This paper presents the data that is used in the article entitled "A Multi-Hazard Approach to Assess Severe Weather-Induced Major Power Outage Risks in the U.S." (Mukherjee et al., 2018) [1]. The data described in this article pertains to the major outages witnessed by different states in the continental U.S. during January 2000–July 2016. As defined by the Department of Energy, the major outages refer to those that impacted at least 50,000 customers or caused an unplanned firm load loss of at least 300 MW. Besides major outage data, this article also presents data on geographical location of the outages, date and time of the outages, regional climatic information, land-use characteristics, electricity consumption patterns and economic characteristics of the states affected by the outages. This dataset can be used to identify and analyze the historical trends and patterns of the major outages and identify and assess the risk predictors associated with sustained power outages in the continental U.S. as described in Mukherjee et al. [1].

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Specifications Table

| Subject area | Risk and reliability |
|--------------|----------------------|
| More specific subject area | Major power outages, Severe weather-induced outages, Natural hazards, Electricity service reliability |
| Type of data | Table, Excel file |
| How data was acquired | Using different publicly available datasets such as: (i) OE-417 form Schedule 1 published by DOE’s Office of Electricity Delivery and Energy Reliability [2] (ii) U.S. Energy Information Administration (EIA) [form EIA-826 and EIA-861] [3]; (iii) National Oceanic and Atmospheric Administration (NOAA) and National Climatic Data Center (NCDC) [4]; (iv) U.S. Department of Labor; Bureau of Labor Statistics [5]; (v) U.S. Census Bureau. |
| Data format | Raw; Aggregated, Filtered |
| Experimental factors | Not applicable |
| Experimental features | Statistical analysis of the data leveraging a hybrid classification-regression model to identify and estimate the influence of various predictors attributing to increased risk of sustained power outages |
| Data source location | All the states in the continental U.S. |
| Data accessibility | Data is available within this article in the link provided |

Value of the data

- This dataset serves as a rich repository of various information related to the major outage patterns, and characteristics of the states in the continental U.S., including their climate and topographical characteristics, electricity consumption patterns, population, and land-cover characteristics.
- This data provides valuable information that can be used to conduct future research in various paradigms, such as—state-level power outage risk maps for the continental U.S., predicting demand load loss, analyzing vulnerability of the U.S. states to frequent major power outages, and studying historical trends of major power outages.
- The aggregated and filtered data would also help the researchers to test various types of hypothesis of their interest in the future, especially in the areas of utility planning, risk management, and policy analysis.
- This dataset can be also leveraged to replicate the results corresponding to the original article following the data preparation procedures and the methodology as proposed in [1].

1. Data

The data presented in this article is included in a single excel file containing 55 variables. The excel file can be accessed from the link: https://engineering.purdue.edu/LASCI/research-data/outages/outagerisks. The variable measures are given in Imperial System of Measurement. The variable descriptions are summarized in Table 1. This data contains valuable information related to the severe weather-induced major power outages and the various regional characteristics that might attribute to the growing risks of such outages.

2. Experimental design, materials and methods

The data on major power outages and the characteristics of the regions witnessing the outages were obtained from various publicly available data sources such as the: (i) OE-417 form
| Variable types               | Variable names          | Description                                                                                                                                 |
|-----------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| GENERAL INFORMATION         |                         |                                                                                                                                            |
| Time of the outage event    | YEAR                    | Indicates the year when the outage event occurred                                                                                           |
|                             | MONTH                   | Indicates the month when the outage event occurred                                                                                            |
| Geographic areas            | U.S._STATE              | Represents all the states in the continental U.S.                                                                                             |
|                             | POSTAL.CODE             | Represents the postal code of the U.S. states                                                                                                  |
|                             | NERC.REGION             | The North American Electric Reliability Corporation (NERC) regions involved in the outage event                                             |
| REGIONAL CLIMATE INFORMATION|                         |                                                                                                                                            |
| U.S. Climate regions        | CLIMATE.REGION          | U.S. Climate regions as specified by National Centers for Environmental Information (nine climatically consistent regions in continental U.S.A.) |
| El Niño/La Niña             | ANOMALY.LEVEL           | This represents the oceanic El Niño/La Niña (ONI) index referring to the cold and warm episodes by season. It is estimated as a 3-month running mean of ERSST.v4 SST anomalies in the Niño 3.4 region (5° N to 5° S, 120°–170° W) [6] |
|                             | CLIMATE.CATEGORY        | This represents the climate episodes corresponding to the years. The categories—“Warm”, “Cold” or “Normal” episodes of the climate are based on a threshold of ± 0.5 °C for the Oceanic Niño Index (ONI) |
| OUTAGE EVENTS INFORMATION   |                         |                                                                                                                                            |
| Event start and end         | OUTAGE.START.DATE       | This variable indicates the day of the year when the outage event started (as reported by the corresponding Utility in the region)          |
| information                 |                         |                                                                                                                                            |
|                             | OUTAGE.START.TIME       | This variable indicates the day of the year when the outage event started (as reported by the corresponding Utility in the region)          |
|                             |                         |                                                                                                                                            |
|                             | OUTAGE.RESTORATION.DATE| This variable indicates the day of the year when power was restored to all the customers (as reported by the corresponding Utility in the region) |
|                             | OUTAGE.RESTORATION.TIME| This variable indicates the day of the year when power was restored to all the customers (as reported by the corresponding Utility in the region) |
| Cause of the event          | CAUSE.CATEGORY          | Categories of all the events causing the major power outages                                                                             |
|                             | CAUSE.CATEGORY.DETAIL   | Detailed description of the event categories causing the major power outages                                                             |
|                             | HURRICANE.NAMES         | If the outage is due to a hurricane, then the hurricane name is given by this variable                                                   |
| Extent of outages           | OUTAGE.DURATION         | Duration of outage events (in minutes)                                                                                                       |
|                             | DEMAND.LOSS.MW          | Amount of peak demand lost during an outage event (in Megawatt) [but in many cases, total demand is reported]                               |
|                             | CUSTOMERS.AFFECTED      | Number of customers affected by the power outage event                                                                                      |
| REGIONAL ELECTRICITY CONSUMPTION INFORMATION |             |                                                                                                                                            |
| Electricity price           | RES.PRICE              | Monthly electricity price in the residential sector (cents/kilowatt-hour)                                                                  |
|                             | COM.PRICE              | Monthly electricity price in the commercial sector (cents/kilowatt-hour)                                                                 |
|                             | IND.PRICE              | Monthly electricity price in the industrial sector (cents/kilowatt-hour)                                                                  |
|                             | TOTAL.PRICE            | Average monthly electricity price in the U.S. state (cents/kilowatt-hour)                                                                  |
| Electricity consumption     | RES.SALES              | Electricity consumption in the residential sector (megawatt-hour)                                                                          |
|                             | COM.SALES              | Electricity consumption in the commercial sector (megawatt-hour)                                                                          |
|                             | IND.SALES              | Electricity consumption in the industrial sector (megawatt-hour)                                                                          |
|                             | TOTAL.SALES            | Total electricity consumption in the U.S. state (megawatt-hour)                                                                          |
|                             | RES.PERCEN             | Percentage of residential electricity consumption compared to the total electricity consumption in the state (in %)                          |
|                             | COM.PERCEN             | Percentage of commercial electricity consumption compared to the total electricity consumption in the state (in %)                            |
|                             | IND.PERCEN             | Percentage of industrial electricity consumption compared to the total electricity consumption in the state (in %)                           |
| Customers served            | RES.CUSTOMERS          | Annual number of customers served in the residential electricity sector of the U.S. state                                                  |
|                             | COM.CUSTOMERS          | Annual number of customers served in the commercial electricity sector of the U.S. state                                                  |
|                             | IND.CUSTOMERS          | Annual number of customers served in the industrial electricity sector of the U.S. state                                                  |
|                             | TOTAL.CUSTOMERS        | Annual number of total customers served in the U.S. state                                                                                |
|                             | RES.CUST.PCT           | Percent of residential customers served in the U.S. state (in %)                                                                          |
|                             | COM.CUST.PCT           | Percent of commercial customers served in the U.S. state (in %)                                                                           |
|                             | IND.CUST.PCT           | Percent of industrial customers served in the U.S. state (in %)                                                                          |
Schedule 1 published by DOE’s Office of Electricity Delivery and Energy Reliability [2] (ii) U.S. Energy Information Administration (EIA) [form EIA-826 and EIA-861] [3]; (iii) National Oceanic and Atmospheric Administration (NOAA); (iv) National Climatic Data Center (NCDC); (v) U.S. Department of Labor; Bureau of Labor Statistics [5]; and, (vi) U.S. Census Bureau. The data spans from January 2000 to July 2016. The various data sources were then aggregated using the year, month and the region (i.e., the U.S. state) as the nexus. The major outages are described in terms of duration of the outage event and the total number of customers affected during that event. The dataset is rigorously preprocessed and checked for inconsistencies to minimize the measurement errors leveraging different methods such as data visualization, analyzing the descriptive statistics as well as manual cross-checking of the observations.

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Table 1 (continued)

| Variable types                   | Variable names          | Description                                                                                                                                 |
|----------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| REGIONAL ECONOMIC CHARACTERISTICS |                         |                                                                                                                                               |
| Economic outputs                 |                         |                                                                                                                                               |
| REGIONAL LAND-USE CHARACTERISTICS |                         |                                                                                                                                               |
| Population                       |                         |                                                                                                                                               |
| Land area                        |                         |                                                                                                                                               |

Note: “NA” in the data file indicates that data was not available.
Transparency document.  Supplementary material

Transparency data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.06.067.

Appendix A. Supplementary material

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.06.067.

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