

First, the presentation will describe the basics of valuation-based systems framework, including both the static part (variables and valuations), and the dynamic part (combination, marginalization, and making inferences). Next, it will describe the Dempster-Shafer belief function theory using the framework of valuation-based systems. All concepts will be illustrated using the Captain's Problem from Russell Almond's book on Graphical Belief Modeling (1995, Chapman & Hall). Next, we will describe how one can compute marginal of the joint valuation for a variable of interest using local computation (without computing the joint valuation). The local computation algorithm will then be described as propagation in a join tree. Finally, we will describe the theory of conditional independence for valuation-based systems, which generalizes the corresponding theory for probability theory, and which applies to all calculi that fits in the valuation-based system framework including Dempster-Shafer belief function theory.