Teaching Statement: Dipanjan Das

I have been actively teaching students for the past ten years. My teaching experience started with tutoring high school students in mathematics. In India, where I did my schooling and undergraduate studies, to study engineering in esteemed institutions, one has to appear for nationwide competitive entrance examinations in the sciences. During my early undergraduate years, I started teaching high school students in my neighborhood to prepare them for these exams. In senior year in college at the Indian Institute of Technology (IIT), Kharagpur, I was one of two undergraduate students in Computer Science to be appointed as a teaching assistant for a programming and data structures course. IITs are known all over the world for their premier status in undergraduate education; being part of the teaching process there gave me early experience in teaching introductory Computer Science material to first and second year undergraduate students in the sciences and engineering.

Since then, I have acted as a teaching assistant and recitation instructor for three courses in graduate school; at each occasion, my involvement was praised by the primary instructor and the students. Beyond academics, at leisure, I have been a teacher of North Indian vocal classical music for the past few years, and have taught several aspiring vocalists in the city of Pittsburgh. With my wide range of teaching expertise, I have gained experience about how different students learn in different ways; through training undergraduate students in research and teaching them introductory computer science topics necessary for research projects, I have developed expertise in estimating the spectrum of learning techniques across students.

In the following sections, I will describe the teaching philosophy I adopted as a teaching assistant for three courses at Carnegie Mellon University and Stony Brook University. I will conclude with some ideas about future courses I would like to design and teach.

1 Probabilistic Graphical Models (Fall 2010)

Although my primary research area is natural language processing, in Fall 2010, I got an opportunity to serve as a teaching assistant for Probabilistic Graphical Models, a graduate course in machine learning at CMU. The Fall 2010 edition of this course was taught by Professor Noah Smith. As a graduate student, I did not take this course, but I wanted to be its TA to learn more about this area of machine learning, which is increasingly being adopted in a wide range of areas within Computer Science. I was fortunate to be selected as a TA for this course, and I faced the challenge of learning as well as teaching the course to other graduate students. The experience was unique, and the amount of knowledge I acquired by interacting with students and learning with them is unparalleled in comparison to any other course I have taught or taken. Apart from learning new topics, teaching the course instilled confidence in me to teach new and recent topics appending the traditional syllabus of a course.

As part of this course, not only did I design and solve assignments and a final exam, I also got a chance to interact with the students by teaching biweekly recitation lectures. This exercise, a rare opportunity in CMU in a graduate course, required me to clarify and delve deeper into concepts taught in the main class lectures. The atmosphere in these recitations was informal, with questions often interrupting the teaching process, and the knowledge exchange being interactive. As part of these recitations, I focused on areas which were covered swiftly in class lectures, but are useful in practice. I brought in examples from application areas like language and text processing as applications of graphical models, to instantiate the abstract models taught in class. Students often asked questions about problems from the course’s textbook, which I solved in class.

The course also required me to advise several student research projects. From advising students on project selection by reading proposals to assessing midterm reports and advising on feasible directions of these projects, I closely followed these projects till the end of the semester. Some of these projects were successful studies, worthy of publication at academic conferences. Apart from interacting with students who participated in projects related to my research area, I chose to advise certain projects in areas like computer vision and computational biology to learn how declarative models are used to solve problems in these related areas in Computer Science.
2 Introduction to Computer Music (Spring 2009)

My first teaching experience at CMU was as a teaching assistant of one of the coolest courses offered by the School of Computer Science. I was a TA for the Introduction to Computer Music course for Professor Roger Dannenberg, famous computer scientist and trumpeter. Being formally trained in music for over 15 years, I was interested in the interdisciplinary area of Computer Music, an area trying to amalgamate algorithms, cognition and music. Having dabbled in automatic generation and understanding of music during my undergraduate days, I approached Prof. Dannenberg and was selected by him to be a teaching assistant of the course. The nature of instruction of this course was very different from any other course I took in the past ten years of study in Computer Science. The first lectures involved teaching to program in a new functional programming language called Nyquist, which is well suited for sound synthesis and composition. Gradually, signal processing techniques for emulating real instruments, and creation of new, attractive sounds from first principles, using frequency modulation and artificial inclusion of effects like vibrato were introduced in the course. Principles of creating whole compositions came last. Along with guiding students to learn to generate music using the above techniques during office hours, I had to learn the course material myself ahead of time. Grading assignments and projects for this course was a rewarding experience as I was introduced to a wide array of creativity, both from the perspective of art and Computer Science. I learned from Prof. Dannenberg how to make a lecture interesting for a student body coming from nearly all the different departments at CMU, by including a range of things – from listening exercises that sometimes lasted fifteen minutes to having a live interactive Skype conference call with Computer Music stalwarts like John Chowning. This TA experience gave me an insight into generating interest in a new area of Computer Science among a broad audience.

3 Computer Science I (Fall 2005 – Spring 2006)

For two semesters, I was a teaching assistant for one of the largest introductory Computer Science courses at Stony Brook University, where I spent two semesters as a graduate student in 2005-2006. The goal of this course was to teach first year undergraduate students the basic principles of programming, the use of data structures, and teaching specifics of a selected programming language. I taught two recitations of this course every week, graded assignments and two exams over the course of two semesters. As this course was taken by a large body of students of varying interest in the material, I had to develop a technique of reaching out to students with different degrees of involvement in the course. For the general audience, I had to be patient with very basic topics; with careful hand-holding, in each semester, the students evolved to be comfortable in writing basic programs. Several students in the class went beyond the basic course material; I piqued their interest by introducing challenging subject matter during the recitations. At the end of the academic year, I was proficient in designing and teaching a basic Computer Science course to undergraduates.

4 Future Courses

Other than the aforementioned experience in teaching, I have served as a guest lecturer in the graduate empirical methods in language processing course, called “Language and Statistics II” and the undergraduate “Natural Language Processing” course at CMU. Attending and serving as a guest lecturer in these courses, and having worked in the area of NLP for the past seven years, I have a precise idea about teaching both an undergraduate and graduate course in natural language processing, especially with a focus on statistical methods. I have novel ideas about creating interesting project ideas for a graduate course in statistical NLP, that can go hand in hand with the evolving topics that form the syllabus of such a course. A teaching goal I have is to generate and develop interest in the area of natural language processing in the undergraduate community, who often are not exposed to this interdisciplinary area of Computer Science. I am also in a strong position to teach a course machine learning, as a significant portion of my Ph.D. has been spent on developing new learning techniques suited to the problems that my dissertation attempts to solve.

Given the opportunity, I also intend to organize graduate-level courses and seminars, especially in the areas of semi-supervised and unsupervised learning, and computational semantics, two areas that interest me and I want to actively pursue in the near future.