Yue Gao

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EDUCATION

University of Wisconsin-Madison, Madison, WI ▪ Fall 2006 – present
BS Honors in Computer Sciences
BS in Mathematics
Overall GPA: 3.78 out of 4.0
Winona State University, Winona, MN ▪ Fall 2004 – Spring 2006
BS in Computer Sciences
BS in Mathematics
Overall GPA: 3.91 out of 4.0

HONORS & ACTIVITIES

University of Wisconsin-Madison (2006-present)

- Summer Research Fellowship in Computer Science Department (summer 2008)
- Dean's List (2006-2007)

Winona State University, Minnesota (2004-2006)

- Dean's Lists(2004-2006)
- Computer Science Scholarship(2006)
- President Honor Cross Culture Awards (2005)
- Certificates for Tutoring of Winona State University

RESEARCH EXPERIENCE

Senior Honor thesis Project (01, 2008- present.):

University of Wisconsin-Madison
Advisor: Professor Michael Coen (Computer Science Department).
This research project aims to develop a learning framework for understanding how humans play the number game. The theory explains how learners can generalize the formulation of a sequence of numbers with a few data examples by making rational inductive inferences that integrate prior knowledge about plausible hypotheses. Our proposed solution is by constructing a probabilistic context free grammar(PCFG) framework for the number game. In PCFG or Stochastic Grammar framework, we will not be limited by infinite many hypothesis, instead, we can explore the hypothesis space based on its prior.. By applying Viterbi algorithm, we have the probability guide the search through infinite hypothesis space yet still able to capture

the simplest function that generates the sequence of numbers. This project touched on a very interesting aspect about how human learns to generalize concepts from infinite hypothesis space cognitively and computationally. In addition, this framework is applicable in fields such as construction of protein and RNA folding patterns.

Research Assistant in Voice lab (08 /2007- present.):

University of Wisconsin-Madison

Advisor: Professor Jack Jiang (Biomedical Engineering Department and Surgery Department)

Spatiotemporal Fourier analysis of high-speed videoendoscopy (under review):

In voice analysis, fundamental frequency (f_0) is of great importance. Many applications have applied temporal f_0 as an indicator of the voice condition. However, vocal fold vibration exhibits spatial as well as temporal dynamics. Therefore, understanding frequency variations in both dimensions is essential for studying the overall voice production in laryngeal pathology. The purpose of this study is to apply a Spatiotemporal Fourier Analysis (SFA) method to high-speed videoendoscopy (HSV) data to delineate the spatial and temporal dynamics simultaneously. The variable spatial bandwidth was defined to categorize the spatial range at the fundamental frequency. By preprocessing the videos by segmentation and noise filtering, we applied SFA to extraction to the processed images. The spatial bandwidth derived from SFA was significantly different between normal and patient groups indicating that SFA is capable of describing human vocal fold vibration for HSV data, which could potentially be helpful in the clinical assessment of laryngeal pathology.

A decision-tree based on support vector machines to classify voice pathologies using high-speed videoendoscopy (writing up)

In this project, we propose a computer based method for differentiating normal and pathological larynges on the basis of HSV recordings from 101 patients with normal larynges, leukoplakia, nodules or polyps. After pre-processing samples were analyzed for the number of glottal regions present during the open phase, the symmetry of the glottal area, the convex nature of the vocal folds and the ratio of the minimal to maximal glottal area. A decision tree based method with support vector machines at the tree nodes was used to separate samples. Measures of the number of glottal regions, the ratio of glottal areas and concavity all showed significant differences between normal and abnormal samples Normal samples were differentiated from pathological samples with an accuracy of 89.1%. The likelihood of a false positive was 18.1%, while false negatives occurred in 8.9% of cases. Images were classified into specific pathology groups with an accuracy of 69.3%. The combination of SVM and decision tree improves the differentiating capabilities of the parameters employed. While our program was successful in separating normal from abnormal samples, the classification of unique pathologies requires the development stronger individual factors.

Research Interest: machine learning, Stochastic programming, medical image analysis.

I am interested in an interdisciplinary research area that is related to both computer

science and biology or medical science. I find myself fascinated about how machines learning concepts is conducive to revealing mysterious puzzles in cognitive science; how a decision support system in medical field can practically benefit the patients and doctors. Being in an interdisciplinary area, seeing and solving problems from a different aspect, I can bring sparkles into both fields. In the future, I will get a PhD degree which will enable me to undertake edge-cutting research and work toward making machine learning a powerful tool for expanding the visions of doctors as well as people on the street.

TEACHING EXPERIENCE

Tutor for Mathematics Department:

Winona State University, Math department. (01/2005-05/2006)

I gave practice sections for two of the introduction level class and held drop off tutoring hours for Math and Statistics classes.

TriO Student Support Service (SSS) program

Winona State University, Academic Assistant Center (01/2005-05/2006).

TriO and SSS is a program which help low-income and first generation disadvantaged students. Being a tutor in this program is not merely about teaching. Instead, I met people from different culture background. Furthermore, I was trained to be a better communicator and a more patient listener.

CS 250 (Java programming), CS 275 (Algorithm Design) Grader and tutor

Winona State University(01//06-05/06)

PROGRAMMING SKILLS

Programming Language: Java, C++, C, Matlab, Prolog, Prism, Dreamweaver, JESS
Operating System: Windows, Unix

Higher level Computer Science and Mathematics Coursework

CS352 Digital Systems Fundamental
CS412 Intro to Numerical Methods (Matlab)
CS475 Intro to Combinatorics
CS513 Numerical Analysis
CS514 Numerical Linear Algebra
CS525 Linear Programming Methods
CS537 Operating Systems
CS540 Into to Artificial Intelligence
CS577 Intro to Algorithms
CS638 Intro to Medical Image Analysis
CS640 Intro to Computer Network
CS838 Computational Cognitive Science
Math521 Advanced Calculus.