Guidelines for Student Reports

VERIFICA: IA FOR THE EVALUATION OF THE ROBUSTNESS TO AMPLITUDE/POSITION ERRORS FOR SPARSE ARRAYS

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Abstract

Interval Analysis (IA) consists of a set of rules and tools for the analysis and optimization of functions where the variables at hand are intervals of numbers and not single values as in classical arithmetical/optimization problems. For example, an interval of real values (a real interval) can be defined as a one-dimensional compact set (a segment) between two extreme points, namely the minimum and maximum interval values.

Interval Analysis has several attractive features that can be exploited to perform a deep and accurate analysis in different situations dealing with uncertain, error and tolerances. More in detail:

1. IA has an intrinsic capability to deal with uncertainties, always present when measurements are at hand.
2. Analytical equations and relationships can be easily reformulated and addressed by including intervals of numbers once the fundamentals of IA are known.
3. The bounds of a function when evaluated over an interval are determined in a straightforward manner without the need of evaluating the function on all (infinite) points of the interval.

In this project, the IA will be exploited to analyze the effect of tolerance on the amplitude and position errors considering various array configurations constituted by different number of elements, but aimed at generating the same beam pattern, in order to verify which configuration provides the highest robustness to errors. Such "sparse" configurations will be determined through a Bayesian Compressive Sampling-based synthesis technique.

Reference Bibliography: Interval Analysis and Array Synthesis [1]-[5]; Array Synthesis and Compressive Sensing [6]-[10].

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