AI for Good[1]
Webinar Series[2]

In order to raise awareness and share relevant information that can help eradicate the propagation of COVID-19, members of the Innovation and Artificial Intelligence Laboratory of the School of Law of the University of Buenos Aires[3] (www.ialab.com.ar) have participated in the third Webinar Series organized by the United Nations. This document describes the digital health strategy of China, as it was outlined during that seminar.

COVID-19 Case Study: China's digital health strategies against the global pandemic[4]

Digital health technologies are critical tools in China's fight against COVID-19. AI, Big Data, 5G and Robotics provide solutions for patient treatment, frontline protection, risk reduction, communications and improved quality of living under lockdown.

The digital health strategy carried out by China was based on the use of AI and ICT technologies to respond to urgent health care needs. In part, this was possible thanks to the large telecommunications infrastructure that the Asian country has, which includes 1 million 4G base stations, 75,000 5G base stations and 170 million broadband subscribers.

In order to face the COVID-19 pandemic, this country focused on transforming the existing technology into capabilities for continuous study, work, life and prevention for tens of thousands of people. Furthermore, China assumed social responsibility and provided citizens with infrastructure and services which are necessary for healthcare and quality of life.
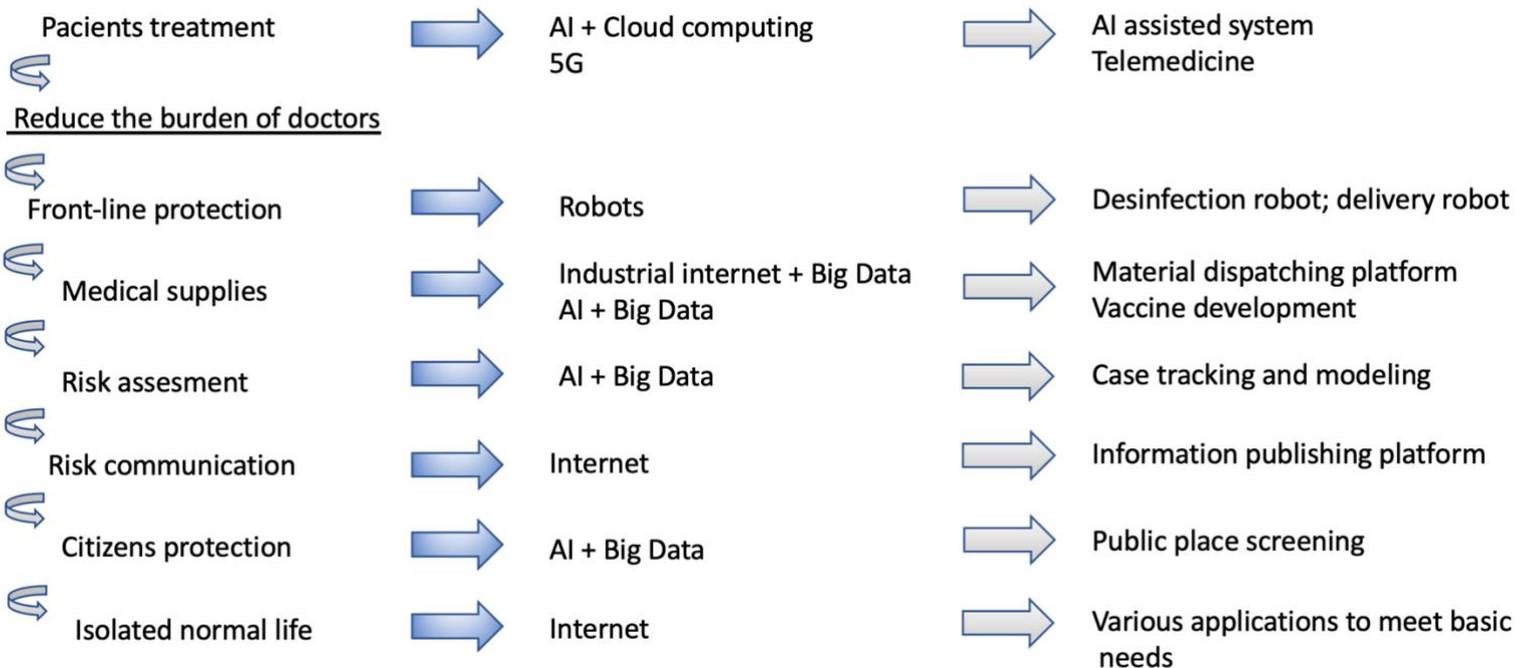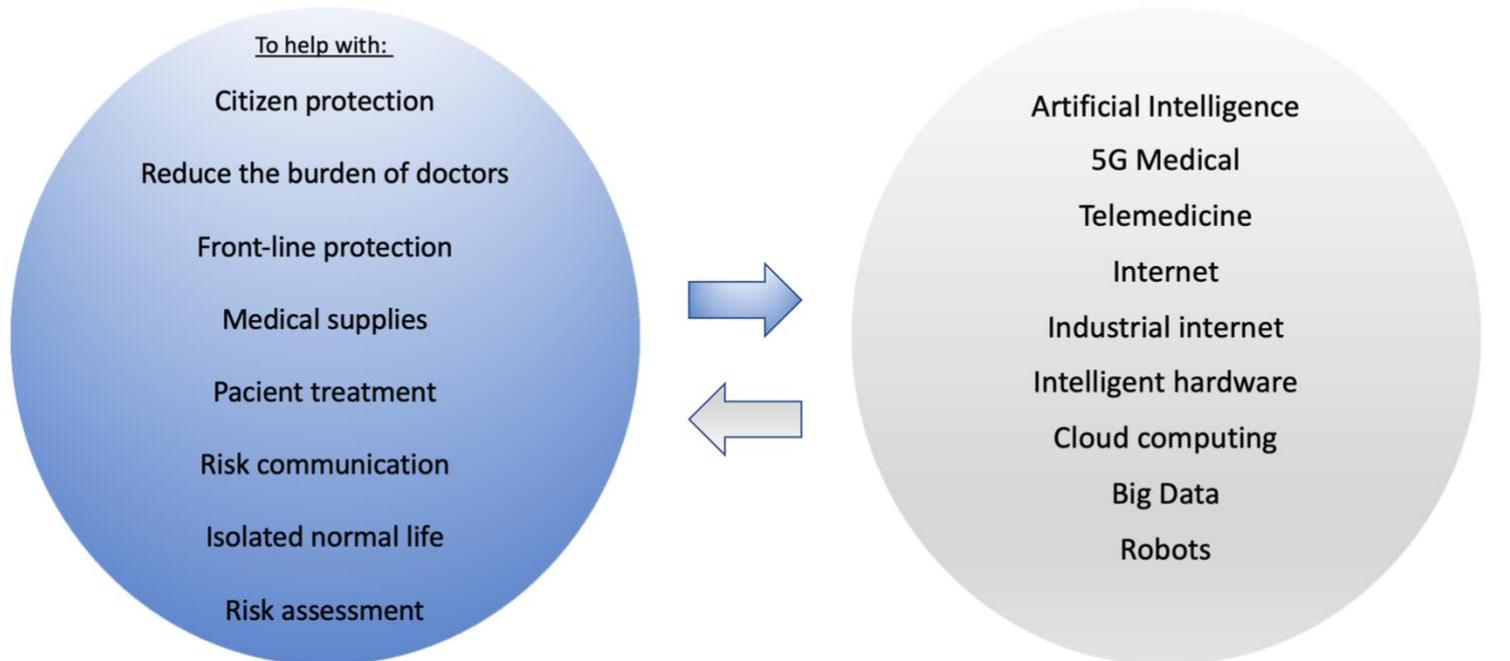
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[1]AI for Good is the leading action-oriented, global & inclusive United Nations platform on AI. The Summit is organized every year in Geneva by the ITU and aims to connect AI innovators with problem owners to accelerate progress towards the United Nations' Sustainable Development Goals, unleashing the potential of AI and other related technologies.

[2]The AI for Good Webinar Series is a free, live series of talks, interviews and panels, featuring inter-disciplinary experts whose ideas, insights and solutions can help humanity leverage AI for good. The series will draw upon expertise from the AI for Good Global Summit community to share the latest developments in AI, unique insights and promising use cases on global challenges from health to the environment and reducing inequalities.

[3]It is the First Innovation and Artificial Intelligence Laboratory of a School of Law in Latin America

[4]Episode 3. Speakers: Shan Xu, Engineer, Smart Health Department, China Academy of Information and Communication (CAICT) and Yuan Zhang, Director, Machine Vision Standardization and Strategy, China Telecom

Requirements vs Solutions

To help with:

Citizen protection

Reduce the burden of doctors

Front-line protection

Medical supplies

Pacient treatment

Risk communication

Isolated normal life

Risk assessment

Artificial Intelligence

5G Medical

Telemedicine

Internet

Industrial internet

Intelligent hardware

Cloud computing

Big Data

Robots

Requirement	Technology	Solution
Pacients treatment	AI + Cloud computing 5G	AI assisted system Telemedicine
Reduce the burden of doctors		
Front-line protection	Robots	Desinfection robot; delivery robot
Medical supplies	Industrial internet + Big Data AI + Big Data	Material dispatching platform Vaccine development
Risk assesment	AI + Big Data	Case tracking and modeling
Risk communication	Internet	Information publishing platform
Citizens protection	AI + Big Data	Public place screening
Isolated normal life	Internet	Various applications to meet basic needs

MEASURES

Among the measures implemented by the Chinese Government we find cloud hospitals, telemedicine, assisted diagnosis, case monitoring, projections and predictions about the epidemic, among others. In addition, platforms related to intelligent transmission, prevention and control of COVID-19 were developed, based on ICT and emerging technologies, such as AI, Big Data and Robotics.

Telemedicine

Telemedicine reduces infections and increases efficiency in diagnosis and treatment. Thanks to it, Vulcan Mountain Hospital staff can transfer local medical data - including CT images and detection indicators - and share it with Beijing Hospital, to achieve remote diagnosis by expert groups.

In telemedicine consultations, medical experts from both locations should share the patient's medical files with high-definition image. 5G large bandwidth, low latency and wide connectivity are used for making remote diagnosis possible.

Assisted diagnosis

The system is capable of processing, in seconds, dozens of high-resolution CT data from a patient. This enables rapid detection of large amounts of case data. The average sensitivity and specificity have achieved judgment results comparable to those of a chief physician in a hospital.

DH cases 02- AI assisted diagnosis

-providing support for rapid screening of a large number of cases
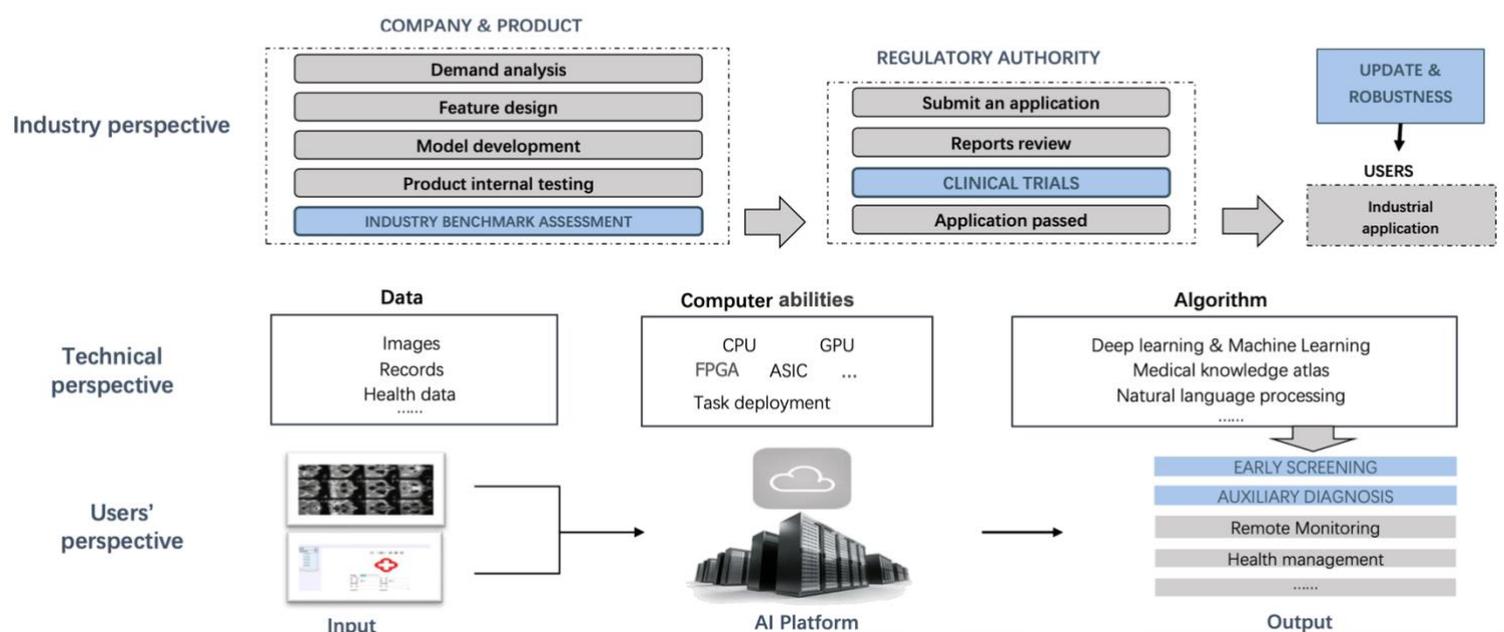
Public place screening

The temperature detection system, which integrates infrared thermal imaging technology, can be used on pedestrians in densely populated areas, such as train stations, airports, underground stations, shopping centers, building entrances, among other places.

Traditional detection is based on the infrared mode that is capable of locating passengers with abnormal temperatures. However, when there are many people, the effective distinction of the image is difficult due to the great amount of heat sources.

This AI-based temperature detection solution combines an AI model to achieve consistency between temperature positioning and body positioning. In turn, the system is capable of precisely matching and locking the abnormal temperature "face area" and its actual counterpart, and alarm automatically to facilitate the staff to conduct a second review of the forehead thermometer. As a result, in high density public places, the efficiency of traffic and screening can be effectively improved thanks to this system.

Case tracking and modeling

To support social recovery, CAICT, China Telecom, China Unicom and China Mobile jointly launched a travel card based on telecommunication data, to verify if a person has been to any epidemic region in the last 14 days or not.

"Traffic light" for individual risk assessment

The data from three telecommunications operators is used to provide itinerary inquiry services for 1.6 billion mobile phone users across the country. This platform supports inquiries from countries (regions) and national cities -in which the user has remained for more than 4 hours- visited within 14 days.

Low risk	Medium risk	High risk

Low risk card: 136****4320的动态行程卡 更新于：2020.02.22 22:22:22 您于前14天内到达或途径：北京

Medium risk card: 136****4320的动态行程卡 更新于：2020.02.22 22:22:22 您于前14天内到达或途径 湖北宜昌

High risk card: 136****4320的动态行程卡 更新于：2020.02.22 22:22:22 您于前14天内到达或途径：湖北武汉

1. National coverage: the "Travel Card" data covers the entire country and is consistent in all provinces and cities.
2. Easy to operate: users only need to scan the QR code or access WeChat, enter the mobile phone number and verify by SMS.
3. Safe and reliable: the "Travel card" service requires authorization and SMS verification. No additional information such as ID number or home address is collected.
4. Objective and accurate: the "Travel card" service is based on personal mobile phone data; calculation and processing are done in the operator's backend, which is relatively accurate.
5. Dynamic update: new calculations will be performed every day to include the user's last itinerary.
6. International characteristics: you can check the global itinerary of your stay within 14 days by using your Chinese mobile phone number.

Material dispatch platform
China built a national platform for the dispatch of medical supplies, with 21 categories of essential supplies that include especially protective clothing, masks, goggles, medicines, among others.

Platform of Digital Health Resource. Supply and demand
This platform enables users to publish demand information, supply information, and contact information for products that include medical protections, software and solutions, computing capabilities, devices, and equipment.
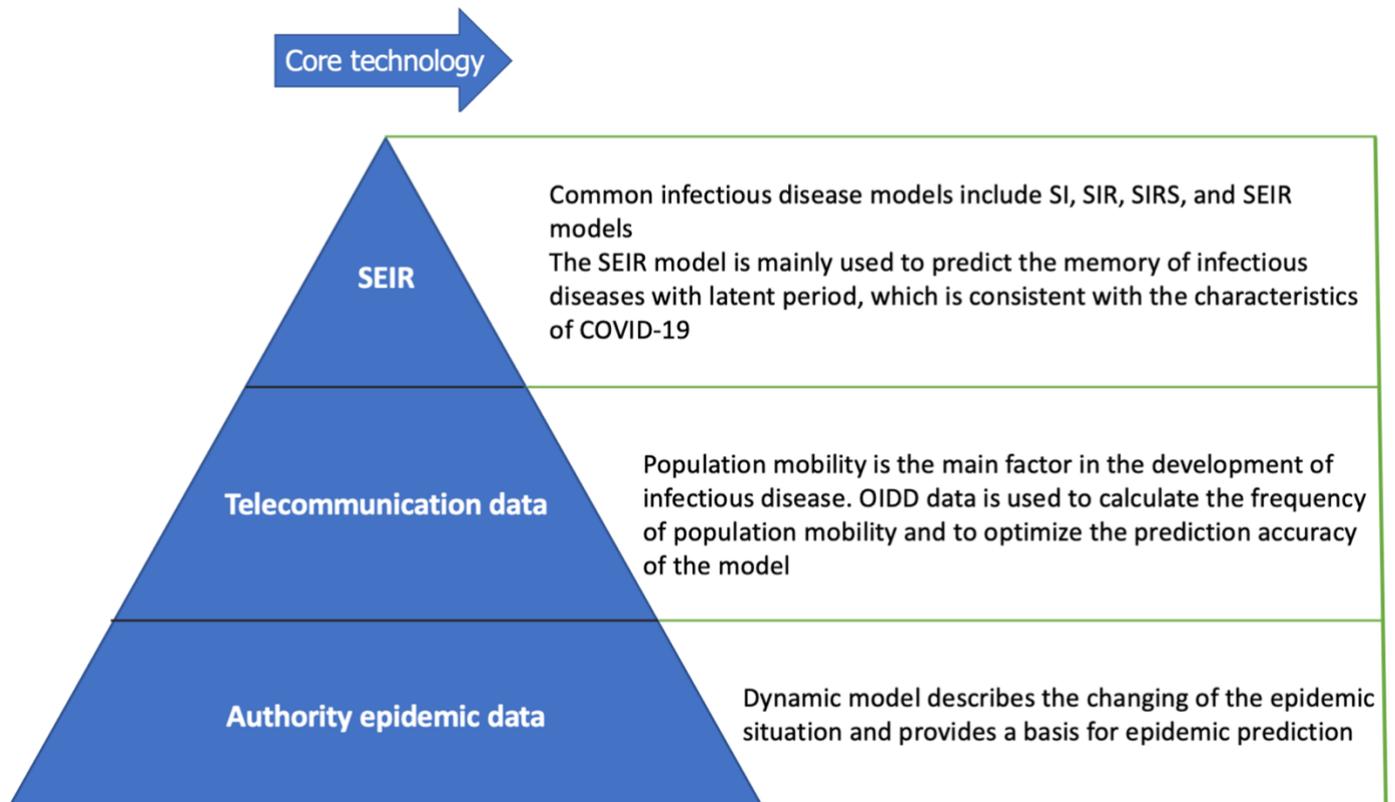
Multifunctional robots
Medical robots have been officially used to disinfect the room, measure temperature, and distribute medical supplies, reducing the workload of medical staff and the risk of cross infection.

Track querying
The track querying app allows users to query regional risk, epidemic situation forecast, return to city, itinerary and the contact. Through the App, 20 billion signaling data (OIDD VOLTE 4G) and billing data were processed per day, covering all 2, 3 and 4G users. Until the end of March, there were 70 million records of inquiries. It is a public App based on HTML5- which has five main functions:
1. itinerary query
2. epidemic forecast query
3. contact query
4. regional risk query
5. return to city query

Epidemic prediction

Core technology

SEIR
Common infectious disease models include SI, SIR, SIRS, and SEIR models
The SEIR model is mainly used to predict the memory of infectious diseases with latent period, which is consistent with the characteristics of COVID-19

Telecommunication data
Population mobility is the main factor in the development of infectious disease. OIDD data is used to calculate the frequency of population mobility and to optimize the prediction accuracy of the model

Authority epidemic data
Dynamic model describes the changing of the epidemic situation and provides a basis for epidemic prediction

Other Apps
During the period of isolation, different Apps were necessary to guarantee normality in the continuity of people's daily life. This included platforms for online queries, shopping, education, work and psychological intervention.

Hospitals in the cloud
There are 100 million cloud supervisors in China at the same time.

What is in the cloud?
- Hospital Information System (HIS), Laboratory Information System (LIS) and Image Archiving and Communication Systems (PACS)
- Database
- Auxiliary information systems (operation, resources, knowledge, financial management, customer service, including the queuing system)

Key points:
- Deploy the same type of services on different underlying servers

- Cloud servers
- Host database and timely data backup

Metrics:
- Availability, reliability, security

Benefits:
- Reduces local maintenance
- Accelerates application deployment

How does it shape our future?
- Exchange between hospitals: systems and data
- Potential standardization area: uniform interface and data format

OBSERVATIONS AND FACTS

Increasing demand for remote applications
- Top to business service: remote video applications
- Main emergency applications: hospital information system, online education
- Conference in the cloud: one month after its launch, more than 700,000 new users were registered and, on average, 90 conferences were held per day, 22.5 times more than previously
- 5G + applications: cloud supervisor, 5G + telemedicine
- Customer service (mobile application): online education, telecommuting

Network Flow: Increased Application Data
- 4G: daily average network traffic increased by 17.87%
- Video and image processing are the major driving forces
- Broadband: daily average network traffic increased by 22.61%
- Backbone network traffic: network traffic of an individual user has increased 18.11pp
- Wireless network access QoS: 97.10%, 0.60pp

Explanation and comparison
- Has the coronavirus broken the Internet? No
- Why? Because the maximum level of data consumption did not approach the limit of broadband networks. China has advantages in FTTH deployment and optical access networks. Persistent effort to build a network has been rewarded
- China Telecom continuously improves its broadband access
- 100Mbps is the reference bandwidth now. 100 (+) Mbps to the home accounts for 79.4%
- 509K BB subs is using Giga to home service

- Measures taken: regional construction of base station and optical networks to increase capacity

Other observations
- Roaming users and data volumes are falling
- SMS volume is decreasing, except public service SMS
- Increasing need for safety, VPN, remote access
- Need for online services and content delivery network
- Virtual servers in the cloud and use ratio increased
- Development of cloud computers and remote applications with new requirements
- More than 70 new applications were developed for different regions and industries