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AI in the Sky: The Application of Artificial Intelligence to Cosmological Questions

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The increased availability of large data sets and advancements in artificial intelligence algorithms have revolutionized the role of data across industry, society, and the sciences. In the last few years, it has had substantial impact on molecular chemistry, particle physics, and more recently astronomy. AI (e.g., machine learning) is more than likely here to stay, and it has the potential to transform our approach to modeling cosmological and astrophysical data. But, what are these algorithms doing, and what are the critical barriers to enabling their highest impact on science? We'll discuss these topics in the context of modern astronomical surveys, which provide data sets that are unprecedented in size, precision, and complexity. In particular, recent work on the application of convolutional neural networks to strong gravitational lensing, the cosmic microwave background, and cosmological simulations point to the long-term promise for deep learning and its utility in answering fundamental questions about the universe.