AI for Good Global Summit REPORT

Track 2: AI & Health
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Discussion of Ideas
“Artificial intelligence (AI) - the phenomenon of machines being able to solve problems that require human intelligence - has in the past decade seen an enormous rise of interest. A combination of new machine learning algorithms, increased computational power, and an explosion in the availability of very large data sets (“big data”) has led to stunning advances with demonstrations of machines achieving human-level competence at solving clearly defined tasks across many domains. The health sector, one of the most important sectors for societies and economies worldwide, is particularly interesting for AI applications. The potential for AI-assisted health decision making is enormous.”

Marcel Salathé, Sharada P Mohanty.
Ramesh Krishnamurthy introduced the track.

AI applications are most effective in healthcare when they can help achieve the SDGs. National and sub-national governments are encouraged to have policies in place to ensure the ethical and safe use of AI in healthcare without hindering innovation. WHO is working to develop global norms and standards, facilitate policy and governance mechanisms at national levels, and convene global and national technical forums for dialogue.

AI for health can help achieve the SDGs.
AI for Primary Care and Service Delivery

Marcel Salathé; Associate Professor and Head of Digital Epidemiology Lab, École polytechnique fédérale de Lausanne (EPFL)
Stefan Germann, CEO of the Botnar Foundation, moderated this Session.

Stefan argued that healthcare is moving out from hospitals into our living rooms every day. A human design approach is needed to enhance quality of care and deliver it in dignified manner. Solid foundations are key to tackle issues such as the shortage of health workers, the growing population and aging population. AI and digital health technologies can be a game-changer. However, data may be privatized for health use and must be globally available to help create new business models. The Moonshot by 2030 would be to provide access to basic healthcare for 1 billion more people powered by AI and digital applications.

Basic healthcare for 1 billion more people powered by AI and digital applications.
Arun described the use of AI to combat diabetic retinopathy and to prevent vision loss. Early detection can help with treatment. There is a significant lack of ophthalmologists in the developing world. AI could help image recognition with output diagnosis and probabilities. He described examples of the fundus camera (clinics or screening kiosk)-AI deep learning CNN model and the cloud - diagnosis (remote ophthalmologist). 2016, Google pioneered an AI detection model with an accuracy of 95%, which has since been piloted in India. Challenges include getting the necessary training and validation for AI, remote deployment, low-cost image capture and the necessary regulatory approvals.
Shinjini presented the ‘invisible evidence for disease’. Her project focuses on osteoarthritis. IBM Watson estimates that 90% of medical data is in the form of images, but the ‘dark side’ of imaging often prevents analysis. Very small changes in the human body can facilitate the detection of disease, and AI can be used to detect changes invisible to human eye. Transform transport-based morphometry (TBM) which helps find a common pattern, and identifies changes that can lead to development of disease with 86% accuracy. We need to look inside the AI black box. AI technologies can potentially detect what humans cannot.
One solution could be to connect health systems and digital financial systems.
Nao presented “Use-case for AI in primary healthcare for resource-constrained communities”. Nao described using ICT to deliver healthcare as a top priority in Africa. There is a lack of healthcare workers in particular of specialist knowledge for NCDs, HIV and care for children under 5, especially in weak health systems. We need to adopt a patient-centric approach to primary healthcare. Watif is a multi-platform health portal for primary healthcare in constrained communities. It is highly scalable, with self-supporting tools for users in remote areas. Nao cited a case study applying ML capabilities to improve healthcare.
Salem described how AI can be used to predict the consequences of diabetes, which is on the increase worldwide. We need to predict the complications, and reduce visits by medical staff by introducing a remote platform. It is a platform for patients and doctors combining EHRs for patients with live communications with doctors. It includes a data analysis visualization tool for doctors. AI can be used to predict complications from patient data and a cloud API.
Hila presented a healthcare diagnosis App called ADA. Diagnosis is even harder in the developing world, which is mainly where the 4 billion people lacking access to primary healthcare live. ADA’s vision is that “Everyone one on earth has access to healthcare they need and deserve” through a personalized platform using AI to self-diagnose. Technology should be designed to solve the problem of health assessment for consumers and doctors with AI. It uses probabilistic systems linking symptoms with conditions and can prevent long-term damage when illnesses are diagnosed early through the app. ADA’s app can be used in drugstores to give advice to customers. A project in Tanzania showed how to deploy the app for primary healthcare through an AI-powered patient care journey. The system can be made culturally sensitive to each country, and is available in different languages.
Discussions concentrated on:

- Diagnostic adoption and rollout, translation and how we can integrate other languages into the system, affordability and scalability, and how to promote innovation in the broader health system.
- A standard format for data or interfaces could help promote large-scale deployments of AI.
Session B

AI for Outbreaks, Emergency Response and Risk Reduction
Dominic Haazen, Lead Health Policy Specialist at the World Bank, moderated this Session.
Ingmar Weber, Research Director at Qatar Computing Research Institute

Ingmar described the use of hyper-targeted advertising for public health messaging. Current health messaging has only limited targeting, “one size fits all” can only be used for a year. To help personalization, Ingmar Weber suggested we could:

1. Have domain experts generate visuals and texts as well as user segments;
2. Where appropriate, measure offline conversations or promote hospitals as stores.
3. Use AI to learn the best visual text segment combinations.
4. Challenges include privacy concerns, user fatigue and the digital divide. However, social media is a very cost-effective technology that can immediately reach over 2 billion people.
Jeanine described the GSMA’s Big Data for Social Good programme. Mobile big data can help effective response to emergencies and offers powerful insights, while respecting privacy. It may even help understand the impact of pollution on environment and people. There are three core pillars: ecosystem, best practices, and implementation to drive adoption. Using machine learning to predict pollution levels 24h beforehand to help authorities take action, advise people about the risk and change routes.

How can big data help with tuberculosis? She described the use of digital technologies and leveraging mobile big data to combat drug-resistant malaria in Asia-Pacific in Myanmar.
Clara Palau Montava of UNICEF

Clara focused on pandemics, and how new technologies can help. UNICEF is looking into the use of real-time data for messaging platforms to provide information. UNICEF is working with mobile operators to get data on how people are moving in real-time. There are many different factors that lead to diseases and we need to combine different types of data from different sources to ensure data are accurate. The platform allows partners to include new models, new sources of data can improve the existing ones. She described the mapping of risk factors and how ML, satellite imagery and AI can be used to map infrastructure and population distributions. We need to assess epidemic risks and most important factors.
Anita Shah, MD of Kimetrica Kenya

Anita described using AI to monitor child malnutrition. Kimetrica monitors the effectiveness of social spending software and modelling via simulation. The model detects facial features to monitor child malnutrition and is being piloted in the US, with a 78% accuracy in detection. It uses metrics of age, gender, ethnicity, anthropometric measurements, presence of facial oedema in a photograph of the child’s face. UNICEF has established a partnership, but the study objectives need more research, including: accuracy, feasibility (culturally) and cost effectiveness. This pilot project in Kenya has adapted to cultural barriers, and contacted the Ministry to collect data-ethical clearance board-start of data collection process-smart surveys. A smart survey team has been set up with trained enumerators & supervisors, configured tablets, synchronized photo formats, data quality assurance checks, photo quality checks and observations of children’s reaction. We need to change the model to improve facial recognition; and reduce feature representation, as it is a fully connected neural network to detect malnutrition. This is a better option than traditional methods, as it is less stressful for children, faster and no physical contact is needed with the enumerator.
Marcel Salathé, Professor at EPFL

Marcel described the launch of the new platform, Crowdbreaks, a health trends tracking system that openly and transparently analyzes social media data, such as Twitter. It combines ML with crowdsourcing and leverages the wisdom of the crowd by letting participants label tweets. ML algorithms train on this data, continuously improving itself to detect Tweets which are relevant to the issue at hand. Why? The burgeoning body of social media data contains valuable signals for the global health community. Crowdbreaks aims to use AI for good by providing an open source framework suited for collaboration between academia and the public health community. Algorithms use data and label tweets to follow trends and track behaviour.
Jochen described how AI can be used to detect and address malnutrition for aid agencies and state services. The goal is to set a new industry standard. This mobile solution is quick and easy to use, and be given straight to mothers, for rapid response. It provides immediate data, high accuracy, non-profit, and open source software for detection and image breakdown. The first field test is underway in India, using a 3D augmented reality scan & ML-based tool. Metrics include: height, body measurements, estimate weight & age. Accuracy is currently 76% but can reach 98% through AI. We need to readapt software in different countries, due to different body sizes.
AI for Health Promotion, Prevention and Education
Effy Vayena, Professor at ETH Zurich moderated this Session.

Innovation is critical not only in technology, but also in ethics policy and governance.
Łukasz Kidziński, Researcher at Stanford University

Łukasz described the use of algorithms to solve medical issues. Mobiles can be used to record movements and get clinical variables & monitoring process. Information can be extracted from videos to predict clinical variables and lower cost. Algorithms can help extract information from scans. Would trying to clone a person for trial surgeries be unethical? We can develop clones as computer simulations to give better understanding, and explore the use of AI for skeletons by simulations on skeletons to see outcomes of surgeries. Health AI @ Stanford offers scalable solutions for healthcare systems. We want to make it free for everyone through our platform, but who can apply these solutions? Technologies can potentially bring the most value in developing countries.
Mobiles can be used to record movements and get clinical variables
Anne described the use of algorithms to solve medical issues. Mobiles can be used to record movements and get clinical variables & monitoring process. Information can be extracted from videos to predict clinical variables and lower cost. Algorithms can help extract information from scans. Would trying to clone a person for trial surgeries be unethical? We can develop clones as computer simulations to give better understanding, and explore the use of AI for skeletons by simulations on skeletons to see outcomes of surgeries. Health AI @ Stanford offers scalable solutions for healthcare systems. We want to make it free for everyone through our platform, but who can apply these solutions? Technologies can potentially bring the most value in developing countries.
Mr. Anandan stated that many rural communities don’t have access to adequate or sufficient healthcare, if at all, and usually at very high cost. Where primary healthcare centres exist, technology can help mitigate the lack of healthcare of workers. The AI research institute in Mumbai is exploring AI for social good. We need the right type of data to train the models, build models and solutions, but suffer from a lack of technical expertise. The aim is to boost capabilities at the frontline with novel planning and information applications, and provide diagnosis in low-resource settings. The initial projects empower frontline healthcare workers with technologies to solve problems without having to go through doctors. Challenges include the lack of good quality datasets, a complex ecosystem, varying motives and experiences. Only governments can scale these efforts.
Matteo described how Your.MD technology can be used to help solve problems. AI can be used to mitigate the global shortage of primary care physicians, which is fast becoming impossible to solve through traditional methods. Primary care is a precondition for a functioning healthcare system. We need to be able to track information from primary care through an automated system. Your.MD is seeking a partnership with NHS for data, but it is all about getting the right information to everyone. Trust is a major issue – he introduced the clinical management process and issues about who verifies data, transparency and GDPR compliance.
Rafael Ruiz de Castañeda, Lecturer at Geneva University

Rafael described a project for snake identification based on AI and global collaborative expertise. This project is focused mainly on developing countries and anti-venom development and distribution. AI can be used to identify whether a snake is venomous or not, what type of snake and what type of venom, and what clinical manifestations to anticipate. Each bite requires different care. Snapp helps support clinicians to identify snake. We need to use existing platforms for snake enthusiasts and experts to build up image bank of snakes to develop new algorithms integrated in an app and clinical management tool.
Data can be incomplete, biased and/or misleading for many reasons, according to gender, culture, etc.
Dafna Feinholz, Chief of AI at UNESCO

Dafna explained that different factors make patients go to the doctor (depending on the region). Data can be incomplete, biased and/or misleading for many reasons, according to gender, culture, etc. Algorithmic decision-making is based on how doctors interact with patients, and the role of the family when it comes to health decisions; however, final decisions should always remain with physicians. How can we incorporate empathy? AI may change power relationships between doctor and patient. We need to share the benefits more broadly with the world’s population, and ensure the equal distribution of these systems. How can we ensure good follow up, despite barriers of language and culture.
Discussions focused on whether physicians can decide, where there are shortages of doctors. AI tools should be the allies of doctors, and only replace doctors in very specific cases. For big complicated decisions, or when a life is at stake, physicians should still decide. Would AI tools have to go through the same approval process as a medical devices? AI tools should be regulated, but we need a framework for this. The skill of doctors depends on education, training and experience. We need to measure the accuracy of human doctors & AI to find out that AI is better, which point to have a regulatory framework that includes AI. We need a trusted entity to tell us we can trust AI. Trust cannot be regulated, but we can regulate liability and certain aspects to make it [more] trustworthy. The physician’s role depends on the country. Is it possible to understand ethical issues and enforce ethical principles in black-box AI systems, if we don’t understand the AI algorithms underlying the outputs? How can AI solutions best be integrated with clinician’s workflows? Easier workflows, reduced liability, and higher success rates should help physicians accept AI. If built with the right amount of transparency, the system itself can show what went wrong, and could be used in the regulatory process.
Discussion of Ideas

Session D
1. AI for vision loss by medindia.et, taking pictures of eyes and processing by phone for diagnosis.
2. AI for detection of osteoarthritis by the University of Pittsburgh Medical Centre via automated systems.
3. AI and Digital Identity by element: identify people through biomarkers.
4. AI-based health portal by WatIF for primary healthcare for poor communities focusing on Africa.
5. AI-powered infrastructure by ADA, a health guide platform with self-diagnosis.
6. AI-powered PH messaging by Hamad bin Khalifa University: targeted ads through social media.
7. AI-powered epidemic modelling by UNICEF: Map risk factors for epidemics.
8. AI-powered malnutrition detection by Kimetrica & UNICEF partnership via facial recognition.
9. AI-powered malnutrition detection using a 3D augmented reality scan & ML-based tool.
10. AI-based analysis of free text EMR data by Norwegian eHealth centre to predict anastomosis.
11. AI for public health in India by Wadhani Institute for AI: empower frontline workers, surveillance and prediction using AI automatic planning and remote diagnosis in poorer areas.
12. Pre-Primary care with AI by your.MD: automated generalist.
13. AI-based snake identification by the University of Geneva to identify snakes and venom.
14. AI-based social media mining to track health trends by EPFL-crowdbreaks.
15. A proposal for AI for health Focus Group.