CHAPTER 6
CONCLUSIONS

6.1 SUMMARY OF THESIS

The methods developed in this research are important as they provide effective means to resolve the failure-process problem and the better measurement of software reliability. It is fitted by one suitable software reliability model selected from the pool of the NHPP software reliability models.

In this thesis, we prepared and analyzed different procedures related to software reliability. A chapter by chapter summary is presented below.

Chapter One contains an introduction which covers the Motivation, Significance, Organization of the research; a brief review of software reliability concepts, application of statistical process control to software, order statistics, Sequential Probability Ratio Test, Non Homogenous Poisson Process based software reliability growth models, parameter estimation methods, and the analysis of failure data.

Chapter Two covers a review of software reliability modeling, including basic definitions, concepts, terminology, fundamentals of reliability. This chapter incorporates some important concepts used in reliability studies, literature review on software reliability models, which include non-homogenous Poisson process (NHPP) Models, proposed study, failure data sets related to application of SPC and SPRT, failure data sets related to application of order statistics, Goodness of Fit of the failure data sets to the model under consideration. Some numerical examples have been presented in the thesis to illustrate the goodness of fit and the future reliability of the software by analyzing the failure data.

Chapter Three shows that, how the control chart based on NHPP software reliability models has been proposed and implemented to reveal the failure-process change by monitoring the failure curve. By using this chart the failure process is monitored and the process change is detected. Hence, any general NHPP model can be conveniently used to assess software reliability. Maximum likelihood Estimation method is effectively used to estimate the parameters of the
model to different failure data sets. The control limits for the models are derived by using these parameters. The outcome shows that the chart has successfully detected the time point of the failure-process. On the whole, the chart is effective in detecting failure process. The effectiveness of the chart for the Power Law Process is substantiated by real datasets. Application of statistical process control to the failure data sets using the model under consideration is illustrated through tables and graphs.

Chapter Four demonstrates, A control mechanism based on order statistics of cumulative quantity between observations of time domain failure data using mean value function of PLP based on NHPP is developed and applied on different datasets and results are presented. The use of order statistics is significant when inter failure time is less or failures are frequent.

Chapter Five

The use of Sequential Probability Ratio Test in detecting the deviation of the failure process has shown that, the drawing of conclusion can be attained without waiting for the last sample making use of the parameters of similar such projects.

6.2 LIMITATIONS

All of these methods are data specific. There is not a single method that is superior to all data sets. Any other methods should be compared to the results obtained through the MLE method. There is no way to select a single best Software Reliability Growth system based on the properties of a data set. Our results show that by investigating the Growth Model that can be applied to all software failure data sets to make accurate results under all circumstances seems to be difficult to achieve.

6.3 FUTURE RESEARCH

The methods studied in this research are proved to be effective to solve the failure process problem. The studies of using the control-chart technique in software reliability measurement are still few. In further studies, other major
NHPP models should be tried considering other parameter estimation methods. Grouping of failure data when the failures are frequent and use of SPC techniques is still a problem of research to be investigated. The thesis can be extended by the application of regression method.