

A comparative cepstral based analysis of simulated and measured S-band and X-band radar Doppler spectra of human motion.

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Abstract:

A Simulation for human Doppler response is developed based on the Carnegie Mellon University motion capture database. This data is used to simulate human Doppler response as it would be seen by a radar system and this data is compared to measured radar data in S- and X- band. Cepstrum analysis is then used to evaluate the features of each time frame and the synthetic data is compared to measured data. It is shown that motion capture data can be used to simulate the Doppler response of human targets. It is also shown that, whereas the motion of most body parts of a human target can be observed in the X-band data, only the main torso sway can be observed at S-band. This implies that X-band data is well suited to cepstrum based human motion classification, whereas S-band is not ideal. However there are some discriminative features that could be extracted from the S-band data of the main body sway of running and walking individuals. Finally, the statistical differences between cepstrum coefficients of the data of walking and running individuals are highlighted, indicating their discriminative significance.