

Analysing and predicting extreme frequency deviations in power grid

Vedang Tamhane

Xenvolt Technologies, Pune, India

Contributed
Talk

Maintaining the power grid stability requires a balance between the generation and demand across various timescales. The power grid frequency reflects this balance and hence plays an important role in stabilizing and controlling power grids. Large imbalances and hence frequency deviations represent a threat to power grid stability. Therefore, understanding such extreme deviations and having a prior warning would be very valuable for power grid operation. In this paper we analyze extreme frequency deviations and develop a decision-support tool to predict and mitigate such events, demonstrated using data from the Balearic power grid. We inspect the frequency and durations of extreme deviations and identify specific fast ramps as precursors. We develop an interpretable machine learning model that is intended to warn before extreme frequency deviations and provide insights into its reasoning by using SHapely Additive exPlanations (SHAP).
