Another attempt to define computer science

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ABSTRACT

There are equally important scientific and engineering aspects to computer science; they may be described as follows:

SCIENTIFIC ASPECTS OF COMPUTER SCIENCE

The unique aim of the inductive sciences is to predict the future. This has been accomplished in the physical sciences by means of mathematical-symbolic models; the method has been much less successful in the behavioral and life sciences due to the difficulties of constructing soluble models which are valid over a sufficiently large domain. The advent of the computer has made it possible to construct and resolve models sufficiently complex to be interesting although their domain of validity is still limited: the program is here the model. To a large extent, the utility of the mathematical models (or theories) developed in the physical sciences is predicated on the possibility of developing mathematically generalized analytic solutions which permit predictions of very general types of events. This becomes proportionally more difficult as the model becomes more complicated. Thus even though the computer permits resolution of individual cases which otherwise would not be practically feasible, it cannot provide the power of an analytic solution. Thus the scientific aspects of computer science are similar to those of mathematics: they deal with all facets of the construction and especially the resolution of models embodied in this case by programs. The most fundamental problem is still to obtain (if at all possible) general analytic solutions to classes of algorithmic interactions described by programs and this may be considered as one of the most important long-range goals of computer science. In view of the enormous difficulties expected of such an endeavor, secondary goals must also be pursued; these include theoretical studies of program's schema, development and formal analysis of programming languages, development of more powerful computer systems, etc.

ENGINEERING ASPECTS OF COMPUTER SCIENCE

The engineering aspects of computer science are directly related to system design. Defining recursively a system as a collection of interacting objects or systems, we are particularly concerned with systems whose components interact through procedures embodied in computer programs. The aim of engineering is to design a system in such a fashion as to optimize a given criterion function subject to certain given constraints. Thus the design of complex systems where the computer plays a major part requires both extensive knowledge of computer science and of the discipline where the system is utilized. Since a computer system is itself a system of hardware and/or software, computer science design is doubly related to computer science: as the discipline wherein the system is utilized and as the discipline necessary to carry out the design.

The masters degree program in computer science

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ABSTRACT

The Curriculum Committee on Computer Science (C'S) of the Association for Computing Machinery (ACM) is involved in a study of the masters degree curriculum. As visualized by the working group, such programs have two basic objectives:

(a) Providing the student with training in Computer Science preparing him for major positions in the industry.
(b) Testing and preparing the student for more advanced work leading to a doctorate.

Though it is not the intention of the Committee to provide a guide to the formation of a graduate program in Computer Science, it is recognized that many new programs are being developed, and thus it is hoped that the final guidelines will serve as a standard on which the various programs can be measured. To this time efforts have been concentrated on programs directed to the above objectives. It should be recognized that the question of special masters programs such as those for teachers, are not now under consideration.

The structure of the proposed program will be presented, as well as the underlying philosophy of the program. The proposal has been reviewed in several meetings of C'S, and by several departments now offering masters degrees in Computer Science.

The comments and suggestions of the various Committee members and interested professionals will be summarized, and the program will be compared with existing masters degree programs.

This presentation will be of a working document. One of the motivations for presentation of the proposal is to elicit further comments and suggestions from those attending the National Computer Conference.