

Radar Target Generation and Detection

- Implementation steps for the 2D CFAR process.
- Selection of Training, Guard cells and offset.
- Steps taken to suppress the non-thresholded cells at the edges.

The following explanation answers the above points.

1.1 Initialization

The number of training cells, guard cells are initialized with “2”.

A vector for threshold (threshold_cfar) and CFAR applied signal (signal_cfar) each are initialized with zeros.

Total number of training cells are calculated.

1.2 CFAR

A nested for loop that loops over all the valid CUT (Cell Under Test) cells is written. This loop spares the edge cells that do not qualify to be CUT cells as they not have enough cells around them for training and guarding.

For each cell, the threshold is calculated by taking the mean of the training cells around them. If the amplitude of the CUT cell is greater than the threshold, then the element in the signal vector is updated with “1” in the corresponding index. Thus the signal_cfar vector is populated with filtered signal values.

Since the signal_cfar vector is initialized with zeros, the elements in those indexes, that belong to the edges, which do not have a valid CUT cell, have zero amplitude by default.

1.3 Parameter tuning

The visual inspection of the 2D FFT graph infers that the signal is spread in approximately 12 cells in each side in range dimension and 20 cells in each dimension in Doppler dimension. However, a lower number of guard cells were still yielding good results. By manually increasing the parameter’s value by 1, iteratively, until the desired result is obtained, the final parameters are found.