CHAPTER-VI

SUMMARY AND CONCLUSIONS SCOPE FOR FURTHER WORK

SUMMARY AND CONCLUSIONS

Many of the well known statistical distributions arose initially in connection with some specific situations, and once their relevance was established there was little further interest in the theoretical analysis of these distributions as they were mainly used for descriptive purposes. During the last decades the statistical literature was enriched by many of the generalized families and classes of distributions which proved to have many important applications in a wide variety of disciplines such as biological and medical sciences, social and physical sciences, engineering, operation research and so on. A systematic account of various families of distributions and their properties have been given by Patel and Joshi (1968), Mardia (1970) and Johnson, Koltz and Bala Krishna (2004).

Edgeworth (1916, 1917) has considered the possibility of polynomial transformations to normality. Kameda, T. (1928) has pioneered the idea of probability plot to indicate the form of transformation. Johnson, N. L (1949) has introduced a system of frequency curves generated by method of translation analogy to pearsonian system of distributions using log-normal and or unit normal distribution. By choosing an initial distribution Gram-Charlier series distributions are generated by Edgeworth using the normal distribution. Plucinska (1966) used generalized gamma distributions one for negative and one for positive values of arguments to construct a new class of distribution functions. She also developed in 1965 the distributions by reflecting the generalized gamma distribution about the origin. Borgi. O, (1965) has also considered similar reflection of the standard gamma distribution. The main difficulty in these distributions is that the density is zero in general at the point of symmetry. Srinivasa Rao et al (1994) have generated a class of symmetric distributions using Laplace distribution. This thesis is divided into six chapters.

In the first chapter of the thesis we briefly presented the introduction of the problem under study. The review on distributional properties and application of generalized Gaussian distribution is presented in order to highlight the present work in its right perspective. The focus of the thesis along with the chapter wise outline is also

presented. It is interesting to note that the Gaussian distribution and its generalizations have potential applications in communications, economics, engineering and finance.

In chapter 2, we introduced a left truncated three parameter generalized Gaussian distribution. The various distributional properties like the probability density function, the four moments, the skewness, kurtosis, the hazard function and the survival function are derived. It is interesting to observe that the cumulative distribution function is obtained and hence one can obtain the numerical values under the area covered by this density using incomplete gamma function values. The cumulative distribution function (Area under probability curve) tables for standardized truncated generalized Gaussian distribution are computed and presented. The probability density functions of s^{th} order statistic, 1^{st} order statistic and n^{th} order statistic are derived by using the theory presented in David (1981). The distribution of the sample median is also obtained along with the joint moments of the order statistics. Inferential aspects of the truncated three parameter generalized Gaussian distribution are also studied by deriving the moment estimators of the parameters. It is also observed that the truncation has an influence on the moment estimators. The maximum likelihood estimators of the parameters are also presented. The utility of the distribution for fitting the data on length of fish is given. This distribution is useful for analyzing several data sets in management sciences, finance, quality control and agricultural experiments. The values of the cumulative distribution function of the proposed left truncated GGD are useful for further statistical inferences. It is also possible to obtain other inferential aspects such as testing of hypothesis.

In chapter 3, we introduced a right truncated three parameter generalized Gaussian distribution. The various distributional properties like the probability density function, the four moments, the skewness, kurtosis, the hazard function and the survival function are derived. The probability density functions of s^{th} order statistic, 1^{st} order statistic and n^{th} order statistic are derived. The estimation of the parameters involved in this distribution is also investigated. The moment method of estimation and maximum likelihood method of estimation are used for estimating the parameters.

In chapter 4, we introduced a doubly truncated three parameter generalized Gaussian distribution. The various distributional properties like the probability density function, the four moments, the skewness, kurtosis, the hazard function and the survival function are derived. It is interesting to observe that the cumulative distribution function is obtained and hence one can obtain the numerical values under the area covered by this density using incomplete gamma function values. The probability density functions of s^{th} order statistic, 1^{st} order statistic and n^{th} order statistic are derived. The distribution of the sample median is also obtained along with the joint moments of the order statistics. Inferential aspects of the truncated three parameter generalized Gaussian distribution are also studied by deriving the moment estimators of the parameters. It is also observed that the truncation has an influence on the moment estimators. The maximum likelihood estimators of the parameters are also presented.

In chapter 5, we introduced a two component mixture of doubly truncated three parameter generalized Gaussian distribution. The various distributional properties like the probability density function, the four moments, the skewness and kurtosis are derived. It is observed that the frequency distribution includes the various shapes of the bimodal, uni modal distributions for specific values of the parameters. Inferential aspects of the two component mixture of doubly truncated three parameter generalized Gaussian distribution are also studied by deriving the moment estimators of the parameters. The maximum likelihood estimators of the parameters are also presented.

In chapter 6, the results derived in the earlier chapter are summarized with conclusions. The scope for further work in this area of research and applications are also presented.

SCOPE FOR FURTHER WORK

This thesis deals with the descriptive developed of a family of truncated generalized Gaussian distribution which serves as an alternative to existing symmetric, unimodal, bimodal, leptokurtic or platykurtic distributions.

In the analysis of several experiments related to space, agricultural, Biological, chemical, engineering, etc. one is often interested determining the distribution of a population from which the sample values have been taken. The efficiency of the analysis of a random phenomenon is highly influenced by the distribution excribed to the population while excribing a suitable probability density to the population one has to consider the characteristics of the variable under study.

The important feature of the variable is the range incorporate in the finite nature of the range will provide more accuracy in the analysis of data set. This conversion (modification) of infinite distribution is known as truncation which serves the practical situations more effectively and efficiently. It is possible to develop many more distributions with pluduable conditions in order to analyze and understand the nature of phenomenon more close to the reality.