Machine learning for power network partition

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Type Semester/Master

Background Power system is the largest man-made system in the world. Zoning control is an effective way to manage such a complex system. Several intuitive questions include: 1) what are the criteria to partition the zones? 2) which specific zoning control does the partition serve? 3) how to partition the zones for a whole power system? Both the transmission and distribution networks can be viewed as a graph with nodes and branches. Therefore, machine learning techniques for traditional graph partition can be applied to the power system.

Description This thesis will investigate new approaches and develop tools for power network partitioning. The power network partition might be conducted for different zoning controls such as voltage control, active power control, etc. Defining the distance (weight of the branch) between each two nodes is the core of such network partition. Various machine learning techniques can be implemented based on the defined distances. The partitioned zones may also vary for different seasons of the year. Ref. [1-3] can help you have a better understanding of this issue. Tasks are

1. Literature review on power network partition methods and the graph partition methods in other research areas.
2. A summary on the definition of distance between two nodes.
3. Develop clustering or graph partition algorithms for power network partition.
4. Comprehensive case studies on the standard power transmission and distribution systems.
5. Clustering ensemble for network partition with multiple purpose.


Prerequisites The student should be familiar with MATLAB and MatPower toolbox. Preferred backgrounds include: knowledge about machine learning techniques such as clustering, good programming skills with R or Python.