Guidelines for Student Reports

A MULTIRESOLUTION APPROACH FOR DIRECTION OF ARRIVAL (DOA) ESTIMATION IN LINEAR ARRAYS BASED ON BAYESIAN COMPRESSIVE SENSING

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Abstract

The estimation of the direction of arrival of signals impinging on an antenna array is a problem of great interest in many applications, including mobile communications, target tracking and rescue systems. By sampling the angular region of interest with a large number of angular locations, the DoA estimation problem can be rewritten as a linear problem characterized by a sparse solution: hence, it is possible to exploit the Bayesian Compressive Sensing to reformulate the estimation problem in probabilistic terms, by looking for the most probable sparse signal fitting the data measured by the antenna array.
One of the main disadvantages of this technique is that the estimated direction are confined to a grid, introducing a systematic estimation error due to the mismatch between the grid and the actual direction of arrival of the signals. The simplest solution is to define a very fine grid, but at the expense of a higher computational complexity.
This project is aimed at overcoming this problem by defining an adaptive grid-refinement strategy that makes the grid fine only around the angular regions of interest. The objective is to increase the reliability of the estimations without affecting significantly the computational complexity of the overall system.

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