

For self-localization, a detailed and reliable map of the environment can be used to relate sensor data to static features with known locations. This paper presents a method for construction of detailed radar maps that describe the expected intensity of detections. Specifically, the measurements are modelled by an inhomogeneous Poisson process with a spatial intensity function given by the sum of a constant clutter level and an unnormalized Gaussian mixture. A substantial difficulty with radar mapping is the presence of data association uncertainties, i.e., the unknown associations between measurements and landmarks. In this paper, the association variables are introduced as hidden variables in a variational Bayesian expectation maximization (VBEM) framework, resulting in a computationally efficient mapping algorithm that enables a joint estimation of the number of landmarks and their parameters.