HANDOVER

In this document I will briefly go over the python scripts that I will be handing over after the final presentation, by listing and describing the contents of the four main directories in the folder titled "Matteo_Pearce_EXTRA_METRICS" which will have been uploaded to the google drive created by Tian at the start of the internship.

Python code:

This is split into three separate folders:

- Metrics:
  - *shannon_entropy_V15:* Python script for calculating Shannon Entropy of an untrained ESN.
  - *Memory_capacity_V2:* Python script for calculating N^{th} Order Memory Capacity of an ESN with a basic training step comprised of a random input data stream.

- Tools:
  - *GenDatasets_V7:* Python script for calling metric scripts and performing parameter sweeps of primary ESN parameters:
    - Node count
    - Leak rate
    - Spectral radius
    - Connectivity
    - Input scaling
    - Input connectivity

    As well as any metric related parameters (for example history length, if calculating the entropy). These datasets are saved in .JSON files, which can then be read and plotted by another script.

  - *Heatmap_V3:* reads from .JSON as formatted by *GenDatasets_V7* and plots a heatmap of the data.

- Adjuncts:
  - *ESN_Maker_V3:* Python class for easy instantiation of untrained ESNs with default parameters, created for use with *GenDatasets_V7*, *shannon_entropy_V15*, *Memory_capacity_V2*.
  - *Useful_Funcs_V4:* Python script with a few useful functions for printing to console during testing. It is unessential and can be omitted entirely, without consequence.

- Outdated:

    Contains older versions of *GenDatasets, shannon_entropy, memory_capacity* and others, which were used for generating the bulk of the data contained in the test results folder.

Every python script will share its directory with an “archive” folder containing all previous iterations, purely for accountability. None of these will work as intended, for working older scripts see the outdated folder.

Executables

Contains an executable icon and accompanying directory for *Heatmap_V3, Heatmap_V1* & *Plot_XY* (the latter two will be in “Python Scripts >> Outdated”) to allow non-programmers to use the plotting tools.

Test Results

A large database of Shannon entropy and memory capacity calculations in relation to ESN parameter sweeps. There are two folders, legacy and current. The legacy directory is organized into four folders, two with single parameter sweeps, and two with two parameter sweeps:

- *Shannon_Entropy_Sweeps*: single parameter, plot with *Plot_XY*
- *Shannon_Entropy_Sweeps_2D*: double parameter, plot with *Heatmap_V1*
- *Nth_Order_Memory_Capacity_sweeps*: single parameter, plot with *Plot_XY*
- *Nth_Order_Memory_Capacity_sweeps_2D*: double parameter, plot with *Heatmap_V1*

The current folder is for use with *Heatmap_V3*, and is intended more as an example of functionality, as the sweep steps are quite large.

Documentation

Self-explanatory, also contains a readme with a list of all the python library versions used.

For any questions relating any of the above, you can contact me by email at:

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