilingual university students have been recruited to create aligned texts for training. It is planned to do this on a massive scale.
- As Bambara is primarily oral, both oral and written translations will be used.

French original

Objectif réfléchir à de nouvelles stratégies de lutte contre le terrorisme qui continue de faire des victimes dans le sahel.

English (for reference)

Objective to reflect on new strategies to fight terrorism which continues to claim victims in the Sahel.

written Bambara

Laje ni kun tun ye ka hakili jakabo ke feere kuraw la banbaanciw juguya la miniw be ka ciyenni ke Saheli konona la

spoken Bambara

A kun tun ye ka miriya kuraw ta ka banbaanciw keei sira kan o mun bi ka ke sababu ye ka fagali caman kesaheli kononana



Perspectives, Future of AI in Mali

COMMON ELEMENTS

- Data specific to developing country environment
- Imperative for low-cost solutions
- Limited connectivity

NEXT TARGETS

- Agriculture
- WASH (water, sanitation, hygiene)
- Security
- Urban Management

APPROACH

- Belief the AI can provide best approach in terms of cost, time and feasibility
- An approach to bypassing hard infrastructure limitations
- Need for self-reliance, researchers in rich nations have little incentive to help us and probably won't
- Imperative to do what we can now with what we have

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