

Notes from AMORE meeting 5

Dan Kelley (he, him)

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Summary

The main topic was AI (artificial intelligence). interface) for R.

The main topics were as follows.

1. AI in the news (note the name “Hinton”).
2. Concept of neural networks.
 - A two-photon neuron animal trying to detect which direction is “up”. Notation: $bias + weight * signal$ ($y = b + w * x$). Idea: finding minima by Nelder-Mead (“simplex”) method is much faster than a grid search, but knowing derivatives enables even faster results.
 - Extension to a 4-pixel “eye”.
 - Extension to images (e.g. Video Plankton Recorder images).
 - The prime importance of Rumelhart et al. (1986). And note the second author, very much in the news these past weeks.
3. The zipcode example from Chollet et al. (2022).

Plans

From now on, AMORE meetings will be on an as-requested basis. If there is a topic you would like to see addressed in a future session, please visit the website (<https://www.github.com/dankelley/AMORE>) and post an “issue”. Also, please be sure to “watch” this repository (see the top-right of the webpage) so you’ll notice when things get posted.

Resources

This directory holds the code for the zipcode example, plus a PDF that DEK created from his Zotero database of items he tagged as “AI”. Here are some highlights.

- The seminal Rumelhart et al. (1986) paper is an excellent place to start, if you want to explore the mathematics behind the algorithms.
- There is a lot to read but if you want to read as you also learn the practicalities, the Chollet et. al. 2022 book is wonderful resource. (The first author created Keras, a key software system for AI work.)
- The blog posting Rubiera provides a fascinating view of the protein-shape application, as well as painting a picture of how exciting AI is, in just this one of very many fields. Unlike many things in research, the excitement is not faked just to get funding.

Followup

As a followup to the meeting, I added code (in file `mnist/03_examine_ones.R`) that plots all the “1” images from the training set. I also made a short video about this, and placed it here:

https://www.dropbox.com/s/qfl136swz0jucb2/amore_meeting_5_followup.mp4?dl=0