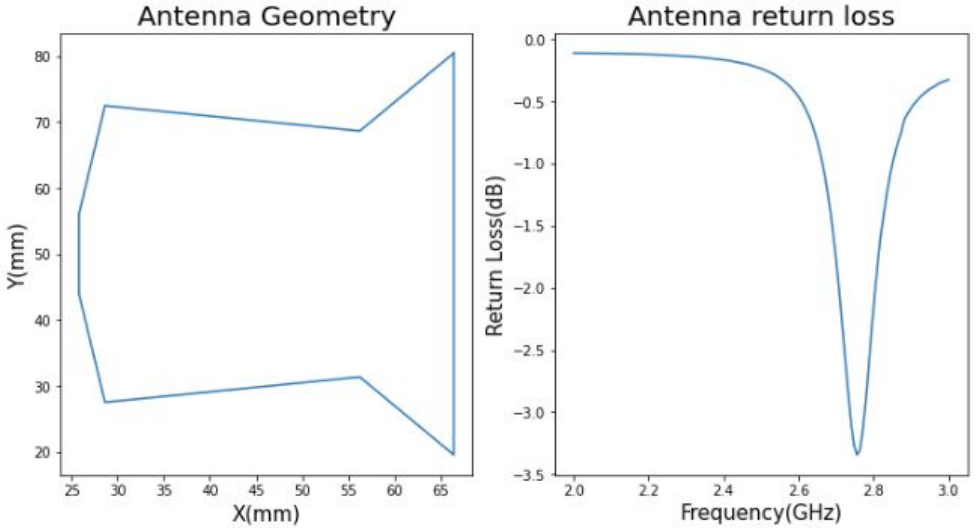
Dataset Visualization

- Input data consists of X and Y coordinates of antenna geometry (in mm)
- Output (labelled) data consists of return loss of the corresponding antenna geometry over a frequency range of 2 to 3 GHz
- Full wave electromagnetic solver (CST-MWS) is used to label the dataset. Labelling the data is both time and computationally expensive

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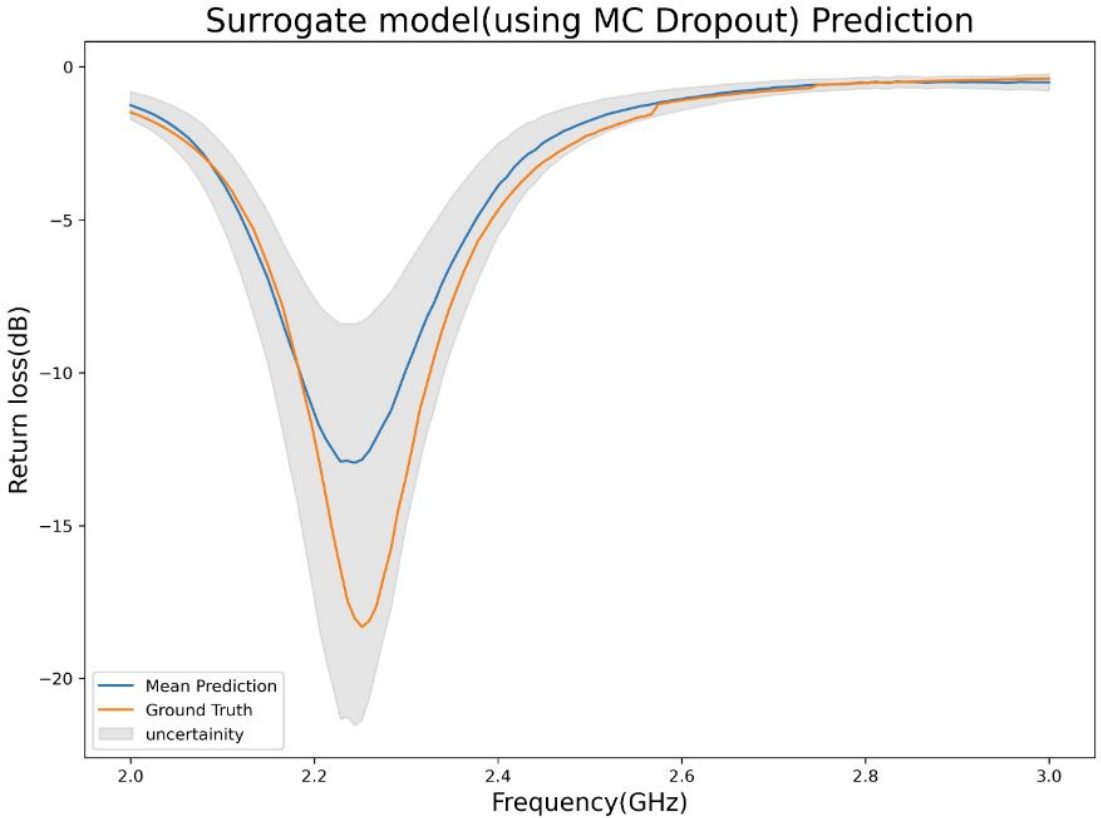
Data input shape: torch.Size([10173, 16]) Data output shape: torch.Size([10173, 128])
```

- Goal is to find (label) those antenna geometry which gives the minimum of return loss over a given frequency range
- Bayesian optimization is employed to achieve this objective

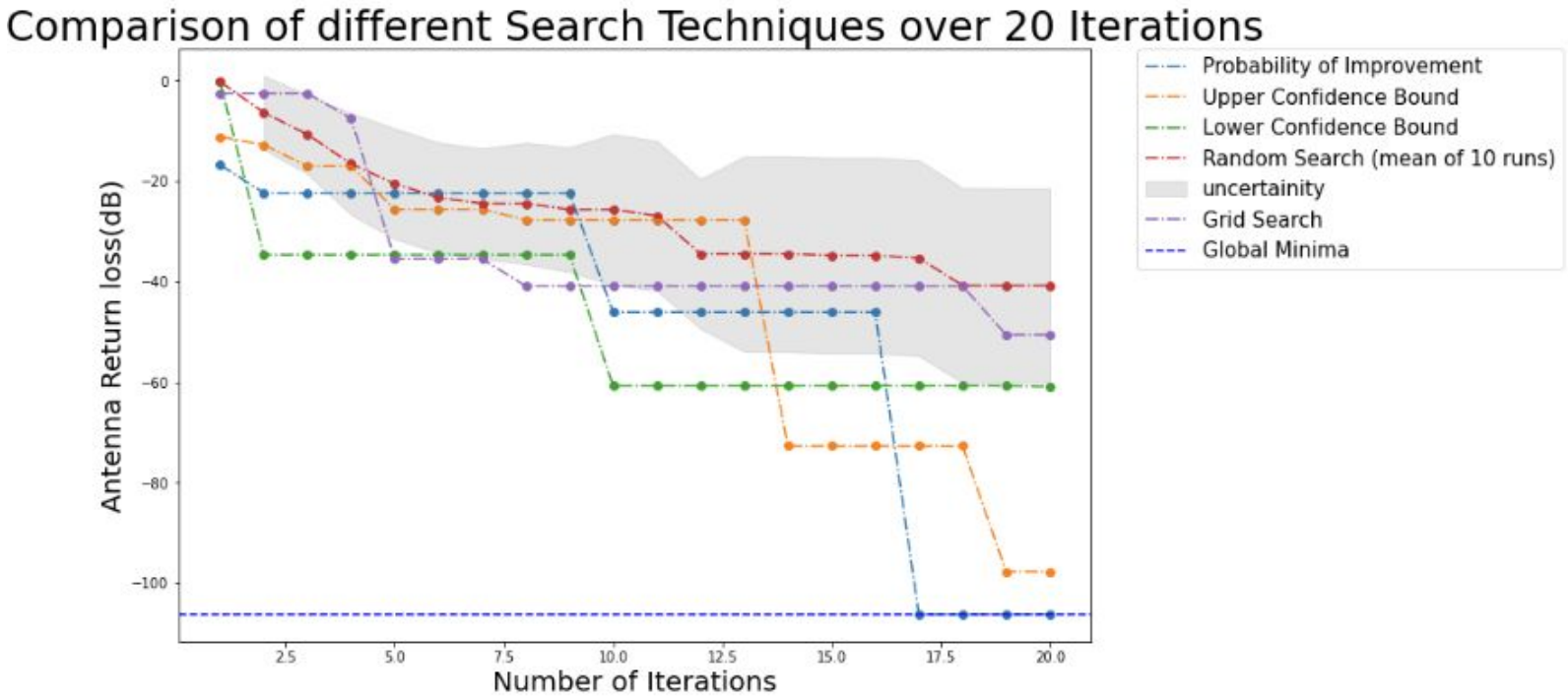
Bayesian optimization methodology

- A surrogate model (using conv1D and dense layer) is trained over some labelled dataset
- Monte Carlo dropout is used during inferencing to get mean and standard deviations of the predictions
- Different acquisition functions (PI,LCB and UCB) are deployed in bayesian optimization loop to optimize the exploration and exploitation of unlabelled dataset
- Acquisition functions are benchmarked with random search and grid search



An example of surrogate model prediction

Results of different acquisition functions over Random and grid search



Number of iterations required to reach return loss of -50 dB