Homework

- Based on the dataset *hw5_data.csv*, which includes the power system operation states (e.g. active and reactive generation(PV_P, PV_Q), power load(Pl, Ql), bus voltage(Va, Vm), line power flow(Line_Ps, Line_Qs), line power loss(Line_Pl, Line_Ql).) of an IEEE 118-bus test system, please use the operation states of this dataset to practice unsupervised learning methods.

(1) Try the clustering and dimension–reduction methods on the dataset.

(2) Compare your clustering result and SSSA given in the dataset. Does your clustering result align with the SSSA result?

- Note: The stability states (SSSA) are also given as labels in the dataset. The labels may be helpful to estimate or explain the clustered operation states. DO NOT use the labels in the learning step, otherwise it will become a supervised problem.

References on the IEEE 118-bus test system (not on the dataset):
http://labs.ece.uw.edu/pstca/pf118/pg_tca118bus.htm
https://matpower.org/docs/ref/matpower5.0/case118.html

作业

- 基于*hw5_data.csv*，请对ieee118节点系统的运行状态测试聚类或降维算法（或其他非监督学习方法）。数据集中的运行状态包含了发电机的有功出力和无功无力(PV_P，PV_Q)，负荷(Pl，Ql)，节点电压(Va，Vm)，线路潮流(Line_Ps，Line_Qs)，线损(Line_Pl, Line_Ql)。

(1) 基于数据集提供的系统运行状态，尝试聚类或降维算法。
(2) 对比聚类结果和原本的SSSA标签。聚类结果与SSSA的分类结果是否相同？例如，同一簇内的运行状态是否都对应了稳定，是否都对应了不稳定?

- 注意：本次作业是非监督学习，SSSA是数据的标签，所以请不要使用这列数据进行降维或聚类，可以利用这列数据对聚类结果进行进一步的分析。

References on the IEEE 118-bus test system (not on the dataset):
http://labs.ece.uw.edu/pstca/pf118/pg_tca118bus.htm
https://matpower.org/docs/ref/matpower5.0/case118.html