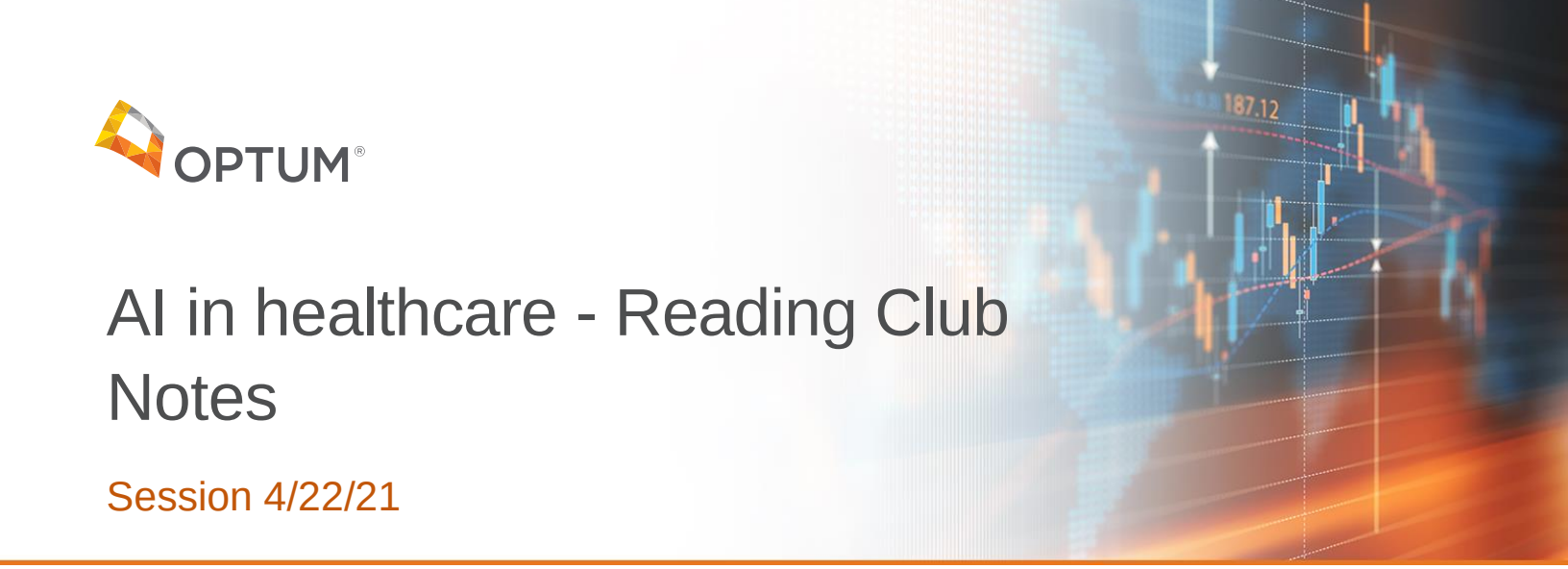

AI in healthcare - Reading Club Notes

Session 4/22/21

What we read:

Why does deep and cheap learning work so well?*

https://arxiv.org/pdf/1608.08225.pdf

Who Participated:

Jayanthi Suryanarayana, Ahmet Dokumaci, Sowmya Polavarapu, Kyle Knudson, Alfredo De Los Reyes, Padmavati Bolaram, Christopher Cleveland, Phelan Niamh

What was the paper about?

Systematic analysis to understand expressability and efficiency of deep neural network which is used for function approximation in all industries. Through well understood principles of Math and Physics, this paper analyses concepts that can help explainability context opening up the black box of DNN to see what is inside - glass box

How is it relevant:

Deep Learning Networks lack full understanding like GOFAI (Good Old-Fashioned AI). They are understood more heuristically. Understanding what kind of mathematical functions are well represented by DNN and their computational complexity using fundamental principles will help in deep understanding DNN architectures. Lower order polynomials, with locality achieved through activation functions are usually well modelled with DNN.

What themes were discussed:

- Mathematical ideas relevant for DNN:
- Powers and logarithms – To simplify from exponents to linear
- Locality, standard transformations – simple functions (sigma, SoftMax)
- Bayes Probability
- Math/Physics terminology for same concepts
- How many data scientists achieve cool things in just Excel

Key Takeaways:

- For AI device developers: Able to better understand the expressibility and compute/parameter cost
- For Product Managers: Better understand explainablility in the products being built
- Regulatory Implications: Can help in submission if we can explain the function implementation

Other References in the discussion:

https://www.darpa.mil/attachments/AIFull.pdf