Automated Medical Image Analysis: A Clinicians perspective

Dr. Sunita Maheshwari
Chief Dreamer and Loop closer
Teleradiology Solutions
The Need
Increased Imaging for Chronic Diseases and Emergencies
Increasing Utilization of Imaging
Diagnostics

High speed, High resolution – More data, More images for analysis

By whom?
Global Specialists Shortage

Radiologists

- US – 1: 10,000
- Singapore – 1: 20,000
- Japan – 1: 35,000
- India - 1: 100,000
- Bangladesh – 1: 1,000,000
- Africa – Acute shortage
Teleradiology
A Technology cum Service Innovation
Phoenix, Ariz. November 7, 2016: Teleradiology Solutions (TRS), a global leading tele-diagnostic delivery company that is among the first teleradiology companies in the U.S. to be accredited by the U.S. Joint Commission (JC) accreditation for healthcare organizations, announced it was selected by Massachusetts General Hospital (MGH) in Boston, one of the top-ranked hospitals in the United States, to perform remote 3D post-processing services.
How can we make a Radiologist more efficient?

- Auto detect a lesion, pull up relevant priors and clinical history
- Measure the lesion, compare to previous scans
- Have a templated report ready

AVERAGE: ONE RAD CAN READ 6-10 RVU’S/HR

IF HE CAN READ 20 RVU’S/HR HALF THE SHORTAGE ISSUE OF THE WORLD IS RESOLVED
Auto-detection of Disease

• **Brain:** Bleeds, Strokes, Tumors
• **Bones:** Fractures, Tumors
• **Heart:** Coronary disease
• **Lungs:** Pneumonia, Cancer

• **AI onto PACS:** IBM/Merge, Philips, Agfa, Siemens, Zebra onto RadSpa

_Bengaluru:_ One of the facts that Prime Minister Narendra Modi signed with the Israeli government on Wednesday (July 5) has put in place a tie-up between Telerad Tech, an affiliate of Bengaluru-based company Teleradiology Solutions and Zebra Medical Vision, an Israel-based firm working on artificial intelligence. This deal between two healthcare companies in India and Israel aims to bring cutting-edge solutions to India, Asia and Africa. Artificial intelligence in radiology will allow automatic and intelligent detection of cancer, stroke, fractures and other medical conditions.

“Our company is proud to serve healthcare systems that treat millions of patients in over 30 countries globally,” said Dr Arjun Kalyanpur, founder of Teleradiology Solutions and Telerad Tech. This tie-up helps bring Zebra’s cloud-based deep-learning analytics engine to India, said Dr Kalyanpur. “Our focus has always been on high-quality radiology reporting. Zebra’s ability to produce and deploy artificial intelligence for radiology is the exact type of added value we hope to bring about to help fulfill our vision of impacting patient diagnosis and medical care in India, Asia and Africa,” he said. Tele-radiology Solutions serves healthcare systems that treat millions of patients in over 30 countries. In an email statement to TOI, Elad Benjamin, co-founder and CEO of Zebra said: “Our partnership with TRS will help us bridge the growing gap between demand and supply of radiology services, and allow developing healthcare economies to make a leap in their quality of care by using state-of-the-art deep learning technology.” Zebra, through its imaging analytics platform, allows healthcare institutions to identify patients at risk of disease, and offers improved and preventative treatment pathways to improve patient care. Headquartered in Kibbutz Shefayim, Israel, the company was founded in 2014.
AI is not just for radiology.....From Radiology to Pathology

Digital Slides: Auto Detect Malaria, Anemia, Leukemia and more
Neurology and AI: Strokes and more

- Auto reporting of EEG’s
- Report generation for review

**EEG REPORT**

Last Name: MINTAMBO  
Registration No: 351384  
Age: 14Y.

First Name: SAMWELI  
Sex: M  
Date:  
Doctor:  

Clinical History: C/O CHRONIC HEADACHE FOR 4YRS ASS WITH VOMITING, NOT ON MEDICATION

Master MINTAMBO SAMWELI was awake and cooperative during the EEG recording.

Findings:
The background shows alpha activity at 8-10 Hz in the posterior central regions and is responsive to eye opening.
Small to moderate amount of slow activity is seen in the background.

Paroxysmal activity: No focal or epileptic discharges are seen.

Hyperventilation: Shows physiological changes
Photic stimulation: Shows following responses

Impression:
This awake EEG record is within normal limits for the age.

Dr. Suresh Kodakara,  
MD (Internal Medicine), DM (Neurology), CON (US)  
Senior Consultant, Neurologist
Opthalmology

- Auto detection of diabetic retinopathy
Cardiologists and AI, Heart attacks and more

• Pedi cardiologist perspective: Can AI help me not miss a hole in the heart on echo?

Lessons learned from a series of patients with missed aortopulmonary windows.

Kiran VS¹, Singh MK, Shah S, John C, Maheshwari S.

• Auto reading of ECG’s, algorithm based MI detection—already in clinical use, saving lives; auto measurement of ejection fraction
You may ask: Are docs willing to work with AI or do we go straight to the patient with this?
We’re adaptable!
AI companies and algorithms

- Osteoporosis – an algorithm that receives CT Chest/Abdomen studies and delivers an alert if the data suggests low bone mineral density (osteopenia or osteoporosis)

- Emphysema – an algorithm that receives CT Chest data and delivers an alert if the data suggest emphysematous lungs.

- Compression Fractures – an algorithm that receives CT Chest/Abdomen data and delivers an alert if the data suggests a vertebral compression fracture.

- Malignant tissue - an algorithm that received 2D Mammography and alerts if suspicious malignant tissue if occurs.

- Algorithm that Detects Opacities on Xray Scans

- Xrays: Algorithms that auto detect fractures
Confused clinican?

• There is ‘AI’ on my workflow but will it pick up all the lesions or just alert on a few diagnoses?
• Different AI companies have different algorithms for different diseases? How do I access all of them on my one system?
• If AI is not 100%, if accuracy is 80%-should I trust it?

What taxes are scrapped by GST from 1st July 2017? Here is the list.
1. Central Excise
2. Service tax
3. Additional Customs Duty (CVD)
4. Special Additional Duty of Customs (SAD)
5. Central Sales Tax
6. Central surcharges and cesses
7. State Govt VAT
8. Octroi, Entry tax
9. Luxury Taxes
10. Tax on Lottery, betting/gambling
11. Purchase tax
12. Entertainment tax

Al feels like the 12 taxes!
Granted, we’re cautious

Can artificial intelligence replace human doctors? Most doctors say no
Don’t tell a Doctor AI will replace him...

It can help him avoid a miss, 1 less malpractice case

It can help him get more efficient and do more work in the same period of time

It can reduce physician stress (eg have priors ready, clinical history made available, comb through thousands of data sets) yet at the same time make his patient care superior

Tell him it will take him from human doc to...
We are not just Telemedicine providers or Scientists or Techies...
We are enablers of a better future of Patients and Doctors, Globally.

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