

Listed are abstracts from recent papers by IBM authors. Inquiries should be directed to the publications cited.

Abstracts

A class of algorithms for fast digital image registration, D. I. Barnea (Eljim, Holon, Israel) and H. F. Silverman, *IEEE Transactions on Computers* C-21, No. 2, 179–186 (February 1972). The automatic determination of local similarity between two structured data sets is fundamental to the disciplines of pattern recognition and image-processing. A class of algorithms, which may be used to determine similarity in a far more efficient manner than methods currently in use, is introduced in this paper. There may be a saving of computation time of two orders of magnitude or more by adopting this new approach. The problem of translational image registration, used for an example throughout, is discussed and the problems with the most widely used method-correlation explained. Simple implementations of the new algorithms are introduced to motivate the basic idea of their structure. Real data from ITOS-1 satellites are presented to give meaningful empirical justification for theoretical predictions.

A computer-based-design approach to partitioning and mapping of computer logic graphs, R. L. Russo and P. K. Wolff, Sr., *Proceedings of the IEEE* 60, No. 1, 28–34 (January 1972). A system of design automation computer programs that is capable of assigning blocks of a logic design to modules so as to satisfy certain constraints specified on the assignment is described. System features that enable designer-computer cooperation are discussed, and quality of solutions obtained with the system are compared to manual solutions for the same tasks. Three conclusions are reached. First, these computer programs make it possible to perform partitioning and mapping experiments not possible before. Second, for one-level partitions (e.g., logic gates on chips), highly automatic solutions obtained by the system are at least as good as manual solutions and are less costly to obtain. Third, for multilevel partitions (e.g., logic gates on chips on cards) or for mappings, the solutions obtained with the program are again at least as good as manual solutions; furthermore, the system allows a designer to try more alternatives than he could manually, so that he can trade off the time and cost of trying additional alternatives against the value of a better solution.

Laboratory vs. field experimentation in human factors—An evaluation of an experimental self-service airline ticket vendor, R. L. Erdmann and A. S. Neal, *Human Factors* 13, No. 6, 521–531 (December 1971). Human response times in the experimental Automatic Ticket Vendor (ATV) system were studied first in a laboratory test with simulated operation of some parts of the system and then in a field test at O'Hare Airport in Chicago. Results for human response times were comparable in the two tests, but the field test answered other questions about consumer behavior and subjective reactions that could not be studied in the laboratory. This paper compares the test conditions and results and discusses the relative advantages of the two methods of testing for various purposes.

On-line library housekeeping systems: A survey, C. McAllister, *Special Libraries* 62, No. 11, 457–468 (November 1971). This survey of operational on-line library housekeeping covers all systems known as of September 1971. A general discussion of on-line procedures, batch and real-time updating, types of files and indexes, terminals, and the use of a general-purpose data management system as a vehicle for on-line operation is followed by an Appendix giving detailed information on each of the known systems.

On the optimization of message-switching networks, B. Meister, H. R. Mueller, and H. R. Rudin, Jr., *IEEE Transactions on Communications COM-20*, No. 1, 8-14 (February 1972). Criteria recently developed by the authors for optimum capacity assignment in message-switching networks are applied to a network model that now contains nodal processors as well as interconnecting links. Linear and stepped cost functions are examined, and various performance and cost-performance curves are presented. An efficient design procedure is described for the tedious case of stepped cost functions. For general continuous cost functions and the minimax design, the distribution functions of all point-to-point delays can be easily calculated.

Service in a loop system, A. G. Konheim and B. Meister, *Journal of the Association for Computing Machinery* **19**, No. 1, 92-108 (January 1972). The statistical behavior of a loop service system is studied. The system consists of a main station, a server, and N stations arranged on a loop. Customers arrive at each station according to a random process. The server makes successive tours along the loop bringing customers from the N stations to the main station. Two related measures of the grade of service are considered: the average queue length and the average virtual waiting time at each station.