Applying Multi-modality Artificial Intelligence for Screening of Tuberculosis in a TB High-burden Large Rural Region in China

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Background and Challenge
- In rural area, although radiological equipment including DR and CT are widely available, it lacks of skilled radiologists to interpret radiographs for active and MDR-TB.
- Similarly, microscopy systems are also available but shortage of pathologists is even more serious.
- Use of multiple modality can improve the diagnosis accuracy but is challenging in rural area.
- Artificial intelligence can play very important roles for fast and early screening and diagnosis of TB.

Motivation Objectives
- ERASE TB is a high-burden large rural province affected by TB, Qinhai, to assist physicians in detecting TB in radiological and pathological images.

Technologies & Solutions

Deployment
Deployment Activities
Field Engineers travels mountain and river over thousands of miles to install AI automatically generate marks in image indicating different abnormalities.
Installation Steps of AI
1. Installation of Image Collector
2. Over 70 rural hospitals connected with ERASE TB networks
3. Training
4. Routine Usage
5. Al automatically generates marks in image indicating different abnormalities
6. Diagnostic reports [text] are also generated automatically based on AI performance
7. Diagnostic reports will be changed if doctor changes the marks on the image

Results of Usages
Within 8 months
- 70 rural hospitals and 1 central TB hospital connected with ERASE TB networks
- Over 8k adults have been processed by ERASE TB
- Analyze 20,000 ~ 30,000 each month to increase screening rate
- Increase detection rate by 20% compared to historical rate
- Alleviate the pain for the shortage of doctors
- Early detection of TB resulting in the detection of more MDR-TB
- In 10 sec, AI automatically screen 12 different abnormalities: TB, nodules, TB, infection,cardiomegaly
- AI automatically generate text
- 30~60 min for doctor to generate reports for patients

Summary & Conclusions
Within 8 months
- TB AI installed in central TB Hospital
- Time to identify 12 abnormalities and generate diagnostic reports from 1 image

Conclusions
- Large-scale routine usage of AI in China for TB screening
- AI can improve the performance to screen TB especially in the rural area where doctors are not enough
- Installation of multi-modalities will further improve the performance to identify more TB

Collaboration Organization