A3D3 Y1 EPO Report

Prior to the A3D3 Kick-off Meeting in Nov 2021, we organized a four-week series of familiarization talks on each of the core science areas of A3D3 – HEP, MMA, Neuroscience, and HAC – to help educate the A3D3 team on the general problems in these that A3D3 would address. These were led by the respective area leads: Michael Coughlin (MMA), Miaoyuan Liu (HEP), Amy Orsborn (Neuro), and HAC (Pan Li).

The A3D3 Seminar Series is a monthly online seminar given by an expert in their respective field on a topic which aligns with A3D3 interests. The seminars have a biannual cycle through the four core science focuses of A3D3 – HEP, MMA, Neuroscience, and HAC – with a general topic of interest in the fifth month and then a Distinguished Speaker in the sixth. The talks are also recorded and posted to the A3D3 YouTube channel for general access (https://www.youtube.com/channel/UCozE47hFawTUb4lUhYlQNIQ with 50 subscribers). The first set of seminars have been:

Date	Speaker	Affiliation	Area	Seminar Title
Feb 2022	Kyle S. Cranmer	NYU	HEP	Acceleration Simulation-based Inference
Mar 2022	Ashley Villar	PSU	MMA	Time-Domain Astrophysics in the Era of Big Data
Apr 2022	Anqi Wu	Georgia Institute of Technology	Neuro	Understand The Brain Using Interpretable Machine Learning Models
May 2022	Zhiru Zhang	Cornell	HAC	A Pursuit of Efficient and Accurate Binary Neural Networks
Jun 2022	Georgia Karagiorgi	Columbia	General	Machine Learning for Discovery with Particle Imaging Detectors
Jul 2022	TBA	TBA	TBA	TBA

Attendance has varied between 50 and 100 participants in the live seminar with another 30-50 views currently on the YouTube channel.

A3D3 members have developed and taught a number of undergraduate and graduate-level courses this year on generic data science as well as more focused material on specific subdomains, e.g., Mark Neubauer's course at UIUC on "Data Analysis and Machine Learning Applications" and Michael Coughlin's course at the University of Minnesota entitled "Big Data in Astrophysics". We are gathering the syllabi, course materials, and data sets from all of these to identify commonalities and support synergistic activities in subsequent years, such as the development of a community repository for data science curricula to enable the easier development of new courses and the production of golden data sets for community usage and the assessment of different machine learning algorithms using them.

We are also engaging in similar collations of tutorials for specific packages, e.g., HLS4ML, and relevant white papers to assist in the development of more specific education activities, such as week-long bootcamps and workshops.

A3D3 members have been participating in a Snowmass 2021 white paper on "Data Analysis and Machine Learning in Education" for the Proceedings of the US Community Study on the Future of Particle Physics.

A number of A3D3 institutes are supporting summer undergraduate research projects on A3D3-related topics: for example, Matthew Graham at Caltech has a summer student working on hardware accelerated inferencing for real time astronomical alerts using edge TPUs.

The University of Minnesota (A3D3 Lead: Michael Coughlin) has an ongoing partnership with Galtier Elementary, a local elementary school in St Paul, Minnesota. The group is working with Peter Ratzloff, the science teacher at Galtier, to incorporate real astronomy in classes spanning K – 5. For example, a 3rd Grade class put together telescopes earlier this year and these will be used to observe the sky at later dates.