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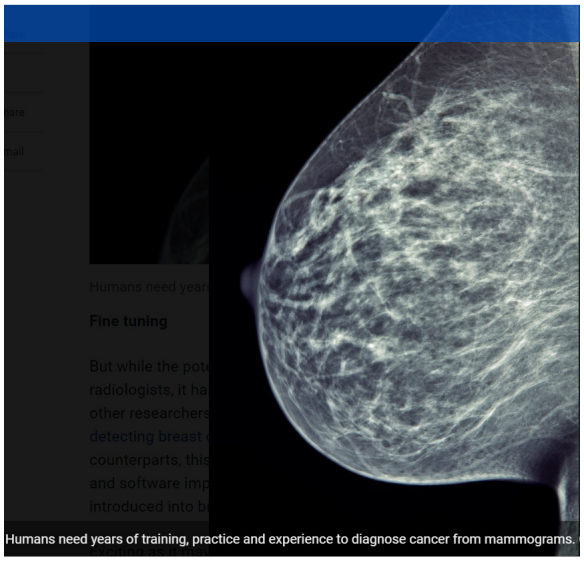
MSDS 480 (Fall 2019)

Value of Analytics – Use Case

Summary:

Application of artificial intelligence is evolution in the world of analytics. The main article reviewed here talks about compelling AI use case for breast cancer diagnosis as good as human experts. Breast cancer screening routinely includes a mammogram (X-ray of the breast). Reading mammograms is complex process and is normally performed by specially trained radiologists and radiographers. Every mammogram is read by two specialists, which can lead to potential delays in diagnosis if there is a shortfall in expertise. Their skills are vital to early detection and diagnosis of cancer. AI has huge potential in image recognition at the time of screening thereby reducing the dependency on already scarce specialists in this field and reduction in associated anxiety for the women who have been tested.

Some facts gathered from the article:

- Breast cancer is the most common cancer in the UK and accounts for 15% of all new cases.
- One in eight women will be diagnosed with it during their lifetime.
- Even with highly experienced practitioners reading and interpreting the mammograms, false negative rates – where cancers are incorrectly diagnosed or missed – are between 20 and 30%.
- 

- AI has already made substantial strides in cancer image recognition. In late 2018, researchers reported that one commercial system matched the accuracy of over 28,000 interpretations of screening mammograms by 101 radiologists. This means it achieved a cancer detection accuracy comparable to an expert radiologist.
- In another study led by the same researcher, radiologists using an AI system for support showed an improved rate of improved breast cancer detection – rising from 83% to 86% and it also reduced the time spent by radiologist on the screen to analyze an image.

It is as exciting as it may be to think that AI could be used to help detect such a prevalent cancer, public confidence and acceptance of technology need to be taken into consideration. With well tested and criticized models as described in the 2nd article, there is a tremendous opportunity for the delivery of radiology healthcare services, and ultimately the potential to detect more patients with breast and other cancers.

Discussion

While the AI system discussed here for diagnosing breast cancer is still in research phase, this is very compelling use case in my POV because it adds immense value to social cause and human life. One in eight women getting diagnosed with breast cancer in their life time is heart touching story and any efforts to augment the screening quicker and more accurate without human bias and errors (sensitivity or specificity of the reader) is certainly a high value addition. For example, quickly flagging the images as suspects can intervene specialists to take closer look at the image to provide complete diagnosis. It can also be used in the scenario where human expert diagnoses cancer but could not read the type and characteristics of the tumor with naked eye, so the AI system can augment the expert's knowledge to characterize and estimate severity of tumors. The article claims that one commercial system achieved a cancer detection accuracy of an expert radiologist by learning from 101 radiologists interpretations of mammograms. The 2nd article presents a scenario where the machine learned from X-rays to be an expert, but it also got fooled by edges of the images. AI systems have promise and potential in medical care, but the algorithms should get enough tested, attain public confidence before putting it into practice. While I believe that human experts can never be replaced with machines in medical care due to associated cost of

action (human life at stake), augmenting their ability to catch features from images where human eye has hard time perceiving can avoid costly mistakes (false negative rates). It is also equally important to avoid misuse of these algorithms, for example a health insurer using this system to make decisions about whether to pay for medical care.

References

1. Breast cancer diagnosis by AI now as good as human experts: https://medicalxpress.com/news/2019-04-breast-cancer-diagnosis-ai-good.html
2. How Can Doctors Be Sure A Self-Taught Computer Is Making The Right Diagnosis?: https://www.npr.org/sections/health-shots/2019/04/01/708085617/how-can-doctors-be-sure-a-self-taught-computer-is-making-the-right-diagnosis