

PACKAGE ID - 000695D0VAX00 STADIC2

KWIC TITLE - Monte Carlo Sampling Multiple Probability
Distributions

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LIMITATION CODE -UNL **AUDIENCE CODE** - UNL

COMPLETION DATE - 02/13/1990 **PUBLICATION DATE** - 02/13/1990

DESCRIPTION - STADIC2 uses a Monte Carlo simulation technique to generate pseudo-samples to characterize complementary cumulative distributions for up to 40 user-defined output functions of up to 300 independent variables. The user can describe each independent variable via a normal, log-normal, loguniform, or tabular probability distribution. The user must provide, via FORTRAN coding in the SAMPLE subroutine, the mathematical functions that define the output variables as functions of the input variables.

PACKAGE CONTENTS - Software Abstract; GA-A16227; Media Includes Source Code, Executable Module, Object Module, Sample Problem Input and Output, Read.me File;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 Mag Tape

METHOD OF SOLUTION - Each Monte Carlo sample consists of selecting one pseudo-random sample value for each input variable (from its corresponding statistical distribution), then mathematically combining that set of sample values to find the corresponding value of the function. Multiple values of the function are generated in this way until the desired sample size is attained. These values are then sorted, and the resultant complementary cumulative distribution of the output is generated.

COMPUTER - DEC VAX

OPERATING SYSTEMS - VMS

PROGRAMMING LANGUAGES - FORTRAN

SOFTWARE LIMITATIONS - Because Monte Carlo sampling is used, the number of samples required for an output complementary cumulative distribution function to be meaningful in the tails may be very large if very high confidence is desired. Therefore, caution should be exercised when using the output, to assure that results are statistically meaningful over the desired range of use. In demand mode, output lines are too long to conveniently display on a screen.

SOURCE CODE AVAILABLE (Y/N) - Y

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UNIQUE FEATURES - Input variables can be specified to have standard probability distributions including normal, lognormal or loguniform, or a non-standard distribution can be specified via tabular input. The program can be allowed to choose bins into which to sort results, or bin boundaries can be specified by the user.

RELATED SOFTWARE - STADIC2 was originally based on the SAMPLE code, developed by Aerojet Nuclear Company and used in the Reactor Safety Study (WASH-1400, 1975).

OTHER PROG/OPER SYS INFO - FORTRAN coding describing the output functions mathematically in terms of the input variables must be provided in subroutine SAMPLE (which, depending on the complexity of the relationships, may call other user-provided subroutines). The new coding must then be recompiled and linked to the rest of the package. Package compiled without error. Linkage failed due to undefined symbol (MERR) in module plot.

HARDWARE REQS - VAX running VMS

TIME REQUIREMENTS - Run time requirements are proportional to sample size, but depend strongly on the complexity of the relationship(s) between input variables and output function(s). A simple case of printing out four input distributions based on 20,000 samples takes 13 seconds of computer time on the VAX. A complex case where 93 input variables are combined into 40 output functions, using relationships that require multiple subroutines to encode, take 32 hours of computer time to generate 20,000 samples on a VAX.

REFERENCES - P.K. Koch and H.E. St.John, STADIC2, A Computer Program for Combining Probability Distributions, GA-A16227, July 1983.

ABSTRACT STATUS - Package submitted December 1993. Released AS-IS June 28, 1994.

SUBJECT CLASS CODE - P

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
S CODES
SAMPLING
MONTE CARLO METHOD
PROBABILITY
DISTRIBUTION FUNCTIONS
STATISTICAL MODELS

EDB SUBJECT CATEGORIES -
990200

SPONSOR - DOE/NP

PACKAGE TYPE - AS - IS