Intro to Machine Learning with JAX

September 15, 2021 / 7:00 PM - 8:00 PM ET

Description

Machine Learning is changing the world, powering breakthroughs in fields as diverse as genomics, self-driving cars, physics simulations, and so on. JAX is a library that was designed to make these cutting-edge techniques easy to implement and experiment with. In this workshop, we'll explore JAX's most powerful feature (function transformations) and how they make machine learning simple and accessible.

Learning Outcomes

The goal of this workshop is to learn how to construct these models from scratch (and hopefully, explore that they are actually quite simple at heart). Specifically, there are two lessons you will hopefully take away from this workshop:

- JAX is *very* similar to NumPy, allowing you to turn intimidating looking math into easy-to-read code.
- JAX's function transformations allow us to convert ordinary math functions into full-scale machine learning models.

Prerequisite Knowledge

In order to get the most out of this workshop you should be comfortable with the following concepts:

- Python: Functions, NumPy arrays
- Math: Fitting a line to data (linear regression), Derivatives

We only expect *conceptual* understanding of these concepts (we won't be writing super-complex Python code, nor doing any math by hand). We're here to support you, and if you'd like to review, check the "Additional Resources" section!

Pre-Workshop Checklist

Before the workshop, please make sure you complete the following items:

- Not much, actually! Just make sure you have a stable internet connection. We'll be using a Google Colaboratory notebook to get some real-time practice with coding. This runs fully in the browser, so no prior setup is required.

Timeline (1 hour)

Time	Module	Description
5 min	NumPy, meet JAX	Quick review of NumPy, and how JAX's syntax differs (actually, doesn't) from NumPy.
20 min	Function Transformations	Explore how function transformations allow us to "remix" functions into doing new things.
15 min	Fit a line to data, Pt. 1	Many machine learning tasks, at core, involve "fitting a line to data". We look at the simplest case, which is fitting a straight line to 1D data.
10 min	Fit a line to data, Pt. 2	Real world datasets generally have more than one input. How should we expand our model to account for this?
10 min	Q/A and wrap-up	Open the workshop to a Q/A, both about the content of this workshop, and next steps to continue learning.

Workshop Lead Contact

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Additional Resources

Hack the North Resources

Hack the North 2021 Event Schedule

Check this out to stay up-to-date on activities, workshops, and other key happenings this weekend.

Workshop-Specific Resources

NumPy: the absolute basics for beginners

A great resource to get started with NumPy. For this workshop, the “Basic array operations” section is particularly relevant.

Derivative as a concept

This Khan Academy video covers derivatives as a concept; this is all we’ll need for the workshop, we will *not* be computing these by hand.

Estimating with linear regression (linear models)

This Khan Academy video provides a good conceptual introduction to the “line fitting” problem we’ll be using as an example.