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Translating AI's in Pediatric Radiology

Ananth Annapragada is Professor of Radiology, Director of Basic Research and Vice-Chief of Research in the Edward B. Singleton Department of Radiology at Texas Childrens Hospital and Baylor College of Medicine. Previously, he was the Robert Graham Professor of Entrepreneurial Biomedical Informatics and Bioengineering at the School of Biomedical Informatics at the University of Texas, Health Sciences Center at Houston. He holds additional positions at the Keck Institute and The University of Houston.

An engineer by training, Ananth received his Ph.D. in Chemical Engineering from The University of Michigan in 1989. After Post-Doctoral Fellowships at the University of Minnesota and MIT, he joined Abbott Laboratories as a Research Scientist in 1991. In 1996, he joined SEQUUS Pharmaceuticals, Menlo Park, CA. He stayed with SEQUUS through its merger with ALZA, and when ALZA was acquired by Johnson and Johnson, he left for his first Academic position in 2000, at the Cleveland State University and Cleveland Clinic Foundation. In 2003, he moved to UT. He moved to TCH in June 2011.

Ananth's research interests are in the development of nanomaterial based solutions to medical and imaging problems. Some examples of his work in the field are the development of novel nanoparticle contrast agents for both CT and MR, "Intelligent" nanostructures for glucose responsive insulin delivery, and targeted nanostructures for imaging and therapy.

Ananth is a co-founder of several biotech companies based on research originating in his laboratory, including Marval Inc., Sensulin LLC (Oklahoma City, OK) and Alzeca Inc. (Houston, TX). He serves on the Board and the Scientific Advisory Board of Alzeca, in his role as Chief Scientist. He is also on the Scientific Advisory Board of Sante Ventures a VC firm based in Austin TX, with ~$2B under management.

Abstract: The advent of readily available convolutional neural networks and high-powered GPU's has triggered a revolution in AI applications, and the field of Radiology, with its reliance on image recognition, has become the perfect target for powerful AI's. The FDA has in turn rapidly rolled out guidance for the development of Radiology AI's, and a large number of companies have populated the space: the 2019 RSNA meeting featured ~180 companies exhibiting Radiology AI products, and the 2020 meeting is anticipated to double the size of that roster. Showcased products include tools for patient positioning, image acquisition parameter optimization, probe positioning, image reconstruction, dose reduction, image interpretation and tentative diagnosis.

Paralleling these rapid developments is the increasing recognition of the importance of valid data to train AI's. Factors of local relevance need to be incorporated, a particularly difficult task when training algorithms for broad general applicability across the country or the globe. One therefore anticipates the need for local training and optimization of pre-trained algorithms. The critical nature of both the algorithm and the training data raises the question of who actually owns the final trained algorithm.

In this presentation, I will describe the development and testing of several home-built algorithms, and explore the issues involved in deploying hybrid home-built and commercially sourced algorithms in a clinical environment.