Gmail

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Dataset_848

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To: Michael Corbett <michaelcorbett2007@gmail.com>

Thu, Apr 14, 2022 at 5:52 PM

Hello Michael,

Thanks for getting in touch and glad you and your teammates found our data useful.

Regarding the processing steps of the data, here are some tips. I hope these will help.

- Each file that you download should come in the form of a long vector where you have all the samples of all the radar chirps one after the other. The first action is to reshape this vector into a MxN matrix where M is the number of samples per chirp and N is the number of chirps in the recording. Remember these are complex raw data, so each element of this matrix is complex, with real and imaginary part. It does not matter if you transpose the matrix, NxM in this case.
- The first pre-processing step to apply on this resulting matrix is an FFT across the samples of each chirp. Be careful when you say "pulse compression" because this is not a pulsed radar but an FMCW radar, so the typical approach is a double FFT, one to extract range information (that you need before the spectrogram) and one for the Doppler (that you don't need in this case to make spectrograms). A good potential source for simple FMCW processing explanation is my PhD thesis (just google and you will find it from Durham University in the UK, chapter 3). After this FFT the resulting matrix is a range-time. The dimension across which you calculated the FFT is now associated to range and the dimension of the number of chirps is the (slow) time. If you use MATLAB, recall FFT is implemented in a way that the output vector is half the size of the input one. The resulting matrix you have at this stage is a range*time matrix which is again made of complex numbers and if you plot its absolute value you should see something physically meaningful. For example, if you take a dataset for a person walking, you should see some sort of zig-zag line where the person walking back and forth, aka away/towards the radar, makes this line so that he/she goes away from the radar (line moving into higher range bins) and towards (line moving into range bins with lower value index, aka associated to shorter distance). On the contrary, if the person is static in place and makes only one action, say sitting, the person signature should look more like a constant line in range bins.
    - Because the person is a kind of extended target, he/she will occupy multiple range bins, aka it is visually a thick line.
- When you have the range*time, you can see the range bins where the target is present. Select those range bins and calculate the spectrogram. You have 2 options: you can sum coherently in complex values all range bins to get one vector at the end and apply STFT on it, or you can apply STFT independently on each range bin and finally sum the absolute value of the results to get a final spectrogram. Again you can use one or two datasets of walking and say sitting to check first that your process makes physical sense before automating the process across all data.

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