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TREED GAUSSIAN PROCESSES AND PATTERN SEARCH OPTIMIZATION

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Asynchronous Parallel Pattern Search is a derivative-free numerical optimization algorithm. We show how to combine pattern search with Treed Gaussian Processes (TGP) to produce a more robust method for maximization or minimization by incorporating information about our uncertainty. The TGP emulator can also provide sensitivity analysis and a probabilistic analysis of convergence. Our approach is particularly useful for physical experiments or complex computer modeling problems, where each new datapoint or function evaluation may be expensive to obtain. We demonstrate results on both synthetic and real data.