Guidelines for Student Reports

CONTRAST SOURCE INVERSION TECHNIQUES BASED ON BAYESIAN COMPRESSIVE SENSING FROM GPR DATA

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Abstract

Compressive Sensing (CS) techniques, recently developed in signals processing field, allow to obtain a reliable reconstruction of high resolution signals using a number of measurements extremely lower than the number predicted by the well-known Nyquist-Shannon theorem. CS techniques have been already successfully applied to many practical problems like radar and audio/video compression. More recently, the Compressive Sensing (CS) paradigm has been employed to develop new strategies for imaging sparse scatterers at microwave and optical frequencies exploiting the Born approximation, the Rytov approximation, and the Contrast Source formulation in order to obtain a linear dependency of the unknowns to the collected data, with appreciable results.
This project is aimed to implement a contrast source inversion algorithm for microwave imaging based on the Bayesian Compressive Sampling (BCS) for the reconstruction of sparse buried objects from the GPR aquired data. In particular, the multi-task version of the BCS allows to exploit during the reconstruction process the correlation among multiple problems. In the specific case, this implementation allows to takes into account the correlation between the scattered data provided by multiple frequencies.

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