AI Foundation Models: More than just cheating on homework

Michael
Little
LS Technologies LLC for NASA
Dr. Madhulika Guhathakurta, NASA Headquarters
Dr. Jacqueline Le Moigne, NASA Advanced Information Systems Technology Program

Oral

Advanced AI constructs, such as Foundation Models (FM) and Digital Twins (DT), offer considerable opportunity to accelerate scientific discovery. The key issue in the cost-benefit analysis is the extent to which they are re-usable by other scientists for validation and then for scientific investigations. They also require careful design and construction and, most importantly, thorough and thoughtful validation. NASA conceives of these constructs almost as instruments enabling domain scientists to conduct investigations that were not previously possible. The objective is to permit such tools to be used by scientists who understand the basic functionality and have confidence in them due to the validation program. This is similar to the way a new instrument is added to the fleet. To be useful, an FM or DT requires thoughtful design both to make them easy to use, but also to impose guard rails on their use to within known boundaries. As has been demonstrated with Chat-GPT, FMs can be used for good, for bad and for stupid objectives. The ability of FMs and DTs is being demonstrated to make important contributions to human understanding of the world around us, but need guard rails to be used within those design limitations. This talk will focus on some important applications in scientific discovery and how NASA and its collaborators are using FMs and DTs to advance and democratize science and will hopefully lead to a vigorous discussion.

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