User Guide

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We will explain how to use the proposed SQUARE-Mamba algorithm to solve the drought forecasting (DF) problem. Note that the proposed DF results are computed using SQUARE-Mamba (i.e., mode=0). However, if you are unfamiliar with the implementation of the quantum neural network (QNN), you may alternatively use the classical model (i.e., mode=1), which is SQUARE-Mamba without the quantum local temporal encoding module (QLTEM).

Requirements (Tested under Python 3.10.13 and CUDA 11.6 under Linux OS)

- MATLAB: R2023a

- torch: 1.13.1+cu116

- scipy: 1.13

- einops: 0.8.0

- pytz: 2024.2

- pennylane: 0.38.0

- transformers: 4.45.2

- causal_conv1d: 1.1.1

- mamba_ssm: 1.1.1

Run the demo code

Modify "whichcase" in "demo.m" to select your preferred mode (e.g., mode=0 or mode=1), then run the script to evaluate its quantitative and qualitative performance.

Train and test the model using your own dataset

The "main" folder provides two models, including SQUARE-Mamba (with QLTEM) and SQUARE-Mamba without QLTEM. Depending on your needs, you can choose to train the model using either:

- "train_SQUARE_Mamba.py" (for SQUARE-Mamba with QLTEM);

- "train_SQUARE_Mamba_wo_QLTEM.py" (for the classic model without QLTEM).

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To train the model with your own data, please replace the time series data in the "CRU_data" folder and then run the selected script. After training, you can evaluate the model's performance using "demo.m".

Citation

If you find our work useful in your research or publication, please kindly cite our work:

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