Teaching Statement

General Statement
My teaching interests are in the general area of my research efforts, however the teaching methodologies that I have adopted are not mandated by particular research areas but rather by patterns in conducting research. In a nutshell, I strongly believe that in order to achieve success in the classroom, the instructor needs to motivate and challenge the student. In order to do so, a balanced exposition to theoretical and practical issues is required. Furthermore, I consider very important to encourage students to work on fundamental as well as on difficult problems using their own initiative and capabilities. What is important is not to actually solve the problem but rather for students to establish their own strategy for addressing problems, to acknowledge their individual strong and weak qualities. Course work should be considered as a means to stimulate interest, inquisitiveness as well as thoroughness. Equally important is inspiring the students to adopt a code of academic ethics and integrity. I consider teaching to be a particularly powerful tool in achieving these goals.

Numerical Linear Algebra
Undoubtedly, Linear Algebra is one of the most important areas in mathematics, with numerous applications in an extremely wide spectrum of disciplines in Science & Engineering. In Linear Algebra, the powerful techniques of mathematical analysis are combined with the wealth of intuition that Geometry provides, resulting in mathematical objects that are primarily characterized by structure. Transferring Linear Algebra to the computer, the fundamental notions of approximation and algorithm evidently arise. Thus, I firmly believe that Numerical Linear Algebra can serve two major pedagogical goals in a Computer Science curriculum:

- To provide a structured framework for teaching algorithms and programming. Furthermore, through Numerical Linear Algebra, students can appreciate the importance of verifiability of results, appreciation of the fact that almost everything in computing is an approximation which must be controlled.
- To provide students with very useful analytical skills in modern applications. Linear Algebra, although traditionally central in other areas of Science & Engineering, has been, in recent years, emerging as a key tool in popular Computer Science applications too. Some include, performance evaluation of computing systems and networks (i.e. in Matrix Analytic Techniques), pattern recognition and learning (i.e. in Linear Discriminant Analysis), Data Mining of large scale data and graph partitioning just to name a few.

Numerical Methods in Mining of High Dimensional Data
One of my teaching goals is to establish a course program for numerical techniques in mining of high dimensional data. The material will involve a theoretical introduction as well as complete exposition of relevant algorithms. Furthermore, students will be required to acquire “hands on” experience by programming projects. Apart from the goal of grasping the material per se, students will come to appreciate the importance of scalability of algorithms, which is a property crucial in numerous computing applications, such as data mining.

High Performance Parallel & Distributed Computing
The last decades have witnessed a dramatic increase in the speed of computing machinery as well as in memory capacities, almost exactly following Moore’s law. In this process, ideas and practices that were once used only in supercomputers have found their way into our desktop machines. Computers, having gained tremendously in raw power, have also become far more complex, both in terms of hardware as well as software (i.e. Operating System) support. This progress has enabled scientists to conduct complex simulations, that
were in the past considered to be intractable. Computations that in the past were run only on supercomputers are emerging today as usual tasks on of commodity workstations. However, the increased computing power at our disposal has opened the way for even more complicated and costly simulations and computing challenges. Thus, even our most powerful computers have very limited capabilities versus contemporary computational problems in science and engineering. For the above reasons, I strongly believe that educating new computer scientists in high performance computing is absolutely essential.

Multiprocessors, distributed and GRID computing are emerging as very active fields in the computing profession. Therefore, I consider important to familiarize students with techniques of parallel and distributed computation, that due to the ever increasing network integration of computing resources, tend to become a mainstream practice in modern computing.

Graduate, undergraduate and interdisciplinary teaching
I am very interested in teaching at both the undergraduate and the graduate level. I find the interaction with students to be particularly rewarding. Furthermore, I am eager to teach in a interdisciplinary environment. I believe that teaching computing practises in students outside a computer science department has much to offer.

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