Robust DSSE with Data-driven Models

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The overall theme of the approach is to build on top of classical DSSE by properly initializing it using classification models and properly using measurement weights from time-dependent probabilities learnt from the historical data. Additionally, the historical patterns and spatio-temporal correlations of line flows, node injections & node voltages are used to derive the most probable pseudo-measurements along with probability. A "robustified" DSSE is used so that it is capable of handling errors from fat-tailed distributions that are present for pseudo-measurements and actual measurements due to outliers. At the beginning of each DSSE iteration, we reweight the measurements based on the residuals and update the positions of various switches along with the pseudo measurements to match the spatio-temporal correlations identified from historical data. The iterations are performed until the maximum iteration number is reached or until the non-outlier residuals are below a threshold.