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Solving Bernoulli Bandit Problems for Weather-relative Overhead Distribution Line Failures Forecasting

Wang, Shengyi; Sun, Hongbo; Kim, Kyeong Jin; Guo, Jianlin; Nikovski, Daniel N.

TR2021-087 August 10, 2021

Abstract

In this paper, an evaluation approach for analyzing the impact of weather events on line outage status in the distribution system is explored. By representing weather condition in a tabular form, the possible weather condition scenarios are reduced. Our failure forecasting problem is formulated as an online sequential decision-making problem. Each failure forecaster in the problem attempts to solve multiple independent Bernoulli Bandit problems. There are two learning frameworks based on maximum likelihood and maximum a posteriori used for designing a desired failure forecaster, which can online adjust model parameters using the reported outage data in order to mitigate the impact of unknown inherent uncertainties on model accuracy. A dataset with 10,000 artificial points is used to verify the effectiveness of two proposed algorithms. The results obtained by different action selection strategies are compared.

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