

# Joint AMS and JSPS symposium on medical imaging and artificial intelligence

Co-chairs

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# A Brief History and a Breakthrough

- ▶ 20 to 30 year history of machine learning and classification
  - ▶ Neural networks in the 1990's really didn't work in real applications
  - ▶ Then “Decision Trees”, “Random Forests”, etc etc
  - ▶ Radiologists and pathologists still safe!
- ▶ *“The major break through in science and technology in 2013”  
MIT Tech Rev*
  - ▶ Convolution Neural Networks
  - ▶ Back Propagation Algorithm
  - ▶ Large labelled data sources (including crowd sourcing of labels)
  - ▶ Highly Parallelised solvers (mapped on to GPUs)



# Successes

(Greenspan, van Ginneken, Summers, IEEE tMI 2016)

- ▶ Breast CAD
- ▶ Lung and Colonography CT CAD
- ▶ Chest X-ray
- ▶ Fracture Detection
- ▶ Stroke assessment
- ▶ ....

*“those who made horse-drawn buggies were not asked whether they liked the advent of automobiles” Forsting, JNM, Jan 2018*

*Radiologists and pathologists do need to be worried*

# Challenges and Opportunities

- ▶ Remaining technical challenges of which there many but progress is rapid
- ▶ Validation and responsibility

*Change the question: from “is there a spiculated lesion” to “what is the cancer risk and prognosis of this patient”.*

*If the system works what a fantastic opportunity to ask how?  
Generate the hypotheses for hypothesis driven science.*

- ▶ Who will own and control the development of the technology?
- ▶ Who will own and control the data needed to train the systems?
- ▶ How should the large publicly funded healthcare providers respond?