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Modeling of Reasonable Service Region of Power Plants in the U.S. Using weighted Voronoi
Diagram

Global Power Plant Dataset: <https://datasets.wri.org/dataset/globalpowerplantdatabase>

As it's already known, there is a fair amount loss of electricity when the current flow is distributed from power plants to the end user through the cables, due to the resistance of conduct material. The percentage loss increases with distance from the power source and can reach as high as 10% - 20% for remote locations. We apply Voronoi Diagram to these power plant as sources, partitioning the U.S. territory into cells. The partition theoretically represents the most efficient distribution of electricity, where the end users obtain electricity from the nearest source. Additionally, we use a weighted Voronoi algorithm, considering other factors such as electrical generation capacity that might make one plant more "influential" than the other. However, the partition, purely based on the properties of power source, may not meet the actual electricity demands in each cell area, which can be computed by the size of resident population in the area and the average electricity consumption per capita.