TEACHING STATEMENT
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Teaching Plans. As an instructor, I plan to offer courses in both introductory and graduate levels in broad areas, depending on the needs of the department. As both research and industry communities require versatile talents from students, my learning/teaching/research experience in many different areas (i.e., computer science, electrical engineering, statistics and robotics) will definitely add value towards developing skills needed both in industry and research. In general, for undergraduate courses, the main goal will be to (1) familiarize students with the basic topics with strong examples with a focus on proficiency in the “standard” material, (2) include enough content in the lecture/assignments to challenge those exceptional students at the right tail of the distribution. In the graduate level courses, I plan to teach more advanced topics to help students think independently and analytically, and encourage them to become independent researchers.

Based on my expertise, I plan to offer Medical Image Analysis or related courses in both undergraduate and graduate levels. These are the courses that integrate multiple areas such as computer science, statistics, electrical engineering and neuroscience, and they are not common at many schools. The class will consist of introduction to brain image data acquisition (e.g., magnetic resonance image and diffusion tensor image), statistical data analysis (e.g., sampling, linear models and group analysis), image processing (e.g., Fourier transform and image segmentation) and machine learning (e.g., support vector machine (SVM) and logistic regression). Students in this course will learn to collaborate with people from different fields and make contribution to both machine learning and biomedical communities. Minoring in Statistics, I can also offer introductory statistics/mathematics courses such as Mathematical Statistics and Linear Algebra from a strong application side, that are fundamental in Computer Science and Electrical Engineering. I believe that statistics has now become a fundamental topic in Machine Learning and Data Science, and its contents are essential in both industry and research. The courses will cover basic concepts and methods in statistics (e.g., sampling techniques, parameter estimation, mixed effects model and hypothesis testings) and data analysis using Linear Algebra (e.g., principle components analysis, singular value decomposition and matrix completion).

Since my primary background is in Computer Science, I am happy to teach courses in Computer Science especially related to Artificial Intelligence (AI). For an introductory course, I can offer Introduction to Artificial Intelligence, which will cover basic concepts in AI (e.g., decision trees, SVM, naïve Bayes and robotics), which will help students understand how computers learn from observations (data). I can also teach graduate level courses in AI such as Machine Learning and Computer Vision, both of them will cover not only traditional methods but also the state-of-art techniques (e.g., graphical models, convolution neural network and deep learning) in the area. In these courses, I will try to provide research intuition to students, and hopefully advance course projects to publishable papers. Other than these AI courses in Computer Science, I can also teach some of the introductory undergraduate courses such as Data Structure and Algorithms, which are exciting because of the size and diversity of the audience.

Since I got B.S. in Information and Communication Engineering (concentrated in electrical engineering) / M.S. in Robotics and my research combines Signal Processing and AI, I can also offer those courses that overlap between Computer Science and Electrical Engineering such as Image Processing and Signal and Systems. I am interested in teaching these topics since they are closely related to Harmonic Analysis.

Advising Plans. As a faculty, I look forward to supervising graduate students who are interested in biomedical image analysis, data analysis and computer vision. The research topics will vary depending on the students’ interest but mainly focused on

1. developing sensitive methods for statistical brain image analysis,

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2. developing machine learning techniques motivated by applications in biomedical areas,
3. developing scalable data analysis methods for high-dimensional large-scale imaging and clinical data.

These are the topics that I have been working on and plan to mentor new students in. A typical collaborating student will develop diverse skills in machine learning, mathematics and image processing, and will be able to conduct original research. I also plan to collaborate with undergraduate students, introduce a taste of research and excite them to join graduate programs if possible.

**Teaching Experience.** At University of Wisconsin - Madison, I was a teaching assistant for two graduate level courses, *Statistical Medical Image Analysis* and *Computational Methods in Medical Image Analysis*. Since I did not give lectures myself in those courses, I put more emphasis on communication and discussion with students. Especially in Statistical Medical Image Analysis course, I attended every class so that I could meet the students as often as possible and kept both regular and open office hours. When a student came to my office hour, I generally tried to explain things from different perspectives because each student understands a given concept in different ways depending upon their background.

Regarding lectures, I have consistently given invited lectures in *Computer Vision* and *Methods in Medical Image Analysis* courses every year. In each lecture, I prepared visual slides that excited students, which made it easier for me to interact with the students actively. Each slide had illustrative figures that speak more than letters and words, and I was able to efficiently deliver messages to the class.

I also had three undergraduate students as mentee during each summer in 2012, 2013 and 2015. With Sylvia Charchut, one of the mentees from Southeastern Louisiana University, we studied identifying group differences in brain network between subjects with bipolar disorder and normal controls, and our findings were published in Medical Image Computing and Computer Assisted Intervention (MICCAI) conference in 2013.

Earlier during my Masters at KAIST, I was a TA for *Intelligent Robot Design Laboratory*, a course of 15 students. For the course, I designed experiments that students would run to understand basic concepts in robotics. Throughout the course, I carried weekly discussion sessions on my own and successfully led everyone to finish the course. In the sessions, I would not just give an answer to certain question but provide as much materials as possible for students to think analytically so that they can answer the questions themselves. I also have a fair bit of tutoring experience with high school students in mathematics, physics and English, where I first learned to communicate with students.

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