A 5-week lecture series on Deep Learning and Physics

Date & Time:
Every Thursday from March 30 to April 30 at 12:30 PM to 1:30 PM

Location: Conference Room 1400 (First Floor, Integrated Science Complex), Next to Starbucks

Who & how to join:
Anyone who is interested can join by simply coming to attend lectures. You don't have to register anywhere.

Abstract:
Machine Learning (ML) has recently taken the world by storm, proving its immense capabilities for business, scientific, and individual purposes. In this mini course, we will discuss the use of ML techniques in physics and related fields. We will begin by introducing the basic building blocks of deep learning followed by an overview of more recent "architectures" and learning algorithms developed by the AI engineering community. We will then take a whirlwind tour of recent breakthroughs in the application of ML to diverse areas such as theoretical physics, experimental biology, astronomy, pure math, and more.

Secondly, we will introduce reinforcement learning (RL), a powerful method for tackling sequential decision-making problems. Originally inspired by the psychology of behavioral learning in animals, the computer science community has paired RL with the tremendous successes of deep learning to provide useful tools for real-world problems. RL is now a rapidly growing field with wide applications such as solving problems in geometry optimization, drug dosing, playing board-games, robotics, and quantum control. After displaying such results on the use of deep learning for the physical sciences, I will conclude the course with a brief outline of how physics is being used to better understand the successes of machine learning.

I hope to answer the following questions throughout the course:
- What is machine learning, deep learning, and reinforcement learning?
- What are the basic algorithms used in these fields?
- How can ML and RL be applied to physics-related (i.e., your research) problems?
- What can physics do for AI?

Instructor:
Jacob Adamczyk (PhD Candidate, Applied Physics)
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