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Survival analysis is a popular area of statistics dealing with time-to-event data. A special characteristic of survival data is the presence of censoring. Censoring occurs when the survival time is only partially known. In medical studies, censoring can be caused by patients dropping out of the study before their disease event occurs. This dissertation focuses on the analysis of interval-censored data, where the failure time is only known to belong to some interval of observation times.

One problem researchers face when analyzing survival data is how to handle the censoring distribution. This is an important consideration because sometimes a patient's survival time is related to the time they drop out of the study. It is often assumed that these two times are unrelated, so special methods need to be developed when they are dependent. Part of this dissertation investigates the effectiveness of methods developed for interval-censored data with dependent censoring when the censoring is actually independent. The results of these simulation studies can provide guidelines for deciding between models when facing a practical problem where one is unsure about the dependence of the censoring distribution.

Another important problem seen in survival analysis is variable selection. For example, doctors might want to identify a set of diagnostic tests or measurements that can predict patient survival. We propose an imputation approach for variable selection of interval-censored data that utilizes penalized likelihood procedures. This work is significant because researchers currently do not have many tools to select important variables related to the survival time for interval-censored data.