

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 DF results can be computed using SQUARE-Mamba (i.e., mode=0). 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: 1.13.0+cu116
- scipy: 1.14.0
- einops: 0.8.0
- pennylane: 0.38.0
- 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).

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”.

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