

**REPORT ON THE
SESSION ON STATISTICAL COMPUTING HELD DURING THE
43rd ANNUAL CONFERENCE OF THE INDIAN SOCIETY OF
AGRICULTURAL STATISTICS ON 20th DECEMBER, 1989 AT
HARYANA AGRICULTURAL UNIVERSITY, HISAR**

1. The ISAS held a session on Statistical Computing during its Annual Conference to give an opportunity for Agricultural Statisticians to meet, discuss, review and disseminate information and the state-of-the art in Statistical Computing. The session had as

Chairman : Dr. M.N. Murthy
Applied Statistics Centre
Madras

Covnenor : Shri R. Gopalan
I.A.S.R.I.
New Delhi

Speakers : Prof. Prem Narain, I.A.S.R.I.,
New Delhi
Shri N. S. Murthy, C.T.R.I.,
Rajahmundry
Shri O. P. Dutta, I.A.S.R.I., New Delhi
Dr. Padam Singh, I.R.M.S., New Delhi

Participants : 74 delegates.

2. The session started with the Chairman's remarks. He drew the attention of the participants to the problems of
 - (i) Memory management and different schemes used for internal data representation.

- (ii) Error management and rounding off errors in arithmetic computations.
 - (iii) Conversion of data bases to information systems.
 - (iv) Use of simulation techniques for model building.
 - (v) Manipulation of large volumes of data, development of software packages and their portability, adaptability and usability.
 - (vi) Graphics as an integral part of statistical reporting.
 - (vii) Stepwise iterative and recursive methods in statistical computing.
3. The Chairman introduced the lead paper prepared by scientists of Division of Computing Science, I.A.S.R.I. The paper presented the many difficulties and challenges that must be met if we are to make effective use of the power and economies offered by the computer. Better numerical methods are needed for avoiding questionable results being obtained. Attention must be paid to sources of error in statistical computation. If the computational power of computers is to be fully realised for statistical analysis, then additional algorithms need to be developed, published, and disseminated.

Data sorting is an area worthy of much additional attention, because what constitutes a rational data sequence is a matter that must be analysed in the presence of uncertainty, concerning how and how frequently, the data may have to be used. Data bases are constructed independently of procedural capabilities needed for statistical analysis. Statisticians should use statistical techniques in the design and organisation of data base systems.

The primary limitation of use of statistics and computers in simulation modelling is the lack of adequate algorithms.

With the development of faster CPUs and central memories, and with the awareness that the percentage of CPU utilisation, there is interest in interpretive system as part of a general interactive capability in time sharing systems. Information on performance evaluation provides an indication of whether or not the software is performing correctly, and enables the users to make a rational selection from available software. Evaluating computer software is difficult and time consuming task. Statisticians can make a very important contribution here.

For reasons of accuracy and costs work needs to be done on the analytical side of the pictorial representation of data.

With computer intensive methods one can be confronted with a large number of problems of data input, storage and output.

4. Initiating a discussion on statistical computing, Prof. Prem Narain spoke about issues related to data-bases. He talked about informatics, systems approach to establishment of and operation on information systems. He recommended real time applications in agriculture, computer networks and KRISHINET.
5. Shri N. S. Murthy spoke about establishment of germplasm databases and suggested projects for developing information systems. He talked about the software packages as a source of man-power utiliser, foreign-exchange earner, and sophisticated statistical analyser. But, statistical software packages have moved the user away from data. He recommended suitable teaching and training programs for all computer users.
6. Shri O.P. Dutta spoke about use of computers in electronic data processing and presentation of results. Decision making authorities assimilate information better if presented in graphs. For developing such graph writers, a certain amount of knowledge of mathematics is a prerequisite. He recommended the use of graphics in all teaching and training programmes.
7. Dr. Padam Singh spoke about software packages for analysis of survey data. The problem relates to sampling fraction, biased estimation, data editing, statistically non-significant estimates, detection of and decision on outliers, and non-flexibility of many packages. He recommended production of software packages dedicated to specific applications.
8. Some of the participants attending the session joined in the discussion and the points made included the following.

Error propagation is related to both numerical algorithms and computer hardware. As such alternative techniques may have to be developed for existing numerical methods.

Statistical software packages may be made available for analysis of primary and processed data.

Computer hardware scenario is changing fast and users may plan their computing requirements accordingly.

Those collecting data may involve themselves in data validation

and application programmes may be made available in user friendly problem oriented languages along with programme-user-manuals.

Programmes developed may be effectively tested and evaluated. This may require executing programs with standard sets of data, randomly constructed sets of data, and end-users sets of data.

Programming is time consuming and programmes are costly. Programmes so developed may be utilised by a community of users and propagated among them.