

Zanzibar, 3-5 September 2019

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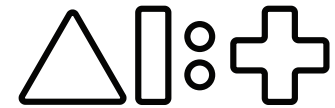
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**Abstract:** This document contains a highlight of key points from the Sixth ITU/WHO Workshop on "Artificial Intelligence for Health" held in Zanzibar, Tanzania, 2 September 2019. This workshop precedes the sixth meeting of FG-AI4H.

# ITU/WHO Focus Group on Artificial Intelligence for Health



World Health  
Organization



**AI for Health**

An ITU Focus Group  
In collaboration with WHO

Funding support by:

*foundation*  
**BOTNAR**

# Welcome Session

- With the creation of the FG-AI4H, ITU and WHO have taken on the ambitious task of developing a standardization assessment framework for the evaluation of AI-based measures for medical care.
  - Historically, ITU and WHO worked closely on matters related to EMFs
- With 13 Topic Groups and three working groups, FG-AI4H, has covered immense ground in terms of both communicable and non-communicable diseases that can be monitored using AI-based technologies

# Session 1: Focus Group on AI for Health

- World-wide Scaling of ICT (to AI4H)
- AI4H: substantial improvements for public & clinical health
- Quality control:
  - *Data: Data collection, statistical properties, experts' reference*
  - *Metrics: Performance, Robustness, Generalizability, Explainability...*

## ITU/WHO Focus Group on Artificial Intelligence for Health:

- *Established in 2018, Jul*
- *goals: standardized framework for benchmarking*
- *Previous meeting: 6<sup>Th</sup> meeting world-wide*

# Session 1: Focus Group on AI for Health

- Structure: WG & TG
  - *13 Current Example Health Topic Groups: call for proposals*
    - A) Community: Creating and extending a community around a health topic*
    - B) Proposals: Solicitation of AI for health proposals*
    - C) Evaluation: Setting up evaluation criteria including data sets and metrics*
    - D) Report: Publishing reports about the evaluation and the results*
    - E) Dissemination: After successful use of an AI for health solution in practice, repeat FG-Ai4H process steps (A-E)*
- World-wide Network for Collaborative Research on AI4H
  - Current collaboration: WHO, ITU, IANPHI, Regulators, IAP, AI4Good, WHS
  - Looking forward to having you on board.

# Session 2: Applications and Use Cases

- Success of AI depends more than just technology, a support ecosystem is needed
- Urgent requirements of AI4H
  - *High Mortality Rate*
  - *Missed Diagnoses & Misdiagnoses*
  - *Lack of Adequate Healthcare Providers*
- AI for health applications & cases:
  - *Medical Images + Convolutional Neural Networks*
  - *Antimicrobial resistance: measurement/Interpretation*
  - Health Assistant for healthcare providers
  - Identify *falsified drugs* : NIR reflectance spectra

# Session 2: Applications and Use Cases

- Towards standardization of AI4H
  - *Data collection: scarce, expensive, heterogeneity*
  - *AI performance: interpretability, explainability, and transparency, Incorporating meta-data*
  - *Clinical Integration: Involve clinicians at every stage*
- Data governance, availability and quality remain key challenges
- Way forward of AI research :
  - *Data quality: collecting, classifying and labeling datasets*
  - Independent auditing for machine learning models
  - Collaborations: Data sharing & Expertise

# Session 3: Regulations & Country Priorities

- DYNAMIC Program:
  - *Beneficiaries: Sick children attending primary facilities*
  - *ePOCT: - full connection to biosensors and rapid tests*
  - *Dynamic clinical algorithms: ML/AI*
  - *Usage: disease surveillance, epidemic detection*
- DIGITAL REACH INITIATIVE
  - *Approved by the Presidents of the six EAC member countries*
  - *To maximize the power of digital health in East Africa*
  - *Applications: Education, Diagnostic support, training, data collection, UHC, supply chain, resource allocation, population status*
  - *Quick-wins: Regional Telemedicine, EA Health Cloud*
  - *Resources Requirements: Financial, technique, public support, etc.*



# Session 3: Regulations & Country Priorities

- Internet Data & Chronic Diseases in Africa
  - *Monitoring health information needs across the continent*
  - *Monitoring health misinformation*
  - *Estimating prevalence of chronic disease risk factors*
- Regulation principles sharing from China
  - Focus on the assisted decision-making
  - Risk-based (different level, special risk of imported Ai-MD)
  - Total lifecycle management (requirements, data collection, algorithm design, verification & validation, change control)

# Session 4: Fundamentals of AI in Health

- Infrastructures of AI4H:
  - Cloud computing: Network, storage and computing resource
  - Complex situation: without expertise to deploy and operate
  - May able to solve the compatibility of models assessment
- Platform of AI4H:
  - An online personal assistant that works on Social Media
  - Break cultural stigma in Sexual and Reproductive Health by
    - 1) Privacy
    - 2) Confidentiality
    - 3) 24/7 service
    - 4) No biasness
  - Impact: 145,380 people on FB page

# Session 4: Fundamentals of AI in Health

- Use cases of AI4H from IBM Africa :
  - *Supporting Decisions with ML on Malaria Control*
  - *Sharing Digital Resources: (1) Blockchain-based Multi-party Computation; (2) Distributed Trust in Machine Learning*
- Use cases of AI4H from Makerere University :
  - *AI based Microscopy diagnosis of Malaria*
  - *End to end solution from Microscopy image to suggestion*
- Institutions contributions of AI4H:
  - Zanzibar Health Research Institute: fully operational in July 2018
  - Importance of cross-domain & multi-party collaboration

**Additional slides**

# Session 1: Introduction of ITU/WHO Focus Group on "AI for Health" and Keynote (1/3)

- Digital health has enabled the scaling-up of preventive measures and early detection which can lower treatment costs and reduce mortality
- FG-AI4H is the brainchild of the AI for Global Good Summit
- Since its creation in July 2018, FG-AI4H has been developing a benchmarking process for health AI models that can act as an international, independent, standard evaluation framework.
- AI can promote: early detection, diagnosis, risk detection, and improved treatment
- The effectiveness of AI depends on the type of data used to training and testing
- AI-based health apps require evaluation standards for quality control

# Session 1: Introduction of ITU/WHO Focus Group on "AI for Health" and Keynote (2/3)

- Considerations for Quality control of data: availability, incompatibility, reproducibility of training data, homogeneity, completeness, active learning, reference modelling, classification of data among others
- Quality indicators for AI solutions: metrics, input data, handling unknown data, evaluating uncertainty of AI algorithm, reproducibility, nature of the data
- Next FG-AI4H meeting will take place in November 2019 in New Delhi, India.

# Session 1: Introduction of ITU/WHO Focus Group on "AI for Health" and Keynote (3/3)

- The work of the FG-AI4H has been covered by The Lancet in March 2019.
- Key part of the work of the FG-AI4H is focused on data matching and quality control carried out through the various Topic Groups
- Health data suffers the “curse” of dimensionality, which makes it prone to distortion when employing selection criteria or differential privacy techniques.
- Overall the FG-AI4H has 13 Topic Groups that describe a specific problem and quantify the result
- Several domain experts have taken leadership of these TGs

# Session 2: Applications and Use Cases of AI in Health (1/4)

- The success of AI in health is beyond just technology – it is dependent on the ecosystem around it
- Mortality rate is high in Africa related to both communicable and non-communicable diseases
- Africa is further plagued with a low doctor to patient ratio
- Problem of missed diagnoses and misdiagnoses is prevalent: e.g. sickle cell anemia and bacterial sepsis mistaken for malaria
- AI can become essential for diagnosis, forecasts and prognosis
- AI can play a key role in detecting breast cancer, diabetes
- AI can boost the accuracy of radiology diagnostics
- minoHealth aims at improving quality of healthcare by interlinking AI, Data Science, Cloud computing and Biotechnology in Africa



# Session 2: Applications and Use Cases of AI in Health (2/4)

- By combining the streams of cloud computing and data science, it is possible to easily: store and access medical data, auto-analyse data, comprehend aggregated statistics and visualize them
- Overuse of antibiotics produces resistant bacteria (natural selection) AI to deal with antimicrobial resistance-AST app
- Reading antibiogram requires long-term training and there is risk of wrong treatment for patients when interpreted incorrectly
- ASTAPP provides a free diagnostic tool for antibiotic resistance testing for non-expert staff
- ASTAPP app covers all avenues of measurement of diameter, interpretation based on international rules, identification of resistance mechanism etc

# Session 2: Applications and Use Cases of AI in Health (3/4)

- Low availability of healthcare professionals and specialists in rural areas
- “Dr Elsa” –an AI powered health assistant is able to provide healthcare workers with symptom detection, decision-making and recommendations. Currently employed for children (0-14 years) Arusha and Dar Es Salaam
- There are still challenges associated with acquiring high-quality data which is often expensive
- When standardizing benchmark AI tools, only relevant data must be utilized
- Inclusion of met-data (clinicians’ suspicions + background information) can improve the frequency of correct diagnosis
- It is essential to involve clinicians at the deployment and at specialist levels.

# Session 2: Applications and Use Cases of AI in Health (4/4)

- Truespec portable device helps healthcare professionals to determine whether a drug is genuine. This helps curb the use of low-quality medication
- Data sets available in Africa are often smaller but are known to be more accessible – very few countries have legislation for data privacy
- The realm of education needs to be targeted in Africa- only few universities offer advanced degrees in AI

# Session 3: Regulations & Country Priorities (1/2)

- Machine-learning has been the most successful type of AI in recent years
- AI medical device- AI-SaMD (smart standalone software) and AI-SiMD (smart device)
- The complete lifecycle management of AI devices would involve: requirement analysis, data collection, algorithm design, verification and validation, surveillance and change control
- Core concerns of using data in AI: false positives, human error, data diversity, data-set construction

## Session 3: Regulations & Country Priorities (2/2)

- Three uses of internet data in Africa: (a) monitoring health information needs (across regions), (b) detecting health misinformation, (c) deciphering chronic disease risk factors
- Combination of digital health AI even offers the possibility of remote surgeries
- Citizen-oriented Digital REACH Initiative has been approved by the member states within EAC. This aims for driving tech-based health system transformation, attainment of SDGs

# Session 4: Fundamentals of AI in Health

## (1/3)

- AI for malaria detection using microscopy- even skilled lab technicians cannot go through more than 20 slides a day
- Connecting smartphones to the microscopes helps in quick capturing of images. Using defined algorithms, it possible to deduce patterns to enable diagnosis
- There are various application domains for AI in Health: medical imaging, symptom detection, drug development
- Alibaba Cloud applied data intelligence to help doctors and nurses offer better healthcare services to patients by leveraging on EMR and medical reports

# Session 4: Fundamentals of AI in Health

## (2/3)

- Zanzibar Health Research Institute aims to alleviate health related problems based on scientifically and ethically sound research
- Series of modern laboratories (ZAHRI): microbiology, toxicology, photochemistry, biotechnology etc.
- Discussions on sexual health are still a taboo in many countries. This coupled with limited sexual education leads to STDs, teenage pregnancy, sexual abuse etc.
- eShangazi- AI powered online personal assistant (modelled on the cultural role of an aunt in Africa), aimed at reducing teen pregnancy. It uses natural language processing

# Session 4: Fundamentals of AI in Health

## (3/3)

- eShangazi focus areas: teen pregnancies, menstruation, sexual and reproductive health, family planning. The chatbot assures privacy and no bias
- Lack of funds still limits the knowledge available to AI researchers to improve data quality