# Implementation steps for 2D CFAR Process

The main "for" is the range of moving the row of window of CFAR in the rows of the 2FFT or the range of 2FFT, we started with first CUT in row 1+Gr+Tr to the last one which will be the row size of 2FFT matrix – Gr+Tr. The nested "for" is for the range of the columns of window of CFAR, the same method will be used to implement the range of doppler so it will be started from 1+Gd+Td : size of columns of 2FFT – Gd+Td . inside the nested for we sum all the grid elements (window box) of grid as well as the training sum, the sum of elements in the grid is limited from where to end in row as well as the columns. The noise level for every grid will be subtraction of training sum with all the other elements in the grid and In order to get the noise into consideration we got the mean and then multiply it with the offset before we convert it to pow2b. the last threshold which is power we compare it with the signal and see if it's higher or not and the we did normalization process.

```
for i = 1+Tr+Gr:(size(RDM,1) - (Gr+Tr))
    for j = 1+Td+Gd:(size(RDM,2) - (Gd+Td))
        sum_all = sum(db2pow(RDM(i-(Tr+Gr):i+Tr+Gr, j-(Td+Gd):j+Td+Gd)),'all');
        T_sum  = sum(db2pow(RDM(i-Gr:i+Gr, j-Gd:j+Gd)),'all');
        noise_level = sum_all - T_sum;
        threshold = db2pow(pow2db((noise_level / Training_Size)*Off_S));
```

Selection of number training and guard cells.

The selection of the training and guard came from trying many values and see the suitable one, for example when selected training cells in 12 and guard was 4 there were three yellow bar with different velocities which is not precise for one targets, so when I divided the number of the training and guard by 2, I got a one target with the approx. velocity estimation. Tr = 6;Td = 6; Gr = 2; Gd = 2;
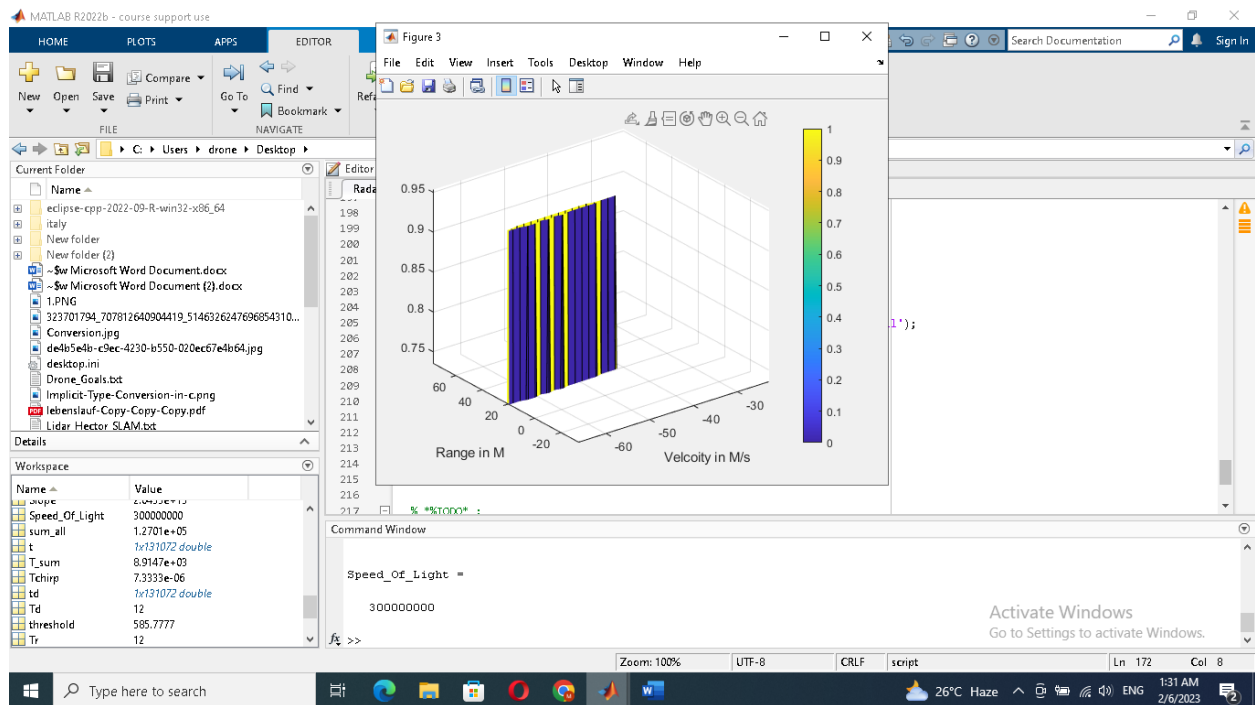
Steps the non-threshold cells.

The steps was to give zero the non-threshold through comparing every single cell with the threshold if it's lower than the threshold then would take zero as non-threshold, if it's not then the cell will be consider as threshold cells.

```matlab
if (db2pow(RDM(i,j)) <= threshold)
        zer(i,j) = 0;
    else
        zer(i,j) = 1;
    end
```