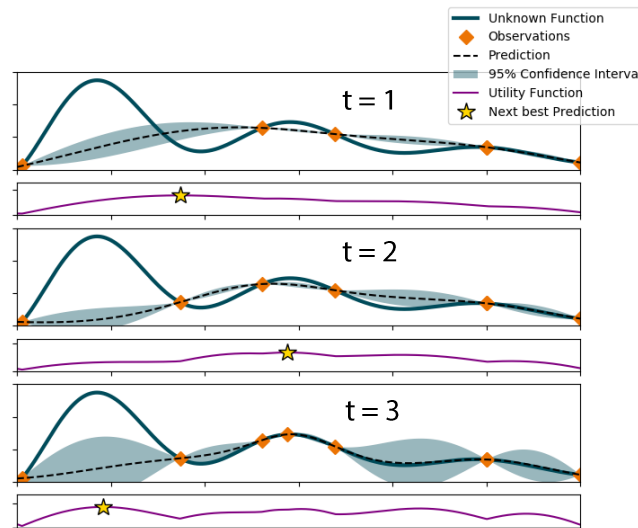


Bayesian Optimization for the Iterative Positioning of an Aerial Network Relay



Project Background

In the first aid of patients at the scene of an emergency, the first responders are cut off from the flow of information, which means that at present, assistance can often only be provided by telephone via the central office and is hardly ever used due to time constraints. Simultaneously, the shock room specialists often lack the information they need to prepare themselves for the emergency. Thanks to mobile integrated medical technology, which is connected to the mobile phone network, resources, technologies, and information of the hospital can already be accessed at the point of care. In addition, up-to-date information can be transmitted to the hospital.

Within the MOMENTUM project's scope, an autonomous repeater infrastructure is to be implemented [1]. Especially in areas with insufficient network coverage during a rescue service operation, this infrastructure should enable a connection to the public mobile network for portable medical devices. For this purpose, drones can autonomously find an optimal location for receiving the radio signal.

Project Description

A drone equipped with a mobile modem is used to measure various mobile network parameters. A distinction can be made between metrics measured by the receiver and parameters specified by the radio cell [2]. The latter can only be determined using cost-intensive hardware. Receiver-side metrics can be measured with commercially available mobile devices. Based on the measured data, models can determine the next measuring point to be approached [3]. For this purpose, the data is integrated into probabilistic models like Gaussian processes to predict the parameters at unknown locations. Bayesian optimization utilizes a tradeoff between exploring the search space and exploiting the current prediction to find the global maximum [4]. Within the internship or thesis scope, the drone's



autonomous positioning public cellular network based on Bayesian optimization should be developed and implemented.

Possible Tasks

- Literature research on the iterative positioning task
- Development of a positioning concept
- Familiarization with the MAVlink protocol
- Getting code examples working in the simulation
- Trial flights with preprogrammed missions
- First autonomous flight missions

References

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