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A New Generalization of Pranav Distribution Using Weighting Technique

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Abstract-In this paper, we introduce a new generalization of Pranav distribution called as Weighted Pranav Distribution (WPD). The statistical properties of this distribution are derived and the model parameters are estimated by maximum likelihood estimation. Finally, an application to real data set is presented to examine the model performance.

Keywords: *Pranav Distribution, Weighting Technique, Structural Properties and Maximum Likelihood Estimation.*

I. INTRODUCTION

Fisher (1934) introduced the concept of weighted distributions and later it was introduced and formulated in general terms by Rao (1965), in connection with modeling statistical data where the usual practice of using standard distributions for the purpose was not found to be appropriate. Weighted distributions provide an approach to deal with model specification and data interpretation problems. In Rao's paper (1965), he identified various situations that can be modeled by weighted distributions. These situations refer to instances where the recorded observations cannot be considered as a random sample from the original distributions. This may occur due to non observability of some events or damage caused to the original observation resulting in a reduced value or adoption of a sampling procedure which gives unequal chances to the units in the original. These distributions arise in practice when observations from a sample are recorded with unequal probability and provide unifying approach for the problems when the observations fall in the non experimental, non replicated and non random categories. The weighted distribution reduces to length biased distribution when the weight function considers only the length of the units. Different authors have reviewed and studied the various weighted probability models and illustrated their applications in different applied fields. Weighted distributions were applied in various research areas related to reliability, biomedicine, ecology and branching processes. For survival data analysis, Jing (2010) introduced the weighted inverse Weibull distribution and beta-inverse Weibull distribution as a new lifetime models. Ayesha, (2017) discussed the Size Biased Lindley Distribution as a new life time distribution and discussed its various statistical properties. Shankar (2017) discussed a Size-Biased Poisson-Shanker distribution and its applications to handle various count data sets. Para and Jan (2018) introduced the Weighted Pareto type II Distribution as a new model for handling medical science data and studied its statistical properties and applications. Recently Hassan et al. (2018) introduced two weighted probability models with applications in handling various lifetime data from different applied fields.

In the present paper, we use the weighting technique and propose a two parameter probability distribution which is the new generalization of Pranav distribution given by Rama Shanker (2018). This new model provides a better fit to data regarding successive March precipitation (in inches) studied by Hinkley (1977).

II. WEIGHTED PRANAV DISTRIBUTION (WPD)

Pranav distribution is a newly proposed lifetime model formulated by Rama Shanker (2018) for several engineering applications and calculated its various characteristics including stochastic ordering, moments, order statistics, Renyi entropy, Stress-Strength reliability and ML estimation. Probability density function (pdf) of Pranav Distribution (AD) is given by

