

Chapter 8

Future scopes and limitations

We have considered various inliers prone models to fit several real life practical situations in this thesis. Since inliers models are nonstandard and incomplete mixtures, the usual inferences are not smooth. Judging a good inliers model itself can pose many problem of completeness and identifiability of the model. As such the literature study does not include many studies on inliers prone models. The least we can find in the literature are lower outliers (inliers) detection related studies. They are also not articulated in a proper statistical way. There are no literature studies on the probability modeling of outliers per se. With the available resources we have tried to express the inliers model in a probability way and then carried out estimation procedures of parameters in the model. In some cases the model for positive observations posed estimation in closed form. In such cases, we resort to numerical evaluation of the likelihood equations. These problems are also found while testing the parameters and detection of inliers.

The motivating factor of doing this kind of research is that, there are many practical situations where inliers are occurring in a natural way. The examples range from almost all fields of statistical applications. Although we have started with instantaneous and early failures, it ended up in modeling inliers based on more than one discrete point as discussed in chapters 5-7. Like in discrete models, where, such situations are organized in a frequency distribution, here it is not possible as some mass points are discrete and others are positive continuous measurements. This is the major difference between truncated and inflated models as seen in literature, and hence

is a big challenge for modeling inliers type situations. As future prospects, we understand that, there is a need to develop probability models for discrete and continuous measures in a sensible way as per the situation demands.

Although some of the models studied in this thesis are general, but the early failure model-1 seems to be restricted to exponential distribution only. Since hazard rate is constant for exponential distribution, it is easy to study the change in hazard function. More than inliers type, this model is a kind of change point model in the average life of the component. This model can be extended to Weibull distribution with a change point in hazard function, and we will explore this study in future.

We plan to study the generalization on inliers prone model observed at two discrete points to more than two discrete points and continuous measurements. We strongly believe that, there are practical situations where at many discrete points there can be mass points and continuous measures. As a future endeavor we will be generalizing the two discrete point model to cater to more than two and positive observations.

The testing procedures when there are more than three or more inliers may pose lots of problems in terms of getting the distribution of the test statistics. For more number of inliers the existing procedures may not work well for identifying the masking and swamping effects. This is really a challenge to work with.

A very important limitation of inliers study is that, if the number of discrete points (zeros or ones) exceeds more than half of the total number of observations, then the estimation can create problems and in case estimators are available, then those estimators may not be sensible enough to interpret. Although we have not come across such practical situations, we are ruling out. While revising the papers for various journals, the referees have pointed out the significance of inliers and the necessity of statistical studies in a formal way.

The other limitations include suggesting inferences other than classical approach based. The authors have already started working on Bayesian approach, which is not applied to inliers prone models so far. The other limitation is to apply for any kind of censoring. This study addresses the Type 2 censoring concepts, as it is based on a fixed number of failures from right side. The Type-1 and random censoring is not easy to address as such. We expect that all censoring concepts will work, but will not be viable for getting all types of estimators provided in the thesis. A serious look into censoring concept is needed, and we are working on it.