

Availability of Datasets for AI Research in Africa and a way forward



Sixth ITU/WHO Workshop on "Artificial Intelligence for
Health, 2-5th September 2019, Zanzibar, Tanzania

Dr. Wasswa William

PhD (Biomedical Engineering)

Lecturer | Head of Department

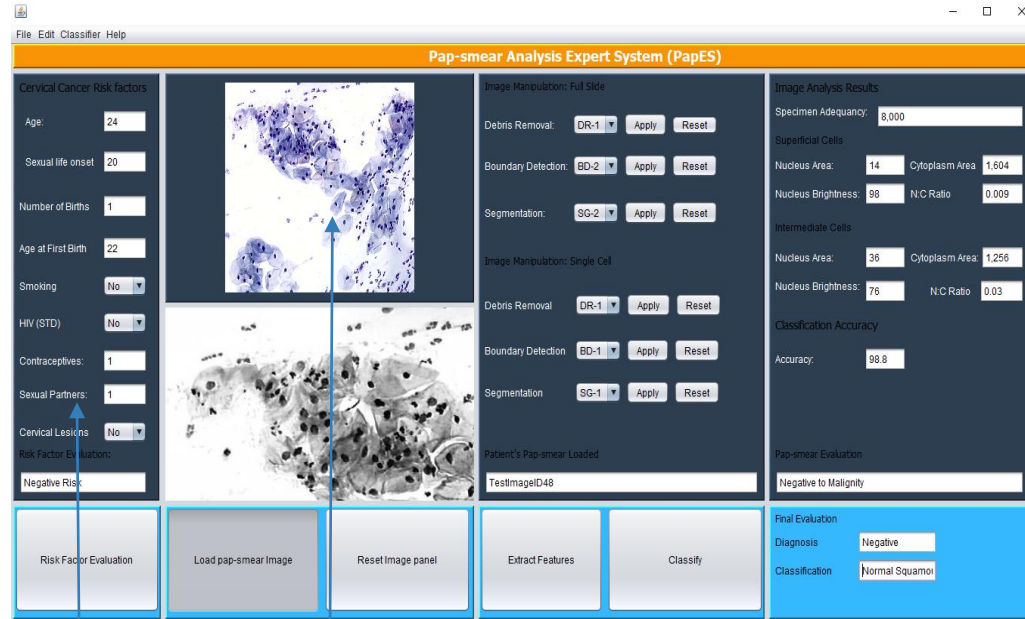
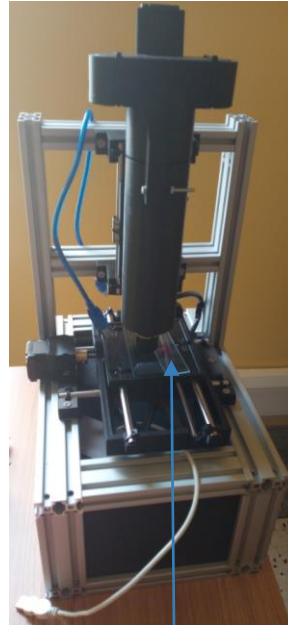
Department of Biomedical Sciences and Engineering



Faculty of Applied Sciences & Technology

Experiences from the Past Experiments/Research

PapES Innovation



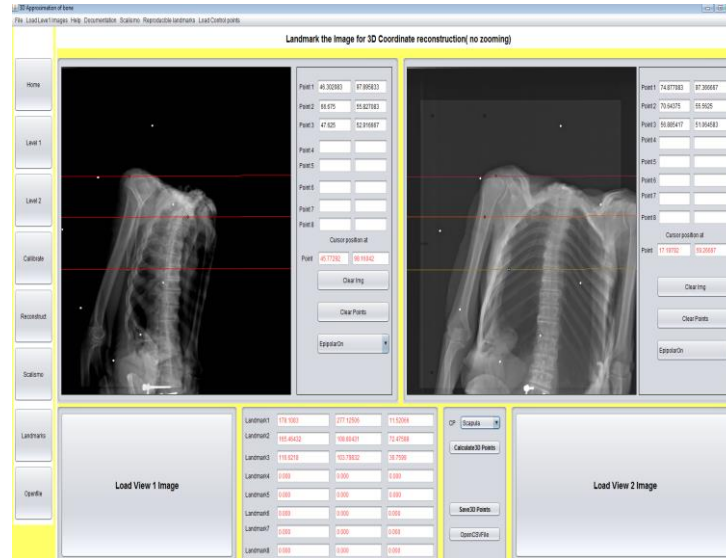
(i) a low-cost digital microscope sliding scanner, (ii) cervical cancer risk factors evaluation engine, and (iii) a pap-smear analysis tool.



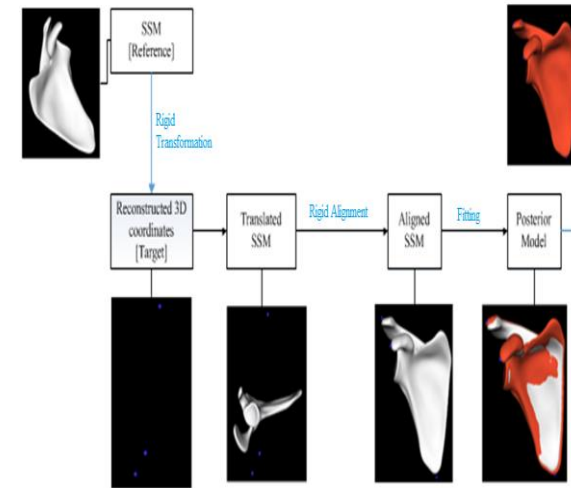
Experiences from the Past Experiments/Research



3D Reconstruction



3D reconstruction of patient specific human Scapula from 2D X-ray images; towards patient specific low cost implant designs:



Landmark Constrained Statistical Shape Model Fitting



AI Research in Africa

Introduction

- ❑ Most **impactful AI** research is not happening in **Silicon Valley**.
 - ❑ Self driving cars Vs **Pap-smear Image Analysis, Malaria Diagnosis**
- ❑ Opportunities in Africa to fill gaps in:

FINANCE More money to operate small businesses With Machine Learning/ AI, companies are now able to better access credit worthiness from data like mobile phone usage, utility bills payments to service the millions of individuals and small businesses that could not get credit from traditional banks. Mines.io M-shwari
HEALTH Fewer deaths given increased diagnosis With Machine Learning/ AI, many more people beyond doctors can leverage cheaper, simpler, smarter diagnosis tools to diagnose ailments, thus ameliorating the burden of the current 1:4000 doctor to patient ratio in Africa. Ubenwa peek
AGRICULTURE Higher local food produce With Machine Learning/ AI and industrial IOT techniques, minimize wastage and improve yield as large farms can be monitored by drones to determine when to weed, water, and harvest produce. This coupled with improved seedlings and transportation logistics can transform Africa's current economic situation. Kitovu

EDUCATION Higher skilled labor With Machine Learning/ AI, platforms can be built to offer personalized training that adapts to a student's needs and potentially reaches broader audience than skilled teachers can today. Tutoria
ENERGY Lower expense on electricity With Machine Learning/ AI and IOT, people can monitor and optimize the way they use the very limited energy they currently have across many African countries to reduce cost and generate more business. Solstice Ozuri

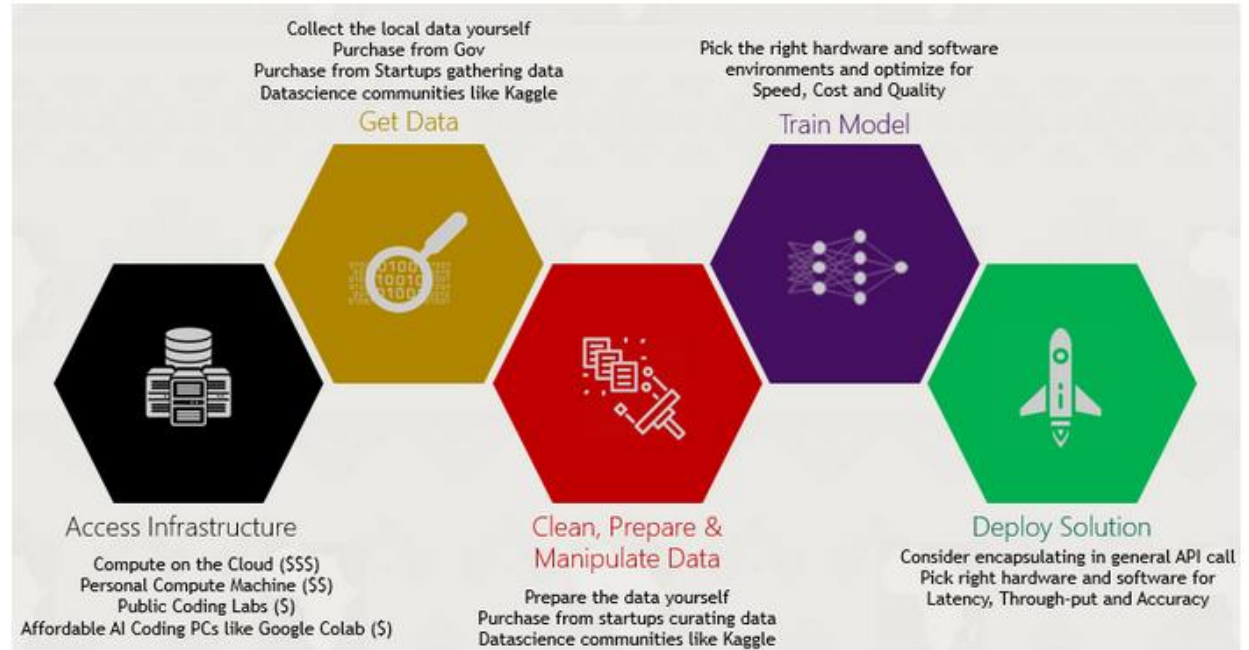
Opportunities for LMIC



AI Research in Africa

- ❑ However, **Reliable** Datasets are typically **smaller** in Africa
- ❑ **But are more accessible.**

Datasets



AI Research in Africa

Datasets

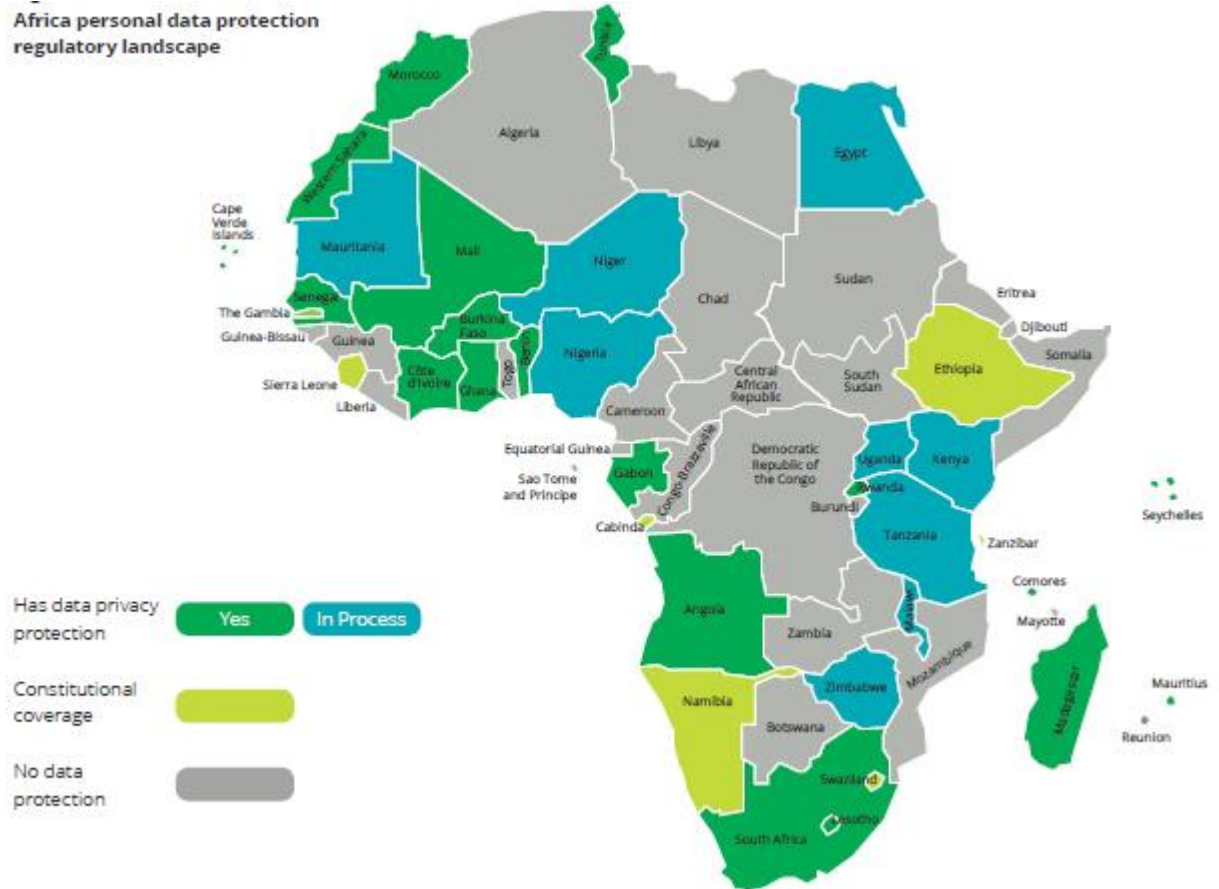
- ❑ Unlike in US and UK, where **data protection laws** are installed to protect individual privacy, these are few in Africa
 - ❑ In **Uganda**, Data Protection and Privacy Act, 2019
 - ❑ In South Africa, The Protection of Personal Information Act, 2014 (POPIA); the use and processing of personal information.



Data Protection Laws of Africa

AI Research in Africa

Africa personal data protection regulatory landscape



Source: Privacy is Paramount, Personal Data Protection in Africa, Deloitte, 2017



AI Research in Africa

The Challenge

- ❑ Major AI Advances have been fuelled by advances in **Datasets**
 - ❑ Apps providing driving directions
- ❑ However collecting, classifying and labeling datasets used to train the algorithms is the grunt work that is difficult
 - ❑ **Datasets comprehensive enough to reflect real world**
- ❑ Many companies/researchers do not realise the importance of good data until they have started their AI projects
 - ❑ **My own experience**
 - ❑ Moving from proof of concept and pilot to a production system
 - ❑ **Testimonies**
 - ❑ from developers from a number of computing firms



The Challenge

AI Research in Africa

- ❑ There is still limited **Expertise** in AI in Africa
 - ❑ eResearch Africa
 - ❑ Data Science Africa
 - ❑ **Few universities offer masters degree in AI**
 - ❑ In Uganda, only **1/7** public universities.
- ❑ Limited Adoption of Information Systems in Africa
 - ❑ Hospitals
 - ❑ Business
 - ❑ Manufacturing
- ❑ Closed Standalone Systems
 - ❑ Who pays for **Public Access**?
 - ❑ Limited **APIs**
- ❑ A lot of open dataset **NOT** from Africa's population
 - ❑ <http://machineintelligenceafrica.org/resources/machine-intelligence/data-sets/>



AI Research in Africa

The Challenge

- ❑ For Disease Diagnosis
 - ❑ Lack of disease specific datasets for AI research
 - ❑ Malaria, Cancer, etc.
 - ❑ Specific body part images
 - ❑ X-rays, CT scans.
 - ❑ Natural Language processing
 - ❑ Limited datasets for African Languages
 - ❑ Open Access Registries
 - ❑ A lot of feature selection required
- ❑ Prediction
 - ❑ Limited datasets and History
 - ❑ Limited Expertise in Biomedical Data science



AI Research in Africa

Wayforward

- ❑ Need to skill Africans with emerging AI techniques
 - ❑ Not Only, **Academia**
 - ❑ BUT also **private sector (computing firms)**
 - ❑ **Health professionals**
 - ❑ **What AI can do for them..**
 - ❑ Free Easily Accessible Online Courses
 - ❑ **In Addition to**
 - ❑ **Coursera**
 - ❑ **Data Science Africa**
 - ❑ More competitions
 - ❑ **Kaggle**
 - ❑ **Africa specific health challenges**



Wayforward

AI Research in Africa

- ❑ A need for **independent auditing** of machine learning models
 - ❑ A number of free open Apps especially for Diagnosis
- ❑ **Empower Africans** to build AI models for the existing challenges
 - ❑ A model built with right data, right algorithms may fail to work in a different setting.
- ❑ General education curriculum need to prioritise the cultivation of AI skills to students
 - ❑ Currently, AI common to University (**Masters, PhDs**)
- ❑ Setting up of Centres of Excellence in Machine Learning
 - ❑ **Innovation Hubs with infrastructure to support AI**
 - ❑ Gov. to support Open Data initiatives
 - ❑ AI labs in Universities



Wayforward

AI Research in Africa

- ❑ Strengthen partnerships and collaborations
 - ❑ African and other international academic institutions
 - ❑ Data sharing for training AI models
 - ❑ Expertise
 - ❑ Academic institutions and the private sector

- ❑ Finally More AI for Health Networking Events
 - ❑ Identify challenges
 - ❑ Meet people working on similar projects
 - ❑ **Thanks to ITU and WHO**





Thank you for Your Time

wwasswa@must.ac.ug