On a three-parameter family of beta distribution

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Abstract

This paper introduces a family of beta distribution that depend on three parameters, instead of the four classical (a, b, p and q) of the beta distributions. This is achieved by assuming that the parameters p and q take a particular form, similar to the values of the parameters of the beta distribution that is used as a probabilistic model in the Program Evaluation and Review Technique (PERT).
The major advantages of this family of distribution are: First, the complete determination from three known experts' estimates: optimistic, pessimistic and most likely values, used in the PERT methodology and Second, the sensitivity of the variance in the most likely value, contrary to the beta distribution used in the PERT method, so provide greater flexibility in the construction of probabilistic models for real phenomena that occur in an environment of uncertainty.

Key Words: beta distribution, PERT, uncertainty, Expert judgment