Weekly Guides

In additions to material on the D2L, one should consult & read the chapters from the class textbook, Recurrent Neural Networks: from simple to gated architectures and the online textbook at http://deeplearningbook.org.

Week 1 (Aug. 31-): Overview & videos, MSU gitlab & (MSU/) Piazza setup

Week 2 (Sept 6-): Simple intro to Architectures &(Stochastic) Gradient Descent (SGD). Reading from Part I (Class Textbook & online textbook) & videos. Also, begin exposed to Google Colab and Google Cloud Engine (GCE) tutorial(s) on D2L. For the class, you may use Colab (it is easier) and/or GCE (with much broader capabilities).

Week 3 (Sept 12-): Reading from Part I in textbook and view videos. Reading from (online) Chapter 6-7—Feed-forward Neural Networks. Exploring Keras 2.0 using Google Colab (option 1, recommended) and/or Google GCE (Option 2 or if you are computing/coding comfortable).

Week 4 (Sept 19-): Reading Part I from textbook and from online, Part I (chapters 2-3). Learn about Principal Component Analysis (PCA) and Information theoretic measures, including, Independent Component Analysis (ICA). (These techniques may play a role in (i) data preprocessing, (ii) provide unsupervised losses for hidden layers, and (iii) general unsupervised learning for all layers). *Video lectures are added to support the lecture notes. Read class notes, relevant sections of Part I (in the online book, deeplearning.org), then follow the video at your favorite speed [;)].*

Week 5 (Sept 26-): Introduction/Transition to Convolutional Neural Networks (ConvNets). Notes show a transition of the exposition from FFNNs to ConvNets. See video. Mini-poject #1 is issued. You should readup about the “Sequential()” model , or the API model, in Keras.20 to help with your Mini-project #1. Please note Mini-project #1 is typically done within this week. However, the deadline is set for about 2 weeks to give you ample time to work out the computational exposition. Next mini-projects will be have normal durations of 10 days.

Week 6 (Oct. 3-): We transition to an introduction to (simple) Recurrent Neural Networks (sRNNs) and their associated Backpropagation Through Time (BPTT). The presentation is in terms of the “unfolding” of an RNN to mimic a Feedforward Neural Networks. Mini-Project#1 is due end of this week period.

Week 6R (Oct. 10-): Review Week 6 Folder on Simple Recurrent Neural Networks. Mini-Project 2 issued by end of this week—due on Sunday, Oct. 23, 2022 by mid-nite.

Week 7 (Oct. 17-): Folder Week 7. Expand on Recurrent Neural Networks (RNNs) architectures to overcome limitations of “learning via training” of sRNNs. We introduce the workhorse of RNNs, called Long Short-Term Memory (LSTM) RNNs which incorporate gating signal pathways

in order to enable successful “learning via training” benchmark sequence-to-sequence applications: (movie reviews) sentiments, News classifications, Language translations, etc.. Then we describe two main architectural simplifications to eliminate “redundant” gating signals, and thus reducing the overall number of parameters to be “trained.” —Mini-project 2 is due on Oct 23, 2022 by mid-nite!

Week 8 (Oct. 24-): Reduced-parameters Recurrent Neural Networks: Slim LSTM RNNs, etc.

Week 9 (Oct. 31-): Final Project begins and reviews

Week 10 (Nov. 7-): Final Project Discussion & Guidelines. View Presentation on Intro Reinforcement Learning (RL)-- optional. RL is not required for this course.

Week 11 (Nov. 14-): Final Project Discussions, Q & A—during Zoom Office hours

Week 12 (Nov 21-): Final Project Discussions, Q & A—during Zoom Office hours

Week 12 (Nov 28-): Final Project Discussions, Q & A—during Zoom Office hours

Week 12 (Dec 5-): Final Project Discussions, Q & A—during Zoom Office hours

Week 13 (Dec 12-): Final Project Presentations & Final Report (tentatively, on Monday, Dec. 12, 2022)