Name of software: Pycharm

Developers: Weiwei Gu and Gang Li

Contact: gangli\_rcee@163.com

Date first available: April 5, 2024

Software required: Windows

[Program language](https://track.editorialmanager.com/CL0/https:%2F%2Fnam11.safelinks.protection.outlook.com%2F%3Furl=https%253A%252F%252Fwww.sciencedirect.com%252Ftopics%252Fcomputer-science%252Flanguage-program%26data=05%257C02%257Cm.aggarwal1%2540elsevier.com%257C65d8706a30374a74372f08dce8c8d10d%257C9274ee3f94254109a27f9fb15c10675d%257C0%257C0%257C638641196406366794%257CUnknown%257CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%253D%257C0%257C%257C%257C%26sdata=3ayW4FT6NQE4teD8Gm0Xk%252FkxpXiSRQ279x%252BJ1UTm7AE%253D%26reserved=0/1/010f01931185f4cb-f9a1db7f-bafa-496a-812b-ac4bba2aae0a-000000/fTfhAnr0H8wSpsxDviMK_CrYpTHr5HYa8MdtQALp8v8=184): Python

Source code at: <https://github.com/BYU-Hydroinformatics/api-nwm-gcp>

Documentation: Detailed documentation for application installation, testing, and deployment can be found at [https://github.com/BYU-Hydroinformatics/api-nwm-gcp/blob/main/README.md](https://track.editorialmanager.com/CL0/https:%2F%2Fnam11.safelinks.protection.outlook.com%2F%3Furl=https%253A%252F%252Fgithub.com%252FBYU-Hydroinformatics%252Fapi-nwm-gcp%252Fblob%252Fmain%252FREADME.md%26data=05%257C02%257Cm.aggarwal1%2540elsevier.com%257C65d8706a30374a74372f08dce8c8d10d%257C9274ee3f94254109a27f9fb15c10675d%257C0%257C0%257C638641196406409878%257CUnknown%257CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%253D%257C0%257C%257C%257C%26sdata=Oj7RrKBrGNIqOvnsYCTdu0QyYn2mtdaHNlCodys0lzQ%253D%26reserved=0/1/010f01931185f4cb-f9a1db7f-bafa-496a-812b-ac4bba2aae0a-000000/6eNlyemrGX-O8niRdzAVH4eJ00GJt2ywRvZc9yKsQX8=184)

Name of software: Pycharm

Developers: Weiwei Gu and Gang Li

Contact: gangli\_rcee@163.com

Date first available: November 10, 2024

Software required: Windows

Program language: Python

Source code at: <https://github.com/GL-0701/TimeGAN-LSTM>

Documentation: Detailed documentation for application installation, testing, and deployment can be found at https://github.com/BYU-Hydroinformatics/api-nwm-gcp/blob/main/README.md

Data required for local installation and use of software is accessed through the cloud. See Data Availability Statement.

1. Environment configuration: The environment and installation packages required for project operation can be found at requirements.txt.

2. Data description: The data folder contains three datasets (ori\_data.csv, wq\_data\_0.7.csv, wq\_data\_0.8.csv). The ori\_data.csv represents all of the datasets used for the research, the wq\_data\_0.7.csv represents the 70% of the datasets used for the data generation, and the wq\_data\_0.8.csv represents the 80% of the datasets used for the data generation. Users can alternate their own datasets for the specific research.

3. Data generation module: Use the main\_timegan.py to achieve data generation, and then the generated data is saved in the generated\_data.npy.

4. Visualization module: Use the visualization module to perform PCA and t-SNE analysis between qriginal data and synthetic data.

5. Prediction module: Use TimeGAN-LSTM to add different proportions of the synthetic data for LSTM model training and prediction. The prediction results during training period and testing period are saved in 0T\_train.csv and 0T\_test.csv, repsectively.

6. Data supplement: Since we have no permission to disclose the original water quality monitoring data in public, the water quality data provided in this project folder were multiply by a certain scale. The specific value of the certain scale can be required by contacting the gangli\_rcee@163.com.