Radar Target Generation And Detection Project

1. Implementation steps for the 2D CFAR process.

I have followed the steps given in classroom lectures to achieve this task. The 2D CFAR applied to the results of the 2D FFT, uses a dynamic threshold set by the noise level in vicinity of the cell under test (CUT).

Steps:

1. Training cells for both range and dimensions are selected along with the guard cell numbers.
2. Looping over the cells in both range and Doppler dimensions by leaving the margins using the start and end indices.
3. CUT (Cell Under Test) is slid across the complete cell matrix.
4. At every iteration, signal level will be added within the training cells and dbpow2 function is used to convert the cells from decibel to power to linearize them.
5. Mean is calculated and then converted back to logarithmic using pow2d.
6. Offset (in dB) is added to the result to set the dynamic threshold
7. Now this threshold is compared with CUT and if the CUT is greater than threshold then 1 is assigned otherwise 0 is assigned.
8. At the end non-threshold cells are set to 0 to match the map size same as before doing CFAR.

2. Selection of Training, Guard cells and offset.

Tr - Number of Training cells in Range dimension = 10
Td - Number of Training cells in Doppler dimension = 8
Gr - Number of Guard cells in Range dimension (Gr) = 4
Gd - Number of Guard cells in Doppler dimension (Gd) = 4
SNR_OFFSET = 14

3. Steps taken to suppress the non-thresholded cells at the edges.

The process above will generate a thresholded block, which is smaller than the Range Doppler Map as the CUT cannot be located at the edges of matrix. Hence, few cells will not be thresholded. To keep the map size same, set those values to 0.

A zero is assigned to those training cells which are neither 1 nor 0,

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RDM(RDM~=0 & RDM~=1) = 0;
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