Data and Codes for “A Case Study of Space-time Performance Comparison of Wind Turbines on a Wind Farm”

1. Computer and software environment

**Hardware and Operating System:** Any operating system capable of installing R software (Windows/MacOS/Ubuntu etc.) with a recommended RAM of 4 GB or above.

**Software used:** R  (https://www.R-project.org/)

**Required R package:** DSWE version 1.2 or above available at:  https://github.com/TAMU-AML/DSWE-Package

2. Explanation of the header of the data files

| Header name     | Meaning                                                                 |
|-----------------|-------------------------------------------------------------------------|
| time_stamp      | Time stamp.                                                             |
| wind_speed      | 10-min average wind speed, in unit of m/s                                |
| wind_direction  | 10-min average wind direction, in unit of degree                        |
| ambient_temp    | 10-min average ambient temperature, in unit of °C.                     |
| terrain         | Terrain complexity classification. An integer. Not used.               |
| active_power    | 10-min normalized power output, between 0 and 1.                       |
| sd_wd           | 10-min standard deviation of wind direction, in degrees.               |
| turbulence_intensity | 10-min turbulence intensity.                                    |
| X-coordinate*   | The anonymized horizontal coordinate value of a turbine               |
| Y-coordinate*   | The anonymized vertical coordinate value of a turbine                 |

*Note: These values maintain the relative positional accuracy between turbines.*

The datasets used in Section 4.1 are from https://aml.engr.tamu.edu/book-dswe/dswe-datasets/, the Turbine Upgrade Dataset. The data files are explained in the Datasets Description file on the same website.

3. Reproducing the results in the paper

[Dataset4 comprises a total of 66 files. The Dataset4 is not yet approved by the data owner for public release. We are sorry for the inconvenience.]

| Which results to reproduce | Data File | Code File  | Output                             |
|----------------------------|-----------|------------|------------------------------------|
| Table 2                    | Dataset1.csv | Code_Table2.r | The two column values in Table 2   |
| Table/Figure | Dataset(s) | Code | Description |
|-------------|------------|------|-------------|
| Table 3     | Turbine Upgrade Dataset(Pitch Angle Pair, Table7.3).csv | Code_Table3.r | The two rows of “Our estimate” and “Our estimate/\( r’ \)” in Table 3. |
| Figure 3    | Dataset2.csv | Code_Figure3.r | The six plots, in one PDF file |
| Figure 4    | Dataset3_1.csv, Dataset3_2.csv | Code_Figure4.r | The two plots, in one PDF file |
| Figure 5    | Dataset4.csv | Code_Figure5.r | The boxplots, in one PDF file |
| Figure 6    | Dataset4.csv | Code_Figure6.r | The boxplots, in one PDF file |
| Figure 7    | Dataset4.csv, Dataset_location.csv | Code_Figure7.r | Four PDF figure files, corresponding to Figure 7a, 7b, 7c, 7d, respectively |
| Figure 8    | Dataset4.csv, Dataset_location.csv | Code_Figure8.r | Four PDF figure files, corresponding to Figure 8a, 8b, 8c, 8d, respectively. |
| Figure 9    | Dataset4.csv, Dataset_location.csv | Code_Figure9.r | Four PDF figure files, corresponding to Figure 9a, 9b, 9c, 9d, respectively. |