—— 近期發表論文通訊 *Recent Publications by Faculties of NCTU*

Sunil R. Das, Zen Chen and C. L. Sheng

An approach to microprogram optimization through bit dimension reduction in a given control store specification

Presented at the 5th National Systems Conference, Punjab Agricultural University, Ludhiana, September 4-6, 1978 (Conference Proceedings, pp. 121-125) - Also Computers and Electrical Engineering, Vol. 6, No. 2, June 1979.

Given a particular ROM specification, and word dimension control memory can be reduced by reducing the bit dimension at the expense of flexibility. This problem of bit dimension reduction of control memory in a microprogrammed digital computer was first considered by Schwartz. The problem was later reformulated by Grasselli and Montanari in the framework of switching theory,reducing the main minimization problem to a set covering problem of the prime implicant type. Starting with the same basic formulation as of Grasselli and Montanari. Das et al. subsequently developed an approach that helps to arrive at a solution with less computation in general. The present paper investigates the problem of bit dimension reduction in a control memory specification based on the switching theory formulation of Das et al., and develops a simplified methodology for a good "engineering reduction", or,if necessary,to arrive at a minimal solution.

Sunil R. Das, C. l. Sheng and Zen Chen

On a matrix approach to state identification and control of finite-state machines

12th Asilomar Conference on Circuits, Systems, and Computers, Pacific Grove, California, U. S. A., November 6-8, 1978.

The response of a nontrivial sequential machine to specified excitations becomes unpredictable if the state of the machine is unknown. On the other hand, the response of the machine can always be predicted if the initial state is known. Hence one of the basic problems in the study of sequential machines is to identify the state of the machine under investigation. Once the state is identified, the behavior of the machine under all future circumstances becomes predictable, and definite steps may then be taken to force the machine into various modes of operation at the discretion of the investigator. The former class of problems comes under the broad category of problems usually termed the state identification problems, and the latter problem is commonly known as the control problem in sequential machines. One of the most important state identification problems is that of identifying the unknown initial state of the machine, called the initial state identification problem or diagnosing problem; whereas, another important state identification problem is relating to that of identifying the terminal state of the machine, known as the terminal state identification problem or homing problem, of which the special case is the synchronizing problem. The solution to either of these state identification problems constitutes the solution to the basic problem of rendering the machine predictable to the investigator. In the present paper, instead of resorting to the conventional procedure of using the transition table and the corresponding response tree, use is made of the transition matrix representation of the machine and its higher-order forms to solve the aforementioned state identification and control problems. The developed approach is not only simple, but very systematic, and completely algorithmic, and thus lends itself to easy computer implementation.

Sunil R. Das, C. L. Sheng, Zen Chen and Tony Lin

Magnitude ordering of degree complements of certain node pairs in an undirected graph and an algorithm to find a class of maximal subgraphs

Presented at the International Computer Symposium, Academia Sinica, Nankang, Taipei, Taiwan, Republic of China, December 18-20, 1978 (Symposium Proceedings, Vol. One, pp. 520-536).

An undirected or a symmetric graph consists of a set of nodes and a set of nonoriented edges connecting between pairs of nodes. In widely differing disciplines of science and engineering, symmetric graphs find important uses. In many of these application areas, an often encountered problem is that of finding all the maximal complete subgraphs of a symmetric graph. In this paper, borrowing the concept of strong connectedness in a nonsymmetric graph, the idea of minimally strongly connected (MSC) and maximal minimally strongly connected (MMSC) subgraphs in a symmetric graph is introduced. The MMSC subgraphs play a kind of role identical to that played by maximal complete subgraphs in symmetric graphs. Many important properties of MMSC subgraphs are discussed in the paper, and an explicit, computer-oriented algorithm is developed for finding all the MMSC subgraphs, given an undirected graph.

Sunil R. Das, C. L. Sheng and Zen Chen

An algorithm for finding all maximal complete subgraphs and an estimate of the order of computational complexity

Computers and Electrical Engineering, Vol. 6, No. 1, March 1979.

This paper develops an algorithm for finding all maximal complete subgraphs or cliques of an undirected graph. The algorithm is simple, and is based on a refinement of the technique of successive splitting described by Paull and Unger in the determination of maximal compatibles of states in the context of minimization of incomplete sequential machines. The proposed algorithm tends to reduce computation in generating the subgraphs for problems most generally encountered, particularly in relation to the applicability in sequential switching theory.