

In this thesis we deal with estimating the transition matrix probabilities of discrete time Markov chains with finite state space. We will use two methods, specifically the maximum likelihood method and the bootstrap method, for obtaining estimators of these matrix probabilities and then we will develop the asymptotic distribution of these estimators. We will describe the basic characteristics of the bootstrap method and show the application of two bootstrap methods used for estimating transition probabilities, specifically conditional bootstrap and standard bootstrap. The results of the application of every method used for obtaining transition probabilities and computing confidence intervals will be presented in a numerical study and compared with the results based on asymptotic normality.