Report on Computer Science Colloquium Series

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1 Introduction

This report will focus on Professor Shun-Chin Hsu, Dr. Der-Tsai Lee and Professor Chiou-Shann Fuh's speeches since I was mostly impressed by the concepts and research given by them. This report states my sentiments, opinions and questions about these speeches and it includes three subjects as follows. The first subject is "*How Does a Computer Play Chinese Chess?*" which was given by Professor Shun-Chin Hsu, the second subject is "*A Guided Tour of Computer Vision* which was given by Professor Chiou-Shann Fuh and the last subject is "*Introduction to Geometric Computing*" which was given by Academician Dr. Der-Tsai Lee. Among these speeches, I relish the last subject the most since this topic of research is strongly related to my research and computer algorithms are my favorite.

2 How Does a Computer Play Chinese Chess?

This speech was given by Professor Hsu on October 4. We know that Chess is very famous. We can exercise thinking and doing analyses during playing Chess. However, *Chinese Chess* is much more complex and difficult than Chess because we have to consider much more cases at each option. I think that the *computing power* and *the size of database* are the keypoints to make computers "think" more

quickly and have enough experience to win Chess plays or even Chinese Chess plays.

In my opinion, I think the larger the size of the database is, the "smarter" the computer seems to be because we can find the nearly optimal solution without computing according to the current situation. It seems that algorithms are not as important as the size of the database. For example, if I can memorize much more records of famous Chess plays between expert, I will hardly lose the chess plays. Since I haven't taken the course "*artificial intelligence*", I don't know if my notions are right. Maybe inferences from databases and make use of techniques of data mining will help and they are all what we need. By the way, in order to implement the Chinese Chess playing system must require profound programming techniques and take much time. Besides, if we want to be familiar with the domain-knowledge of playing Chess, we have to spend quite much time to understand techniques and rules of Chinese Chess (or Chess). I think that this field is really difficult to me.

As to artificial intelligence, I think the hardest parts for computers to "learn" are contradictions and emotions of human beings. Contradictions and emotions usually influence our decisions. However, is it necessary to make some computer work like human beings? Do we need a robot *who* has feelings and sometimes makes mistakes? I think they should be subjects which deserve to be discussed.

3 A Guided Tour of Computer Vision

This speech was given by Professor Chiou-Shann Fuh on October 11. This speech is quite interesting to me. Yet it's a pity that Professor Fuh didn't talk about many criteria of Computer Vision. I expect his speech and I hope that he can give us some principles, algorithms or some criteria of computer vision.

Computer Vision makes us observe things and objects more carefully in our environment. After Professor Fuh's speech, I started to view things and objects more precisely. "*What makes it look different?*", "*Why does it look different from what it actually is?*" and "*How should we analyze the object precisely and logically?*" are the most frequently asked questions in my mind. Eyes can tell lies to us. Things look right may actually be wrong.

Some pictures are showed to be unreasonable since some line is not only inside a house but also outside a house. But how does a computer find out these loopholes? If we can redraw the strange pictures in the 3-dimension space, we may successfully find out the loopholes by checking if each part of the object line is located in the house which can be formulated to be an space-equation. In my opinion, tracing the outline of an picture and transfering it to be coordinates and equations should never make us feel confused.

A problem occured in my mind. *How does a computer appreciate of the beauty*? More precisely, what are the essential factors of beauty to a computer? Symmetry, plenty, colorfulness, or something else? If we have sufficient ideas about beauty, writing programs to test if a picture is beautiful will be interesting.

4 Introduction to Geometric Computing

This speech was given by Dr. Der-Tsai Lee on October 18. I have studied in the field of algorithms and computational geometry for more than two years. I know that Dr. Lee is the world's greatest scholar in this field, thus his coming is especially meaningful to me.

He said that computer science is not only *programming*, but also the *problem solving*. The latter is what he emphasizes. I can't agree with him any more. If we cannot have efficient algorithms to solves problems, programming doesn't make sence. The most important part of the problem solving is *mathematics*, which is called the mother of sciences. Analyzing problems, calculating formulas and verifying hypotheses all requires techniques and principles of mathematics.

From this speech, we learned analyzing problems and solving problems by creative approaches. Even a very small or very detailed problem may reveal some efficient solutions to solve. For example, solving the selection problem by comparison machines simultaneously is really efficient and easy to be implemented. In addition, even a very complex or very abstract problem can be solved step by step. For example, solving the Voronoi diagram problem by divide-and-conquer is quite amazing.

I used to be a student of department of mathematics a few years ago, so mathematics is familiar to me. From Donald E. Knuth's book *concrete mathematics*,

we know that mathematics includes the ”continuous” part and the ”discrete” part. Here we may add the ”combinatorial mathematics” to the ”discrete” part. Everybody knows that the discrete part of mathematics is just like our best friend who is always with us and does us favors. However, we seldom exert our strength on the other part: ”continuous mathematics”. I believe that this part should be useful to us. Nevertheless, less research has been done with it. For computer scientists, is it useless? What are its applications? These are the questions I want to consult Dr. Lee. It's a pity that I lost the chance to ask him.

5 Acknowledgement

All speakers invited in this course are very charming and interesting. I think that everyone learns much and enlightened a lot. Here I want to express my appreciation for the teachers who were in charge of inviting and accommodating the speakers. Without your work, we cannot enjoy these wonderful and spectacular speeches. Because of this class, we have chances to learn much more new knowledge and new concepts of research which aids in ourselves research.