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Message from the Chapter Chair

On behalf of the Association for Computing Machinery (ACM) Mid-Southeast Chapter executives, I welcome you to this year's Fall Conference in scenic Gatlinburg, Tennessee. Did you know that

- ACM is one of the oldest, largest and most renowned educational and scientific computing societies?
- The ACM Mid-Southeast Chapter was formed in 1959 and is among the oldest chapters of the ACM?
- The chapter covers the U.S. mid-southeast region that includes the states of Kentucky, Tennessee, Georgia, South Carolina, Alabama, and Mississippi?
- The chapter has a membership of about 100 people?

The chapter is proud of its rich traditions. The membership is small enough for everyone to know and be known by everyone else, but diverse enough to accommodate nearly all areas of computing. In keeping with the traditions that make the membership return year after year, the conference offers an opportunity for collegiality, renewal of friendships, and the making of new friendships that are likely to last for years. The diversity represented by the chapter's membership will be evidenced by the cross-section of presentations in scholarship, pedagogy, roundtable, and poolside discussions. There should be something for everyone. Perhaps one of the best parts of the conference is the presentations by our students. We are excited to have these bright young minds join us and to challenge us. Take a minute during the conference to stop and say hello and thank them for their contribution to this conference.

Membership in the chapter is included in the conference registration, but there are some who join the chapter to help support its goals regardless of whether they attend the fall conference. Everyone is welcome. There are two membership categories: the professional category at \$10.00 per year and student membership at \$5.00 per year.

If I have not found you to say "hello," the hospitality suite will be open. Come, renew the old and make those new friendships. Once again, welcome and enjoy the conference and beautiful Gatlinburg.

Kathy Winters, Chair
University of Tennessee–Chattanooga

Chapter Officers

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Student Paper Competition Judges

Chair

Randy Smith, University of Alabama

Undergraduate 2-year & 4-year

Ramana Gosukonda, Fort Valley State University

Cen Li, Middle Tennessee State University

Jeff Gray, University of Alabama-Birmingham

Undergraduate 4-year

Tony Pittarese, East Tennessee State University

Vicki Hightower, Elon College

Nancy Smithfield, Austin Peay State University

Master's

Tzusheng Pei, Jackson State University

Jim Vandergriff, Austin Peay State University

Anant Honkan, Georgia Perimeter College

Ph.D.

Shamim Khan, Columbus State University

Wayne Summers, Columbus State University

David Frazier, East Tennessee State University

Session Chairs

Azalea Room

- Session I: Shamim Khan, Columbus State University
- Session II: Wayne Summers, Columbus State University
- Session III: Tzusheng Pei, Jackson State University
- Session IV: Jim Vandergriff, Austin Peay State University
- Session V: Anant Honkan, Georgia Perimeter College

Dogwood I

- Session I: Cen Li, Middle Tennessee State University
- Session II: Jeff Gray, University of Alabama-Birmingham
- Session III: Tony Pittarese, East Tennessee State University
- Session IV: Vicki Hightower, Elon College
- Session V: Nancy Smithfield, Austin Peay State University

Dogwood II

- Session I: Joyce Crowell, Belmont University
- Session II: Ashraful Chowdhury, Georgia Perimeter College
- Session III: Ken Adcock, Cleveland State Community College
- Session IV: Ray Seyfarth, University of Southern Mississippi
- Session V: Brian Toone, Samford University

Magnolia Room

- Session I: Kathy Winters, University of Tennessee–Chattanooga
- Session II: Denise Williams, University of Tennessee–Martin
- Session III: Ramana Gosukonda, Fort Valley State University
- Session IV: Brenda Parker, Middle Tennessee State University
- Session V: Jim Johnson, Bethel College

Alternates

- Emery Gathers, University of Tennessee–Martin
-

ACM Mid-Southeast Chapter
2007 Fall Conference
Gatlinburg, Tennessee
Glenstone Lodge

Thursday, November 15, 2007

4:00 – 6:00 p.m. **Registration**
6:00 – 7:30 p.m. **Social Meeting, Hospitality Suite**
7:30 – 9:00 p.m. **Dinner — Individual Arrangements**
9:00 – 12:00 p.m. **Social Gathering, Hospitality Suite**

Friday, November 16, 2007

7:30 – 9:00 a.m. **Registration**

7:30 – 8:00 a.m. **Morning Coffee Sponsored by
Course Technology**

8:00 – 8:10 a.m. **Welcome/Announcements — Azalea Room**

Welcome
 Chapter Chair

Conference Announcements
 Conference Chair

Program Announcements
 Program Chair

8:10 – 9:00 a.m. **Keynote Address**

9:00 – 9:15 a.m. **Coffee Break Sponsored by Course Technology**

Session I: 9:15 – 10:35 a.m.**Azalea Room: Doctoral Degree Papers**

Session Chair: Shamim Khan, Columbus State University

- 9:15 – 9:35 *Point Correspondence via Similarity of Intensity Gradients*, Graylin Trevor Jay, University of Alabama
- 9:35 – 9:55 *Design and Specification of Classes Using JavaMP/JML-MP*, Matthew Thornton, Virginia Tech
- 9:55 – 10:15 *6DOF Bezier Surface Editing Using Marker-based Augmented Reality*, David O’Gwynne, University of Alabama–Birmingham
- 10:15 –10:35 *A Portable Toolbox for the Visualization and Processing of Multimodal Geophysical Measurements*, Bruce Johnson, University of Tennessee–Knoxville

Dogwood I: Undergraduate 4-year Papers

Session Chair: Cen Li, Middle Tennessee State University

- 9:15 – 9:35 *The Mathematics and Computer Science of “Deal or No Deal,”* Jesse G. Smith Jr., Maryville College
- 9:35 – 9:55 *Software Engineering in a Team Environment: Creating an Autonomous Railway System Controlled via the Internet*, Andrew Smith, Stephen Harper, and Abel Montgomery, Columbus State University
- 9:55 – 10:15 *Developing Xbox 360 Games at XnaDownload.com*, Adam Corum, Weston Gentry, Jared Glendowne, and Thomas Hooper, University of Tennessee–Martin, (Advisor: Bob Bradley)
- 10:15 –10:35 *3D Modeling and Animation: A Must Skill for Undergraduate Gaming Majors to be Successful in the Field*, Austin Areaux, Eastern Kentucky University
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Dogwood II:	Professional Papers Session Chair: Joyce Crowell, Belmont University
9:15 – 9:35	<i>Automatic Acquisition of Concepts</i> , Ze Zhang, Coker College
9:35 – 9:55	<i>Pellissippi State's Virtual Campus</i> , David Brown, Pellissippi State Technical Community College
9:55 – 10:15	<i>Building a Computer Networking Lab with Virtualization Tools</i> , Jiang Li and Nancy Smithfield, Austin Peay State University
10:15 – 10:35	<i>Background Virtual Machines for Distributed Computing</i> , Phillip S. Young, Ross A. Binkley, William P. Greenway, Jeremy Ey, and Eric L. Brown, Tennessee Technological University
Magnolia:	Professional Papers Session Chair: Kathy Winters, University of Tennessee–Chattanooga
9:15 – 9:35	<i>An SNMP Agent Software Suite Design and Implementation for SCADA Systems</i> , Yingbing Yu, Austin Peay State University
9:35 – 9:55	<i>Modeling Paradigm Blindness</i> , Steve Donaldson, Samford University
9:55 – 10:15	<i>Automatic Mapping of Applications onto Reconfigurable Computers</i> , Xuejun Liang, Jackson State University
10:15 – 10:35	<i>A Pipeline for Searching Relevant Articles for a Research Topic on the PubMed Database and for Subsequent Text Mining</i> , Tzusheng Pei, Raphael D. Isokpehi, and Hari H.P. Cohly, Jackson State University

Session II: 10:40 – 12:00 p.m.**Azalea Room: Doctoral – Master’s Degree Papers**

Session Chair: Wayne Summers, Columbus State University

10:40 – 11:00 *Study and Analysis of Proteomics and Quantitative 2D Gel Parameters for Different Proteins*, Richa Tiwari, University of Alabama–Birmingham

11:00 – 11:20 *More Accurate Correction of Opacity Composition Artifacts in Oversampled Volume Ray Casting*, Jong Kwan Lee, University of Alabama–Huntsville

11:20 – 11:40 *The Relativity Between Human Genome and Multiply Function Areas*, Hua Zhong, University of Alabama–Birmingham

11:40 – 12:00 *Synthesized Music for DNA Sequence with Computer Audio*, Rong Zhou, University of Mississippi

Dogwood I: Undergraduate 4-year Papers

Session Chair: Jeff Gray, University of Alabama–Birmingham

10:40 – 11:00 *A Study of Current-Voltage Regulation of an Electrical Diode Using Nonlinear Least Square Model*, James Howard, Mississippi Valley State University

11:00 – 11:20 *Organizing a Document Collection Using the Self Organizing Map*, Iyatiti Mokube, Armstrong Atlantic State University, (Advisor: Ashraf Saad)

11:20 – 11:40 *Cognitive Mapping and Artificial Systems*, Gregory Brazda, and Benjamin Dennis, Samford University, (Advisor: Steve Donaldson)

11:40 – 12:00 *Globular Star Cluster Evolution on a Beowulf Class Computer Cluster*, Justin Moore, Furman University

Dogwood II:	Professional Papers Session Chair: Ashraful Choudhury, Georgia Perimeter College
10:40 – 11:00	<i>An Introduction to JGAP: A Framework for Genetic Algorithms</i> , Ken R. Adcock, Jr., UPS Supply Chain Solutions
11:00 – 11:20	<i>A Study of Undergraduate Preferences and Experiences in Online Fashion Shopping</i> , Tony Pittarese, East Tennessee State University
11:20 – 11:40	<i>Improving User Control of Personal Data Release</i> , Syed Raza, Talladega College
11:40 – 12:00	<i>Fast Image Mosaicking using Multicore CPUs</i> , Ray Seyfarth, University of Southern Mississippi
Magnolia Room:	Professional Papers Session Chair: Denise Williams, University of Tennessee–Martin
10:40 – 11:00	<i>GUS: Grading Using Subversion</i> , Roland H. Untch, Middle Tennessee State University
11:00 – 11:20	<i>A Task-Set Approach for Teaching an Online Programming Course</i> , Jeffrey Roach, East Tennessee State University
11:20 – 11:40	<i>(Mis)Adventures in Cyberspace: Teaching and Learning Online</i> , Beth Walker, University of Tennessee–Martin
11:40 – 12:00	<i>Converting an Online C++ Course From WebCT to Desire to Learn (D2L)</i> , Ken R. Adcock and Syed Hasnain, Cleveland State Community College and Tennessee Board of Regents
Lunch	Patio Restaurant 12:00 – 1:00 p.m.

Session III **1:00 – 2:20 p.m.****Azalea Room:** **Master's Degree Papers**

Session Chair: Tzusheng Pei, Jackson State University

- 1:00 – 1:20 *NEUCHESS: An Implementation of Chinese Chess Computer Game*, Xiaofei Nan, University of Mississippi
- 1:20 – 1:40 *Route Validation Using Radio-Frequency Identification*, William T. Watson, Columbus State University
- 1:40 – 2:00 *LDA-based Dark Web Analysis*, Feiqiong Liu, and Li Yang, University of Tennessee–Chattanooga
- 2:00 – 2:20 *Portals with JSR-168 and Apache Pluto*, Madhulika Kamboj, University of Alabama

Dogwood I: **Undergraduate 4-year Papers**

Session Chair: Tony Pittarese, East Tennessee State University

- 1:00 – 1:20 *Barriers to Gender Equity in a Computer Science Education at Middle Tennessee State University*, Julie Paige, Middle Tennessee State University
- 1:20 – 1:40 *XnaDownload.com: Website Development and the Work Environment*, Kurt Wesner, Chris Garner, Ryan Wallace, and Scott O'Neal, University of Tennessee–Martin, (Advisor: Bob Bradley)
- 1:40 – 2:00 *Voice Command in Alice*, Amos Smith, University of Alabama–Birmingham
- 2:00 – 2:20 *Teaching Programming for Non-programming Individuals*, Anthony S. Morris and Mark J. Jones, Talladega College, (Advisors: Syed Raza and Preston Rowe)
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Dogwood II:	Professional Papers Session Chair: Ken Adcock, Cleveland State Community College
1:00 – 1:20	<i>Encouraging Teamwork by Giving Large, Ambitious Projects – Will It Work?</i> , Bob Bradley, University of Tennessee–Martin
1:20 – 1:40	<i>Misreading the Obvious: Why Women Are Not Choosing Computer Science As a Major</i> , T.F. Higginbotham, Southeastern Louisiana University
1:40 – 2:00	<i>Hosting a Successful Technology Camp for Females</i> , Michael Laws and Kellie Price, East Tennessee State University
2:00 – 2:20	<i>Lessons from Kolb for an MIS Class</i> , Denise Williams, University of Tennessee–Martin
Magnolia Room:	Professional Papers Session Chair: Ramana Gosukonda, Fort Valley State University
1:00 – 1:20	<i>Toward a Verifying Compiler, a Grand Challenge for Computer Science</i> , David Frazier, East Tennessee State University
1:20 – 1:40	<i>Using Postscript in an Organization of Programming Languages Course</i> , Jim Clark, University of Tennessee–Martin
1:40 – 2:00	<i>Nifty Problems: Counter-Battery Radar</i> , Richard S. Johnson, University of South Alabama
2:00 – 2:20	<i>An Effective Approach to Teaching an Object-Oriented Systems Analysis and Design Course</i> , Emery Gathers, University of Tennessee–Martin
Break	Poolside 2:20 – 2:35 p.m. Sponsored by Course Technology

Session IV **2:35 – 3:55 p.m.****Azalea Room:** **Master's Degree Papers**

Session Chair: Jim Vandergriff, Austin Peay State University

- 2:35 – 2:55 *Analyzing Student Behavior in an Online Tutoring System*,
Brian Sulcer, Middle Tennessee State University
- 2:55 – 3:15 *Requirements Engineering*, Vikas Singh and Praveer Bahri,
University of Alabama
- 3:15 – 3:35 *A Checklist for Requirement Defects Discovery in an
Academic Environment*, Michael Baldwin, Tennessee
Technological University
- 3:35 – 3:55 *Network Intrusion Detection Using Bayesian Network*, Alma
Cemerlic, University of Tennessee–Chattanooga,
(Advisor: Lee Yang)

Dogwood I: **Undergraduate 4-year Papers**

Session Chair: Vicki Hightower, Elon College

- 2:35 – 2:55 *Design and Implementation of the DES and AES Algorithms
in Java*, Jason Cornwell, Columbus State University
- 2:55 – 3:15 *Design and Analysis of Cryptographic Hash Algorithms*,
John William Ingle, Middle Tennessee State
University, (Advisor: Suk Jai Seo)
- 3:15 – 3:35 *InFlow: A Multi-language Visual Environment for
Developing Distributed Transformation Processes*, Mark Stahl
and Craig Craven, Armstrong Atlantic State
University, (Advisor: Ashraf Saad)
- 3:35 – 3:55 *eMWaste Database Transfer and Functionality Assessment*,
Alvin McClerkin, Mississippi Valley State University
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Dogwood II:	Professional Papers Session Chair: Ray Seyfarth, University of Southern Mississippi
2:35 – 2:55	<i>Finding a Home for the Quantitative Methods Course</i> , Vernon L. McGlone and Teresa A. McGlone, University of the Cumberlands and Eastern Kentucky University
2:55 – 3:15	<i>So You Want to Issue Security Certificates?</i> , Katherine H. Winters, University of Tennessee–Chattanooga
3:15 – 3:35	<i>Will The Laptop Programs at Bethel College Continue?</i> , Jim Johnson, Bethel College
3:35 – 3:55	<i>SQL Techniques for Applications</i> , B. Wayne Walters, University of Southern Mississippi
Magnolia Room:	Professional Papers Session Chair: Brenda Parker, Middle Tennessee State University
2:35 – 2:55	<i>Designing a Professor's Blog</i> , Brian Toone, Samford University
2:55 – 3:15	<i>Lights! Camera! Action! Making Computer Graphics Fun</i> , Otha Britton, University of Tennessee–Martin
3:15 – 3:35	<i>Computer History Myths Debunked</i> , Wayne Summers, Columbus State University
3:35 – 3:55	<i>Context and Keyword Highlighting of Web Based Documents</i> , Ronald Zucker, East Tennessee State University

Session V: 4:00 – 5:00 p.m.**Azalea Room: Master's Degree Papers**

Session Chair: Anant Honkan, Georgia Perimeter College

- 4:00 – 4:20 *Reference Implementation of OAI-PMH Protocol*, NagaRakesh Vallamkondu, University of Alabama
- 4:20 – 4:40 *Model Transformation for Musical Notation*, Amelia Hale, University of Alabama–Birmingham
- 4:40 – 5:00 *A Spatial Median Filter for Noise Removal in High Dimensional Images*, James Clark Church, University of Mississippi

Dogwood I: Undergraduate 4-year Papers

Session Chair: Nancy Smithfield, Austin Peay State University

- 4:00 – 4:20 *Research on Hybrid ARIMA and Support Vector Machine Model in Forecasting Environmental Sustainability*, Benjamin Harvey, Mississippi Valley State University
- 4:20 – 4:40 *Nemesis in the Inbox: A Study of Image-based Spam*, Taylor J. Klotz, Columbus State University
- 4:40 – 5:00 *Data Analysis Methodology for Sand Rat Model: Reengineering BI-9000 AT*, Kimberly Davis, Talladega College (Advisors: Syed Raza, Leonard Cole, and V. Michelle Chenault)

Dogwood II: Undergraduate 2-year Papers/Panel Discussion

Session Chair: Brian Toone, Samford University

- 4:00 – 4:20 *A.C.E. A Card Expert (Blackjack Dealer)*, Tomas Carbini, Isaac Thomas, Phouck, Nguyen, and Mathew Arinez, Georgia Perimeter College
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4:20 – 4:40	<i>A.I.M.E. (Artificially Intelligent Machine for Emergencies)</i> , Bradley Gibson, Quan Tran, Andrew Foo, and Kuncord Wijono, Georgia Perimeter College
4:40	Panel Discussion: <i>Using Fiction to Teach Computer Science</i> , David Frazier, Dan Perry, and Donald Sanderson, East Tennessee State University and Northeast State Community College
Magnolia:	Professional Papers Session Chair: Jim Johnson, Bethel College
4:00 – 4:20	<i>Biometrics for Authentication and Recognition: Issues and Concerns</i> , Shamim Khan, Columbus State University
4:20 – 4:40	<i>A Study of the Sterol Compositions in Dinoflagellates Using Cluster Validation</i> , Cen Li and Jeff LeBlond, Middle Tennessee State University
4:40 – 5:00	<i>Performance Comparison between Computing Neural Network and Traditional Mathematical Models to Estimate Daylily Hybrid Characteristics</i> , Ramana Gosukonda and Masoud Naghedolfeizi, Fort Valley State University
5:00 – 5:30 p.m.	Business Meeting, Hospitality Suite
5:30 – 7:00 p.m.	Social Gathering, Hospitality Suite
7:00 – 9:00 p.m.	Awards Banquet, Magnolia Room Entertainment: Misty River Bluegrass Band
9:00 p.m.	Social Gathering, Hospitality Suite

A “thank you” goes to the The University of Alabama at Birmingham and Course Technology for lending financial support to this year’s conference, and to students from the University of Tennessee – Martin Student Chapter of ACM for technical support.

Keynote Address

Soft Computing Algorithms and Their Applications: An Overview

Dr. Ashraf Saad

Armstrong Atlantic State University

Soft computing algorithms include self organizing maps, Bayesian networks, genetic algorithms, fuzzy logic, neural networks, and their hybrids. These algorithms have been found advantageous for many application domains, including modeling and control, diagnosis, pattern recognition, and intelligent systems. Recent developments in the field have been presented at related conferences, such as the 11th Online World Conference on Soft Computing in Industrial Applications (www.cs.armstrong.edu/wsc11). The talk gives an overview of state-of-the-art advances in the field including an overview of hybrid soft computing algorithms that were developed during a graduate level course on Intelligent Systems at the Georgia Institute of Technology between 2004 and 2006. Promising future directions, including new classes of soft computing algorithms will conclude the talk.

About the Speaker

Dr. Ashraf Saad joined Armstrong Atlantic State University in August 2006 as Associate Professor and Head of the Department of Computer Science. Prior to that, he was Associate Professor of Electrical and Computer Engineering at the Georgia Institute of Technology in Savannah, Georgia (2001-2006) and a faculty member of the University of Cincinnati (1996-2000). Dr. Saad obtained his PhD from Vanderbilt University, his Master's of Science from Cranfield Institute of Technology (Cranfield, England) and his Bachelor of Science from Ain Shams University (Cairo, Egypt). In 2006, he served as General Chair of the 11th Online World Conference on Soft Computing in Industrial Applications (<http://www.cs.armstrong.edu/wsc11>). He was the recipient of the Institute-wide Undergraduate Research Mentor Award at Georgia Tech, and he received a NASA/ASEE Summer Faculty Fellowship. Dr. Saad's research interests include robotics, computational intelligence, and soft computing. He also pursues educational initiatives to revamp computing education nationwide. He can be reached at: ashraf@cs.armstrong.edu.

Student Abstracts
Undergraduate 2-year Colleges

A.C.E. A Card Expert (Blackjack Dealer)

Tomas Carbini, Isaac Thomas, Phouck Nguyen,
and Mathew Arinez

Georgia Perimeter College

The students at Georgia Perimeter College's Engineering and Computer Science Club designed and produced a robot that performs the tasks similar to a blackjack dealer; shuffling, dealing cards and determining a winner using RFID technology. The robot team modified the LYNXMOTION INC.'s robotic arm kit and programmed its actions using JAVA programming, a common programming language. This project uses a combination of the knowledge attained from the various computer science, mathematics, and engineering courses offered to Georgia Perimeter College students. The implementation of robotics in the dealing, shuffling by computer programming is applicable to various tasks in the real world, and it is an exciting aspect in the presentation of the capabilities of a simple robot. In real world applications, this robot could be modified to perform various utilitarian tasks useful in assembly lines, operations, and many other functions that use simple user input.

A.I.M.E. (Artificially Intelligent Machine for Emergencies)

Bradley Gibson, Quan Tran, Andrew Foo,
and Kuncord Wijono

Georgia Perimeter College

The students at Georgia Perimeter College's Engineering and Computer Science Club have decided to design and produce a robot that will be interfaced with the pic-basic program (pic-microprocessors). The robot will be a small remote controlled tank with a claw mounted. The robot will be able to collect materials with the rotating claw. The robot will be able to explore through rough terrain and will generate sounds to alert people based on its condition. The controller will be able to see through the eyes of the robot via a webcam, PC controlled. It will have a motion sensor that detects motion within 15 feet in range depending on the environment the robot will serve in. Similar to the real world robots like the Mars rover or bomb detecting robots, this robot will be a search and explore robot.



Student Abstracts
Undergraduate 4-year Colleges

The Mathematics and Computer Science of “Deal or No Deal”

Jesse G. Smith, Jr.

Maryville College

The hit NBC game show “Deal or no Deal” has captured the attention of the vast majority of the general public, and it has also piqued the interest of many mathematicians. Among the questions that arise in the mathematicians' minds are “How is the bank offer computed?” and, of course, “What is the best strategy for this game?” An equation that produces the bank offers is found through Mathematical Modeling of Data, based on the work of Post [Deal or no Deal: Decision making under risk..., 2006]. By means of regression analysis, we formulate an equation to predict the bank offer using only objective input. The exploration of multi-variable interaction terms in regression analysis is also discussed as the game prompts logical use of such variables in a predictive model. Through mathematical observations, we derive a strategy for deciding how to answer the show’s main question “Deal or no deal?” To demonstrate the derived formulas and strategy, a Java-based game is created that implement these features. The creation of this game is discussed from image creation to game control logic. In addition, we explore the strengths and weaknesses of Java for the implementation of such a game. Finally, we discuss how the questions prompted by “Deal or No Deal” open a doorway to the exploration of modeling human behavior through neural networks.

Software Engineering in a Team Environment: Creating an Autonomous Railway System Controlled via the Internet

Andrew Smith, Stephen Harper, and Abel Montgomery

Columbus State University

With practical use of an autonomous system to control trains within a railway system, this project aims to accomplish two main objectives: first, establish a cohesive project team with each member in a different role and, second, to create software that will successfully control multiple trains within a model train set.

The first objective is to create a team of five members; each with very specific responsibilities and duties pertaining to their associated role within the team. These roles are the team leader, development manager, planning manager, quality and process manager, and finally the support manager. Each role will contribute to the management of the various aspects of the project throughout its life cycle.

The second objective is for the team to participate in a medium-sized software project. Developed in Java, the multi-threaded application must successfully control multiple, simultaneous trains, without collisions, via an Internet connection; both in a simulated environment and on a physical model train set.

The system is designed to be non-layout specific and, therefore, our client application builds its model from an XML file that represents the physical model and all states in the physical model, including block and turnout states, train positions, etc., are tracked within our model. The model is sealed and the controlling logic interacts with it through its API; allowing the separation between logic and data and therefore allows the logic to be replaceable. Communications between the client and server are handled by synchronized threads, Sender and Receiver. These threads work together to relay information to the main logic of the program, the system manager. A sophisticated collision detection system prevents trains from colliding with one another.

Developing Xbox 360 Games at XnaDownload.com

Adam Corum, Weston Gentry, Jared Glendowne,
and Thomas Hooper

University of Tennessee–Martin
(Faculty Advisor: Bob Bradley)

Video game development is an ever-growing field. Today, most games are written by large companies and require large amounts of resources including people, money, time, license fees, content creation, etc. Unfortunately, the individual developer does not normally have access to these resources. Luckily, XNA changes things. Using XNA, a small team of programmers (or even an individual) can create professional-looking video games in a short amount of time. Even better, these XNA games can run on both the Windows platform and the Xbox 360 console system.

For our Senior Seminar class this semester, our instructor asked our team to create three functional video games and to develop a common reusable library of helper classes. The resulting code will be hosted on our website, XnaDownload.com, which is being created by our sister team. To complete this task, we used Visual Studio 2005 Professional, XNA Game Studio Express, and Microsoft's Team Foundation Server. The procedure our team took was a mixture of rapid development, self-learning, and team collaboration. We jumped right into the actual coding and taught ourselves much about how XNA worked. We met and collaborated with each other using team meetings, Google Docs, and class time. The development took about six consecutive weeks to complete.

This presentation will discuss the development of our games, the challenges of doing teamwork, and the advantages of using the XNA Framework. We will be demonstrating three of the games we created: Chess, XRoids, and Tetris. Our games, information about them, and more information about XNA programming can be found on our website, XnaDownload.com.

3D Modeling and Animation: A Must Skill for Undergraduate Gaming Majors to be Successful in the Field

Austin Areaux

Eastern Kentucky University

3D animation is everywhere you look now-a-days. There is always a new 3D animated commercial on TV. The same is occurring in the video game industry. Looking at a video game, you wouldn't think there are many aspects to it, but in reality, there are hundreds of different aspects to every game. The first major aspect is the coding part of the game, which can be difficult for many people. The second aspect is the 3D modeling and animation. This part of the game can be more difficult if you aren't prepared for the challenge. Understanding how 3D animation works, and being able to have some skill in it, could jump start your career in the computer game industry. Knowing the way around a 3D space is the very first and most important aspect of being able to be successful in 3D animation. This paper explains how to get oriented in the 3D world. More specifically this paper explains how to set up a scene and structures on a model, in order to make a smooth and seamless animation. Once you have the basic concepts of working in a 3D environment, and setting up a seamless animation, practice is the final concept to learn. This paper explains certain ways to practice, and shows good practice habits, in order to familiarize yourself with how scenes and structures are set up.

A Study of Current-Voltage Regulation of an Electrical Diode Using Nonlinear Least Square Model

James Howard

Mississippi Valley State University

The Department of Energy is trying to determine which is more efficient, light emitted diode (LEDs) or ordinary incandescent light bulbs. This project focused on the mathematical modeling of current-voltage regulation of electrical diode. The data focuses on the relationship between the current through the tunnel diode and the voltage across the diode. Regression analysis was used to formulate the best fit models.

Organizing a Document Collection Using the Self-Organizing Map

Iyatiti Mokube

Armstrong Atlantic State University
(Faculty Advisor: Ashraf Saad)

The self-organizing map (SOM) is the most popular artificial neural network algorithm used for the visualization of high-dimensional data. It uses unsupervised learning to convert the nonlinear statistical relationships between high-dimensional data into simple geometric relationships of their image points on a low-dimensional display. Fields of science, including statistics, signal processing and medicine have adopted the SOM as a standard analytical tool. In this project, we develop an application that uses the SOM to organize a document collection according to similarities in textual content. Our results show that the application, which is developed using MATLAB, successfully organized the text documents in our sample.

References

- [1] T. Kohonen, *Self-Organizing Maps*, 3 ed. Berlin: Springer, 2001.
 - [2] T. Kohonen, S. Kaski, K. Lagus, J. Salojarvi, J. Honkela, V. Paatero, and A. Saarela, "Self Organization of a Massive Document Collection," *IEEE Transactions on Neural Networks*, vol. 11, 2000.
 - [3] A. R. Martinez and E. J. Wegman, "A Text Stream Transformation for Semantic-Based Clustering," *Computing Science and Statistics*, vol. 34, pp. 184-203, 2002.
 - [4] "Vienna University of Technology.
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Cognitive Mapping and Artificial Systems

Gregory Brazda and Benjamin Dennis

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(Faculty Advisor: Steve Donaldson)

As early as the 1960s, psychologists began conducting experiments to further human understanding of spatial cognition, cognitive mapping, and navigation. More recently, computer scientists have become interested in extending map formation and navigation abilities to machines. This research presents a cognitive mapping simulation in which a simple environment of two-dimensional landmarks is explored in piecemeal fashion, leading to the construction of a unified map that can subsequently be used for navigation. Because the emphasis is on simulating innate human navigation capabilities, the absolute reference approaches of GPS based systems are carefully avoided. In this system, environmental views, possibly containing multiple landmarks, are captured by a digital camera. From these snapshots, individual landmarks are extracted and normalized via a series of image processing steps, and a neural network is trained for subsequent image recognition. Relationships between landmarks present in the field of view are added to the cognitive map and the entire process is repeated as the environment is explored. With map growth, navigation between non-adjacent landmarks becomes possible via transitive relationships and is simulated in the system. This framework provides a platform on which to build increasingly sophisticated systems more nearly approximating human-like navigational skills.

Globular Star Cluster Evolution on a Beowulf Class Computer Cluster

Justin Moore

Furman University

Globular star clusters exhibit an interesting real-world N^2 problem. Calculation complexity increases with the inclusion of Dark Matter. For every time step, each star must calculate its new position based on the Dark Matter interaction in addition to the gravitational interaction of every other star in the cluster. A single machine is generally sufficient to solve this problem. However, when we study cluster sizes of 1,000 to 10,000 stars over several million time steps; the increased scope of the problem warrants a parallel solution.

I first created a parallel version using Mathematica and file-sharing. Disk read/writes prevented it from ever achieving high computational efficiency. To improve efficiency, I restructured the problem using the Message Passing Interface[MPI] on a Beowulf Class Computer Cluster. I use a fourth order Stormer integration method to improve accuracy. A logical ring is created in which a node computes its partial position solution, sends this to its right, and updates its own accelerations when it receives information from its left. An interesting aspect of the MPI solution involves determining optimal performance. Balancing the computational calculation time with the message communication time appears to provide the most efficient means to solve this problem across a fixed number of nodes. Theoretical justification will be given for this result.

Animated visualization of solutions with and without Dark Matter effects have been developed using Java3D. For example, by exporting data sets every n time steps, the positions can be used to show the locations of stars in the cluster as an animation. Users can alter the viewpoint and viewing directions interactively. The ultimate goal of the project is to create a real-time display of the results as they are being calculated.

Barriers to Gender Equity in a Computer Science Education at Middle Tennessee State University

Julie Paige

Middle Tennessee State University

In the United States, there is a critical labor shortage in the IT industry. Increasing women's participation in computer science could potentially reverse this trend, however the majority of female students are not pursuing a computer education. Extensive research attributes this to societal stereotypes, gender biases, lack of role models, lack of support and encouragement, experiences and attitudes of women towards computers.

Similar to other universities, there is low participation of women in computer science at Middle Tennessee State University (10%). There is a critical need to develop programs to attract, retain, support, and encourage women in computer science at MTSU.

We surveyed students in the Computer Science I and II classes to gain insight on why women enrolled and potential barriers to completing a degree in Computer Science.

We have created a new student organization called Women in Computer Science @ MTSU (WCS) to provide an additional resource to reduce the high attrition rate and to attract female students to computer science. The planning and implementation of how this was accomplished will be presented and discussed.

XnaDownload.com: Website Development and the Work Environment

Kurt Wesner, Chris Garner, Ryan Wallace,
and Scott O'Neal

University of Tennessee–Martin
(Faculty Advisor: Bob Bradley)

In today's business environment, rapid product development not only is needed but also is necessary for a start-up business. Getting a product out to the public while maintaining a standard can be difficult, but with the right development tools and products, a start-up business can succeed. By using products/technologies such as Asp.net, Visual Studio Team Foundation server, MySQL, and Photoshop, a small team of people can create a professional website from scratch.

The work environment can be very different from most college assignments for which tasks and time are often limited. Most students have little experience with a real-world business environment. This is where our Senior Seminar class came into play. To break this shell around students, the instructor of our Senior Seminar class asked students not only to become part of a small virtual business but also to create a business type work environment. From three teams (Web Developers, XNA/Xbox Video Game Developers, and Graphics and Model Developers) a small virtual business was formed and given tasks comparable to real life work. These tasks were assigned to students with different skill levels and constraints on August 27, 2007. Within a month, each team met its goals and began new ones.

On October 1, 2007, our team (the Web Development team) successfully created the prototype website, www.XnaDownload.com. This site will be used as a hub for projects and news and as a social gathering spot for programmers of XNA technology and content. These projects will include, but are not limited to, XNA video game development as well as models and graphics for these projects. When the site is finished, users also will be encouraged to leave feedback through a rating system, allowing the efforts of these programmers and engineers to be recognized. Users will be able to post findings on the web and rate those as well. The primary goal is to have www.XnaDownload.com fully functioning and usable before the end of this semester.

During this presentation, we will discuss the development of this website and the many challenges we faced while developing it.

Voice Command in Alice

Amos Smith

University of Alabama–Birmingham

There is an increasing awareness of the need to integrate assistive technologies into software applications in order to provide a new mode of input for those with physical disabilities. Examples of assistive technologies include speech recognition, predictive text, and text to speech. Although each of these technologies may appeal to a different user, they enable a more beneficial and productive experience for those who have mobility limitations that prevent them from using traditional mouse and keyboard input. The need for assistive technologies is especially beneficial to physically disabled programmers who need to navigate around an integrated development environment that is dominated by a graphical user interface.

This presentation will introduce a research effort that unites speech recognition with a GUI-based programming environment that has been successful in teaching children the fundamentals of computing. In particular, the programming environment used in this research as a target for assistive technology is Alice, which is a 3D programming environment from Carnegie-Mellon that is used frequently to teach children. The presentation will describe the process of mapping voice commands to specific functions in Alice. The core insight of the project is a monitoring framework that receives various voice commands from the user, and then performs certain mouse/keyboard functions within Alice depending on the user's command and other information from the user. Through the results of this project, children with physical disabilities will be able to use their voice to manipulate 3D virtual objects and, at the same time, be able to learn programming basics through the Alice environment. This solution will also be usable in certain environments where standard input devices are not available, such as in a museum exhibit.

Teaching Programming for Non-programming Individuals

Anthony S. Morris and Mark J. Jones

Talladega College

(Faculty Advisors: Syed Raza and Preston Rowe)

Virtual Reality (VR) has always sparked many people's imagination. Writing VR programs to explore and develop the mechanisms by which humans can more effectively and enjoyably interact with technology is not an easy job. There have been relatively few innovations in the teaching and learning of programming in the last 30 years, despite the fact that introductory programming courses are often extremely frustrating to students. This research is focused on creating programming and a programming environment based on Alice, which will give a graphical introduction to programming language features such as flow control through the activity of creating short animated movies. The approach was made possible recently due to the increased power of desktop computers and the development of novel software that uses that power, especially for 3D graphics. The aim of the research is to use this innovative approach to allow traditional programming concepts to be taught more easily and understood more readily.

Design and Implementation of the DES and AES Algorithms in Java

Jason Cornwell

Columbus State University

Data security has become one of the most important system requirements in the information technology world. Efficient and effective cryptographic algorithms are essential to the implementation of data security features in most, if not all, computer hardware and software systems. The Data Encryption Standard (DES) was an official federal information processing standard for the United States for almost three decades before it was superseded by the Advanced Encryption Standard (AES) in 2002.

While both DES and AES algorithms encrypt and decrypt data of a specific length (or block size), their underlying mechanisms are developed from a totally different foundation. Specifically, the DES algorithm relies on multiple steps of block substitution and permutation, whereas the AES algorithm uses both block substitution and finite (or Galois) field arithmetic. With considerable efforts, we have successfully implemented both cryptographic algorithms in Java.

This presentation will describe the essence (i.e., computation kernel), the design complexity, and our implementation techniques of both the DES and AES algorithms. A demonstration of the working programs will be given at the end of the presentation, if time permits.

Design and Analysis of Cryptographic Hash Algorithms

John William Ingle

Middle Tennessee State University
(Faculty Advisor: Suk Jai Seo)

Cryptographic hash algorithms are widely used in information security applications including digital signatures, wireless networking authentication, secure web communications (SSL), and others. They are designed to produce a unique, fixed-length output (digest) from an arbitrary-length input (message). Most cryptographic hash algorithms have a simple structure that includes a domain extender and a compression function as described below. The current U.S. federal standard for secure hashing, known as SHA-1, was published as FIPS-180 in 1995. However, as recently as 2005 the future security of this algorithm has been called in to question. This research was inspired by these developments.

In order to produce a fixed-length digest from an arbitrarily long message, the algorithm must break the message into fixed-length blocks for processing and iteratively apply a compression function to each block in turn. The compression function typically utilizes both the current block of the message and the intermediate digest resulting from the previous block in order to generate successive digests. The iteration in this process is a result of the domain extender. Its purpose is to apply the compression function over the entire length of the message. The feedback from intermediate digests is used in different ways depending upon the compression function chosen and contributes cryptographic strength to the algorithm. The compression function is also required to have certain properties conducive to its application in security contexts. These properties are pre-image resistance, second pre-image resistance, and collision resistance, all of which contribute to the uniqueness of the digest and the confidentiality of the message.

The goals of this research are to understand the properties of compression functions, how modern cryptographic hash algorithms attempt to provide them, how cryptanalysts are able to compromise them, and to design a novel compression function for further analysis. My research thus far has enriched my knowledge of the mathematical principles and problems underlying cryptographic hash algorithms and clarified many details of their design. The particular problems relevant to their cryptanalysis and the design of a novel compression function remain to be explored.

*This research is supported by a scholarship from the Middle Tennessee State University Undergraduate Research Council.

InFlow: A Multi-Language Visual Environment for Developing Distributed Transformation Processes

Mark Stahl and Craig Craven

Armstrong Atlantic State University
(Faculty Advisor: Ashraf Saad)

Many businesses incorporate data transformation, in one form or another, as a core business process. Current software development practices offer a large number of diverse solutions to this problem, but most require a large amount of work in order to begin focusing on implementing the transformations required, and are not easily maintained. We have developed an environment that offers a data-centric view of software development by combining the benefits of visual programming with the customization of source text. Each transformation network is a collection of loosely coupled objects (processes) developed in one of several languages, and connected via bounded buffers (channels). This entirety of the environment is a client-server application communicating via HTTP and HTTPS. The client side of the application is a graphical shell providing ease of development, and acts as a communication medium to less technical contributors. The server is a queue of objects, and a minimal HTTP server that accepts Representational State Transfer (RESTful) requests from active objects. Data, encoded in JavaScript Object Notation (JSON), is returned from the server to the requesting object. The use of this architecture allows for the possibility of distributing the transformation network as a remote service. Debugging is done through the inspection and modification of the connecting channels. We allow the developer to stop a running transformation, increment and decrement state, and modify the values in each buffer to test the correctness the receiving process.

eMWaste Database Transfer and Functionality Assessment

Alvin McClerkin

Mississippi Valley State University

I conducted an assessment of the data transfer from the now inactive Waste Inventory Tracking System (WITS) to the active, operable eMWaste® System. The assessment involved two separate verification phases. The first assessment verification phase entailed a 100% review of the WITS inventory utilized for data port to eMWaste®. This involved a one to one comparison of containers on the WITS inventory list against the operable eMWaste® production database.

The second assessment verification phase involved random selection of containers within the eMWaste® inventory system for field comparison that included storage location, container size, type and weight. Waste containers were also randomly selected at field locations and cross-referenced against the eMWaste® inventory database. In addition, a small subset of the containers selected in the second assessment verification were also cross-referenced against the Facility Acceptance Testing-Container Analysis Tool (FATCAT) system to ensure that critical radiological parameters were accurately and adequately tracked to ensure waste management storage facility categorization levels were maintained. All results are shown with graphs and statistical analysis.

Research on Hybrid ARIMA and Support Vector Machine Model in Forecasting Environmental Sustainability

Benjamin Harvey

Mississippi Valley State University

Due to the complexity of environmental sustainability and the historical forecast data and the randomness of a lot of uncertain influence factors, the observed historical data showed linear and nonlinear characteristics. As we all know, the autoregressive integrated moving average (ARIMA) is one of the popular linear models in time series forecasting, and the SVM, which is closely related to the neural networks model, is the recent research trend successfully used in solving nonlinear regression and time series problem. This research presents a hybrid methodology that combines both ARIMA and SVM model is presented to take advantage of the unique strength of ARIMA and SVM models in linear and nonlinear modeling to help forecast environmental sustainability. The linear pattern of the sustainability can be dealt with ARIMA, and the nonlinear association with the SVM model. The effectiveness of the model has been tested using nonlinear patterns in several research studies to forecast environmental pollutants, which play a major role in forecasting environmental sustainability. The test results of the models vary according to the changes in each of the variables. The experimental results showed that the hybrid model can effectively improve the forecasting of environmental sustainability, which was accurately achieved by either of the models used separately.

Nemesis in the Inbox: A Study of Image-based Spam

Taylor J. Klotz

Columbus State University

Image-based spam refers to placing unsolicited and unwanted messages in an attached image. Different from text-based spam, image-based spam presents challenges to e-mail filtering because most spam filtering approaches in use today rely on the text of e-mail messages for classification. Since image-based spam evades e-mail filters, it becomes a significant security threat. Research shows that the amount of image-based spam has dramatically increased. According to McAfee Avert Labs' report, it will be one of the top 3 security threats in 2008. Image-based spam not only slips through filters, but also increases bandwidth consumption drastically. Moreover, image-based spam includes images in an e-mail allowing spammers to mask their intentions and thus increase the success of phishing attacks. Presently, identity theft is also on the rise; image-based spam would quickly tear down many defenses that the industry has erected against such malicious activities.

This paper gives an overview of image-based spam and the techniques available to defend oneself against it. It covers current major image-based spam filtering techniques, including, but not limited to, message screening based on origin and sender identification, analysis of the vectors in the attached image, comparisons of text embedded in the image, extraction of color patterns, and a hierarchal parsing system, which analyzes each piece of the message individually. The strengths and limitations of each method will be discussed. We also try to answer two important questions: “where is this new nemesis (i.e. image-based spam) heading?” and “what are the major design and implementation issues for image-based spam filtering?”

Data Analysis Methodology for Sand Rat Model: Reengineering BI-9000 AT

Kimberly Davis

Talladega College

(Faculty Advisors: Syed Raza, Leonard Cole, and V. Michelle Chenault)

Reengineering contains a plethora of software analysis and restructuring techniques that could be used to assist the exportation problem encountered by the BI-9000AT Digital Autocorrelator program. BI-9000AT does not have the ability to automatically perform statistical functions or the log transformation needed for data analysis or interpretation from data collected by a NASA developed fiber optic device. BI-9000AT is a digital, high speed, signal processor which is used as an auto or cross correlator for dynamic light scattering (DLS) measurements performed in the eye. The sand rat, *Psammomys obesus*, is unique in that it is a nutritionally induced animal model for Non-Insulin Dependent Diabetes Mellitus (NIDDM) or type 2 diabetes mellitus (T2DM). Complications seen in diabetics such as blindness due to cataracts can be studied using the sand rat as a model. DLS can be used to detect cataracts at the early stages. A Sand Rate Data Analysis Model (software) was developed to be used with the BI-9000AT to efficiently and accurately calculate several data files at one time. Thus, study data can be analyzed at the time of collection from the animals for the investigation of various aspects of ocular health- specifically lens opacity, as a possible early indicator of diabetes mellitus.

Student Abstracts
Master's Degree Programs

The Relativity Between Human Genome and Multiply Function Areas

Hua Zhong

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In this paper, we use data mining techniques to study the relationship between Recombination Hotspots and Copy Number Variation (CNV) and their functions on Human Genome. We cleaned the raw data from HAPMAP database and use it to develop the full distributions of Recombination Hotspots and Copy Number Variation on Human Genome, respectively. In the Recombination Hotspots study, from the clustering result (based on protein function) of those genes with more than 10 hotspots, we find that the majority of Recombination Hotspots are distributed out of Genes and there is no Recombination Hotspots distributed in protein coding regions. In particular, we find that these 3 protein function clusters, Biological_process, Cellular_process and Physiological_process, have the greatest number of Recombination Hotspots in their sequences. This contradicts our assumption that Cellular_surface_receptor_linked_signal_transduction should contain the most Recombination Hotspots than other protein function clusters because Cellular Receptors recombine themselves very frequently in order to produce new Receptors to adapt to the outside environment. We also find that that 54 out of the 100 genes which contain the most Recombination Hotspots are specifically expressed in Human Brain. It is suggested that recombination rates in human are influenced by local selection intensity. This finding could be a strong support of the assumption that genes expressed in brain underwent rapid evolution by positive selections in humans. In the Copy Number Variation study, we find that Recombination Hotspots are mainly distributed on the beginning part of CNV sequences. This suggests that Recombination Hotspots could be the mechanism of the Copy Number Variations (CNV).

Synthesized Music for DNA Sequence with Computer Audio

Rong Zhou

University of Mississippi

We develop one method to play Deoxyribonucleic acid (DNA) music. The main role of DNA is the long-term storage of information for living things. The information in DNA is stored as a code made up of four chemical bases: adenine (A), guanine (G), cytosine (C), and thymine (T). Within a gene, the sequence of bases along a DNA strand defines a protein sequence. There is a translation rule from DNA to protein, which is that 3 bases (codon) in a gene sequence determine an amino in a protein.

Our method is based on that rule to transfers a DNA sequence of genetic codes into a piano song. With a given DNA sequence, a codon of three-letter word can be represented by a 3-bit four-nary number, which has 64 possibilities. These numbers are translated into tones of piano with predefined rules. The period for each tone and the interval of two tones can be manually specified. So finally, the chords and the rhythm represent something about the protein's structure. Java programs are developed to generate this DNA sequence-synthesized music. Other advanced programming languages may be used as well. Some sample DNA sequences from Cucumber mosaic virus, Apple/Citrus fruit viroid, and Mitochondrion *Canis lupus* (gray wolf) are demonstrated by the programs with successful results. Our method provides a way to convert the DNA patterns that code for proteins into rhythmic piano tones that sound pleasant to people's ear. The conversion method makes genomic coding more approachable to the general public and also provides scientists — including those who are vision-impaired — an entirely new way for analyzing proteins. It also serves as a great teaching tool for students since everyone is familiar with music and it is a universal language.

NEUCHESS: An Implementation of Chinese Chess Computer Game

Xiaofei Nan

University of Mississippi

Decision game programming is an important field of Artificial Intelligence. As the chess computer game has won great success, Chinese chess, a game with large popularity and higher computational complexity than chess, has been researched extensively. A Chinese chess project, NEUCHESS, won the championship of the Chinese chess in the 11th World Computer Olympiad. This project mainly focuses on move generation and searching strategies. Bitmap board representation was introduced to improve searching efficiency by accelerating local decision makings. Hash table was used to enable efficient position comparison and to make or unmake a move by a Boolean operator XOR. By storing the moves generated off-line, we significantly speed up move generation. Moreover, this also facilitates the query process: (1) the pieces that only move horizontally or vertically are indexed by bit-row and bit column; (2) the pieces that have complex moving constraints are handled separately. Searching is another important component of a chess computer game. Compared with basic Alpha-Beta pruning technique, Principal Variation Search (PVS), which views the left child of a node as the best child, is more effective in finding a minimum tree. Additionally, NullMove and History Pruning are used in forwarding pruning. To alleviate the horizon effect, Quiescent search, Check Extension, and Mate Extension, are included in PVS. Because the efficiency of PVS depends critically on the ordering of moves, two heuristic methods are designed to arrange moves. The first method is Static Exchange Evaluation. It runs, in small scale, the MaxMin algorithm. The second method is based on dynamically recording and querying Hash tables, Killer table, and History table. Killer and History tables save the moves with the highest pruning possibility and the number of appearance of a move respectively. We show that these strategies improve the move generation and searching efficiency significantly.

Route Validation Using Radio-Frequency Identification

William T. Watson

Columbus State University

In recent years, Radio Frequency Identification (RFID) has been proposed and implemented in a variety of applications where tracking objects, animals or people is desirable. This paper proposes a novel approach to the application of RFID technology in those applications where it is possible to validate a person or an object's passive contact with a given or arbitrary set of fixed points along a predefined route. The notable departure from the typical application of RFID technology is that in this scheme, the transponders are permanently installed while the interrogator is affixed to a person or object that travels the course. Data are collected by the interrogator and can be examined later to derive path traveled, distance, and time. The technology can also be adapted for use in a loosely-connected sensor network in which the whereabouts of the interrogator can be transmitted between nodes. The benefit of this design is the capability to detect and report locations of persons between endpoints in both reasonably remote or local conditions. In a hiking trail application, for example, park authorities can use the information gathered to more quickly locate a missing hiker, reducing safety risks to the person as well as saving time and money associated with search and rescue. We will also illustrate that industrial and security applications are also feasible with this implementation.

LDA-based Dark Web Analysis

Feiqiong Liu and Li Yang

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Analysis of dark website is important for developing effective combating strategies against terrorism or extremists when more and more scattered terrorist cells use the ubiquity of Internet to form a community in the virtual space with a fairly low cost. Terrorists or extremists can anonymously set up various web sites embedded in large scale public Internet, forming online social communities to exchange ideology, spread propaganda, recruit members and plan attacks. In this paper, we will propose a method to discover and cluster the latent terrorist communities via analyzing contents of “Dark websites.” The content and data from dark websites are gathered and extracted by crawlers and exported to documents. LDA (Latent Dirichlet Allocation)-based hierarchical Bayesian algorithm is used to analyze the extracted documents so as to discover latent communities from the web sites of terrorists or extremists. Latent communities are subsets of terrorist or extremist networks, distributing over the social actor space. The connections within each discovered community are dense, whereas the connections between the communities are sparse. In contrast to the traditional clustering technology, LDA-based analysis allows one document to be classified into different communities. By using Expectation-Maximization algorithm, a Bayesian inference is carried out to learn the distribution, and classify documents into corresponding latent communities. Our analysis helps to gain more insight into the structure and communities of dark websites.

Portals with JSR- 168 and Apache Pluto

Madhulika Kamboj

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Web portals play an important role in real world applications as they are changing the way Web pages are built and additionally providing the organizational structures used to build them. Their key role is to provide each user a customized and personalized web page. They are very useful as they can aggregate different markups. Portals can run multiple portlets to facilitate different things altogether on one web application. Portlets are web components that basically generate fragment pieces of markup i.e such as HTML, XML or WML.

JSR 168, also called the Java Portlet Specification 1.0, is designed to standardize the interaction between portlet and portlet container by the Java Community Process. JSR 168 focuses on interoperability and re-usability between portlets and portlet containers. Their emergence provides common specification for different portal servers so that any portlet can run on any portal server.

In this paper, we will discuss the Portal Standard - JSR 168 specification with Portal Server named Apache Pluto to reveal how practical they are in developing real world portals. The discussion is based on work done in portal development with reference implementation Portal Server named Apache Pluto.

This paper will also discuss various properties and capabilities of portlet development in respect of portlet caching, internationalization, portlet security, portlet setting and preferences, portlet style and configuration. Some of the challenges regarding security, interconnectivity and multiple portlets are discussed.

By working this, we hope to provide a structured guideline for portal environment as it will bring in light strengths of Portal development as web application and sidewise the limitation, extra work required for providing interactive portlets in portals.

Analyzing Student Behavior in an Online Tutoring System

Brian Sulcer

Middle Tennessee State University

We have developed closed labs for CS-I and CS-II in the form of a web-based tutoring system, called AtoL (Adapted Tutor for On-line Learning). The AtoL system presents the material covered in the lab via web pages and provides a web-based interface for question and programming exercises. AtoL was proven to be effective in teaching/ learning in CS-I and CS-II.

The material covered in these closed labs is divided into conceptual units, with each unit comprising a single page of text. Each lab starts from an index page that has links to these topics arranged in outline form, along with links to the exercises for the lab. Students are expected to read the concept pages related to an exercise before attempting that exercise.

To aid students who may need to reference material covered in prior labs, we added a context-sensitive help viewer linked from the exercise interface. The help viewer displays the lab page that explains the topic related to the current exercise as well as links to related topics. Links to related topics from this help viewer are ordered based on relevance weights between topics assigned by a domain expert.

The AtoL system logs student activities that can allow us to analyze students' behavior with regard to reading the topic pages and interacting with the question and program tutors. This information allows us to extract models of student behavior and potentially correlate these models with performance and time-spent on the lab exercises. Should these models prove to be good indicators of performance, we are proposing an adaptive component in the tutor interfaces to promote usage patterns that result in high performance.

Requirements Engineering

Vikas Singh and Praveer Bahri

University of Alabama

Requirements traceability is fundamental to sound software engineering practice. One must verify that the approved processes are guiding development during each lifecycle phase as well as validate that all requirements have been implemented at the end of the lifecycle. To ensure that all requirements have been implemented, we need to trace requirements through all stages of the software development. Manual tracing is tedious and invites human error. There are a couple of tools which can trace requirements between documents belonging to different stages. These tools import and export requirements using XML tags. These tags are generated according to the database columns where it stores its data. It is very difficult for a user to import requirements as the database is complex and there are number of columns in the database which creates unnecessary tags. We are trying to make these tools more useable by standardizing the import and export of artifacts in these tools by using RML (Requirements Markup Language). Our tool will take requirements in the XML having standardized tags of RML and then import these requirements into the tool. In the future, we would like to make these tools to calculate the dependencies between the different sets of documents on its own by looking at the requirements attributes and its contents.

A Checklist for Requirement Defects Discovery in an Academic Environment

Michael Baldwin

Tennessee Technological University

For software projects, the software requirement specification (SRS) serves as the official statement of user need and what the systems developers are expected to implement. Development of the SRS is a critical task as it becomes the basis for all future development. Utilizing a checklist while inspecting documents, helps in locating defects, i.e. any deficiency with a potential of negative affect on the development process, within the documents. [1] Many studies have shown that these checklist based inspections can significantly improve the quality of software artifacts, including the SRS. [2]

However, existing studies have focused on checklist use in commercial projects. The checklists utilized for commercial projects are not suitable for use in an academic environment, because of their size and complexity. This work describes a checklist, specifically developed for use in academic projects that was designed to include items most relevant to student projects. The checklist described, was developed based upon the results of a study conducted using students' submitted SRS from an undergraduate software engineering course. The developed checklist is helping undergraduate students enrolled in a software engineering course to inspect their SRS submitted for student projects and hence contributing to the overall project quality.

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Network Intrusion Detection Using Bayesian Network

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(Faculty Advisor: Lee Yang)

Intrusion detection has drawn more and more attention in the past two decades. In Intrusion Detection Systems (IDS), there are two general approaches to identifying network security breaches: signature-based and anomaly-based. In the first approach, real-time network traffic is compared against predefined intrusion patterns (signatures) to detect intrusions in progress. The main limitation of this approach lies in its dependence on a frequent update of the database of intrusion signatures and its inability to detect novel intrusions. The second approach can detect novel intrusions, but often generates an excess number of false positive alerts, as well as many false negatives.

Here, we propose an adaptive network intrusion detection system using a Bayesian network, aiming to detect novel intrusions and reduce false positives and false negatives. A Bayesian network is a probabilistic graphical model for inferring and predicting problems containing uncertainty. Each link between two nodes in the network is associated with a probability to denote the causal relationship between them. A training dataset is used to parameterize our adaptive intrusion detection system, and then a testing dataset is used to measure the feasibility and effectiveness of our system. A network traffic activity is marked as suspicious if it is classified as an intrusion by our system. If the suspicious activity is confirmed by the network administrator to be an intrusion, it will be added to the training dataset to re-train our adaptive network intrusion detection system, thus enhancing the system to detect future intrusions of a similar kind.

Reference Implementation of OAI-PMH Protocol

NagaRakesh Vallamkonda

University of Alabama

We are doing a reference implementation of the OAI-PMH protocol. We are trying to provide an efficient way to search for the required information through large number of documents in a repository. We use the six web methods GetRecord, Identify, ListIdentifiers, ListMetadataFormats, ListRecords and ListSets as defined by OAI-PMH for this implementation. With these web methods, we can retrieve a specific metadata record, description of an archive, retrieve the headers of selected records, harvest records from the repository or retrieve the set structure of a repository.

We use SOAP web services for OAI-PMH for sharing metadata between services. Web services are just the web APIs that provide interoperable machine to Machine interaction over a network. SOAP is an XML- based extensible message envelope which can bind all the underlying protocols in it like HTTP, HTTPS and others. The other advantage of web services beyond interoperability is that it doesn't use any object model specific protocol which needs a specific infrastructure at client or server machines.

Model Transformation for Musical Notation

Amelia Hale

University of Alabama–Birmingham

In Model-Driven Engineering (MDE), model transformation is the technique for changing source models into target models. AMMA, ATLAS Model Management Architecture, is a framework for DSLs with its core languages being KM3 for metamodel definition, TCS for textual syntax definition, and ATL for model transformation. Details of the AMMA framework and its three languages are demonstrated by the design of DSLs for Musical Notation. The framework is further exemplified through the transformation of one musical notation DSL to another musical notation DSL. In this project, we illustrated model transformation by first building DSLs for two musical notations: Lily Pond and ABC. After the DSL productions, songs can be transformed from Lily Pond notation into ABC notation. The goal of this presentation is to explain the creation process of the Lily Pond and ABC DSLs and to demonstrate the model transformation with a sample song.

A Spatial Median Filter for Noise Removal in High Dimensional Images

James Clark Church

University of Mississippi

In this paper, six different signal filtering algorithms for high dimensional images are compared based on their ability to reconstruct noise-affected images. The purpose of these algorithms is to remove noise from a signal that might occur through the transmission of an image. A new algorithm, the Spatial Median Filter, is introduced and compared with the current image smoothing techniques. Experimental results demonstrate that this algorithm is comparable to popular image smoothing algorithms. In addition, a modification to this algorithm is introduced to achieve more accurate reconstructions over these popular filtering techniques.

Student Abstracts
Doctoral Degree Programs

Point Correspondence via Similarity of Intensity Gradients

Graylin Trevor Jay

University of Alabama

One of the most pressing open problems in computer vision today is the so-called point correspondence problem. Given two or more views of a scene, which points from one view correspond with which points from another view? Access to this information makes easier or trivial many problems within vision, such as recognition or 3D scene reconstruction. Our approach to this important problem is based on the recent success of model based techniques in vision and recognition. Using similarity metrics we attempt to find matching points by comparing intensity based invariant representations of a point. This novel model pulls a limited amount of a point's horizontal surroundings into its representation. We empirically explore this approach, comparing it to data collected from real-world scenes using multi-channel structured light techniques.

Design and Specification of Classes Using JavaMP/JML-MP

Matthew Thornton

Virginia Tech

JavaMP is a Multiparadigm Programming Language that has had an associated behavioral specification language written for it, JML-MP. In order to show the practicality of JML-MP beyond its theoretical interest, a case study with an appropriately sized problem to solve should be created. Ideally, the case study will involve a software component that allows for the appropriate application of multiparadigm design and specification. The solution then is compared against already-existing solutions for the problem, looking at how it compares in terms of size and complexity.

One such problem space to be addressed is the area of databases and queries against a database. Such a component allows for capitalizing on the searching capabilities of programming in a logical paradigm, applying functions to collections of data, which can be done in the functionally, and the design methodology used in object-oriented programming. While an industrial-scaled database program would involve many aspects of design and implementation that wouldn't be within scope of this work, a more primitive example that involved adding data to a collection and querying against that collection would be appropriate. The Assertion Query Machine example involves creating a set of data and then querying for specific values in the set. Such a simple database tool has an implementation and specification in RESOLVE/C++.

This presentation will discuss the current status of the case study, including the design and specification of the AQM. This will include aspects of the multiparadigm design, observations of how capable JML-MP was in specifying parts of the component, and an outline of how we will compare the specification and implementation in JavaMP and JML-MP to a reference implementation and specification.

6DOF Bezier Surface Editing Using Marker-based Augmented Reality

David O'Gwynn

University of Alabama–Birmingham

The process of using computers to model objects in 3D has long required not only the eye of an artist but also the mind of a technician. Industry standards such as Maya and 3DS Max offer powerful functionality, but they have steep learning curves. Interface constraints placed on users of these systems contribute to this difficulty. The Windows, Icon, Menu, Pointer (WIMP) metaphor, long the standard for HCI in general computing, dominates their interfaces. Because of the complexity of the task of modeling, or perhaps because of the inadequacy of WIMP for such a task, the systems push the metaphor to sometimes painful extremes. In addition, the single-pointer limit enforced by the dominant windowing systems further distorts the process of interaction with a 3D object to a one-handed juggling act among multiple viewports. Those constraints still exist, but new interaction methods like Virtual or Augmented Environments offer possible solutions. The ultimate goal is an accessible modeling environment that places no more burden on the user than that of his creativity.

This presentation describes a marker-based Augmented Reality system for editing tensor-product Bezier surfaces, one of the building blocks of 3D models. It uses both a small-scale multi-marker mat and a two-marker wand as its interactive elements. The multi-marker mat establishes a coordinate frame for the display of the surface. Because of its size, it allows the user to rotate and translate the mat physically, even while editing it. The wand is used to select individual control points and edit their 3D position with respect to the surface's coordinate frame. Differentiation between selection and modification is accomplished through a bimodal association of two markers at the end of the wand. This palette and wand interface is also discussed as an integral part of an overall AR 3D modeling environment.

A Portable Toolbox for the Visualization and Processing of Multimodal Geophysical Measurements

Bruce Johnson

University of Tennessee–Knoxville

The optimal design of field-scale, multi-modal geophysical surveys is currently limited by the lack of software tools that can be used to simulate, visualize and process large data sets. Geophysica is among the few software tools that provides a comprehensive suite of calculation methods for small datasets. Geophysica, while useful, is limited in its portability because each computer using it must possess an expensive MATLAB license. The objective of this study is to develop a portable software toolbox for the visualization and processing of large-scale multimodal near-surface geophysical measurements. We present a Microsoft Visual C++-based tool GeoPhysical Calculation Plus Plus (GPCPP) capable of the same numerical analyses as Geophysica but with significant improvements in simulation and processing capabilities. We developed GPCPP by using the OpenGL-based GUI builder glui and by implementing an n-length fast Fourier transform method. This report provides a description of GPCPP's capabilities and discusses how these capabilities may be further expanded. The resulting toolbox is quite portable and can easily accommodate very large datasets typical of field-scale near surface geophysical surveys.

Study and Analysis of Proteomics and Quantitative 2D Gel Parameters for Different Proteins

Richa Tiwari

University of Alabama–Birmingham

The entire set of proteins expressed by the genome in a cell, organ or organism is referred to as the proteome. The study of entire sets of proteins, their structure and function encoded by genomes at the cellular or tissue level is referred to as Proteomics. In this paper, we have focused on 2D gel electrophoretic separation of proteins and their modifications. The two parameters that we delve into are pI values (pH at which a molecule carries no charge) and intensity of spots. The horizontal position in the gel tells us about the charge of a protein (pH value), and the intensity of the gel spot tells us about the amount of that protein in the sample. In response to a stimulus (e.g., addition of a phosphorus group in the sequence, a common posttranslational modification), one or both parameters of a protein gel spot can change. We examined this by analyzing 28 random 2D gel spots on gels of different samples in an experiment already carried out on rat mammary tissue. We used mass spectrometry to find the peptide mass of the proteins, and internet database search (Mascot data base) to predict their respective pI values. Then standard statistical methods were used to calculate the variance for each protein. The results obtained showed that all the three gels used for our experiment had very different observed pI values (by image analysis of the gels using software Progenesis Discovery) than the predicted values for those proteins. We concluded that these differences were because of the chemical modifications in the protein. Finally, by looking at the variations in the predicted and observed pI values, we assessed the minimum pH range necessary to resolve the different charged forms of these proteins.

More Accurate Correction of Opacity Composition Artifacts in Oversampled Volume Ray Casting

Jong Kwan Lee

University of Alabama–Huntsville

The volume ray casting is a direct volume rendering visualization technique which is widely used in many application areas. Medical imaging is one of such areas where the volume ray casting is often used to visualize the organs to be diagnosed. Volume ray casting involves forming an image by passing rays from image locations through the volumetric datasets and integrating light effects along the rays. Typically, discrete samples are composited along each ray in a front-to-back or back-to-front manner. To better-simulate the continuous integrations of the light effects, a high sampling rate is often used. However, when a high sampling rate is used, the ray sample composition should not over-composite the opacities.

In the literature, there are only two opacity correction approaches for the oversampled volume ray casting. One is based on the dataset homogeneity (which is not a proper assumption for real volumetric datasets) and the other one is the opacity correction which we introduced recently. In this abstract, a new opacity correction approach which improves our existing approach's accuracy is presented. Similar to our prior opacity correction, it is a cell-by-cell approach and does not assume dataset homogeneity. While the existing approach uses a quadratic curve fitting, which is a source of error in determining proper opacity correction factor, the new opacity correction employs a cubic curve fitting in determining more accurate opacity correction factor for the oversampled volume ray casting.

We evaluate the accuracy of the new correction and compare it with the existing approach using real volumetric datasets.



Professional Abstracts

Automatic Acquisition of Concepts

Ze Zhang

Coker College

Machine learning has been a hot topic in computer science both in theory and applications. The aim of this work is to establish a rigorous theoretical formalism of concepts – the abstract entities with which learning and reasoning are carried out. A concept is modeled as a logic expression in terms of its constituent concepts, each of which is in turn expressed as a logic expression of other concepts. A computer implementing such a model is able to acquire and enhance new concepts through interactions with its environment (inputs and solicited responses); and it gradually become “mature” when it can use its knowledge and react to the external requests.

Pellissippi State's Virtual Campus

David Brown

Pellissippi State Technical Community College

The age of practical virtual reality crept up on most of us through the proliferation of MMORPGs (massively multi-player online role playing games). Virtual worlds based on MMORPG engines are beginning to make their presence felt in the "real" world as businesses and individuals begin a digital migration into the third dimension. Pellissippi State Technical Community College now has a campus in the virtual world "Second Life." Dr. David Brown will discuss the challenges the college has faced, and the insights they have gained through their experience in this new frontier.

Building a Computer Networking Lab with Virtualization Tools

Jiang Li and Nancy Smithfield

Austin Peay State University

Virtualization tools are used in a new departmental computer networking lab. The lab is designed to support network and security courses and in particular a Windows network administration course. This paper describes the network configuration and the advantages of using Virtual PC, a virtualization application that allows multiple operating systems to be run simultaneously creating virtual PC guests on each physical machine. Each virtual PC acts as separate host on the network. Computers can be easily configured so that students are working in their own virtualized environment. The department's network is configured as three subnets with each subnet having three physical computers connected by two routers and one switch. Two computers are running Windows Server 2003 with active directory, primary DNS and WINS services, while other computers are running Windows XP and Vista. Each physical computer is hosting two virtual guests, Windows Server 2003 and Windows XP. Therefore, each computer is simulating three hosts on the network, i.e., one server and two clients, each having a different IP address. Virtual servers can also provide networking services. Students can install networking protocols, services, and management tools on their designated virtual servers. They can configure and troubleshoot their virtual server and clients, and other virtual or physical computers within or across subnets. For example, students may set up pull or push replication partnerships with virtual WINS servers, and configure multiple clients to register with WINS servers. They may also create multiple secondary DNS forward and reverse look up zones on virtual servers which update data via zone transfer from the primary zone on the physical server. Application servers, for instance, web servers and file servers have been set up for physical and virtual machines. Future projects include the implementation of RAS with VPN connection, the configuration of IPsec, and wireless communication.

Backgrounded Virtual Machines for Distributed Computing

Phillip S. Young, Ross A. Binkley, William P. Greenway,
Jeremy Ey, and Eric L. Brown

Tennessee Technological University

This presentation will describe the authors' current work using virtual machine applications to build a distributed computing environment. These virtual machines run on the resources of an open computing lab. The goal of this configuration is to exploit otherwise idle resources. As reported by others [1], average processor utilization on these resources rarely exceeds 5%.

For this work, the deployment of a Linux-based virtual machine onto a Windows-based host is considered. This configuration was selected to provide a diverse resource base, providing access to the Linux environment for tasks that exclusively require it [2]. It is hoped that simultaneously supplying the ability to run Windows and Linux-based applications will provide for greater usage than previously published configurations involving specific time windows for teaching and research [3]. Specifically, this work aims to use this resource to perform computational tasks for engineering simulation and research on computational clusters and grids without direct administrator intervention or machine rebooting.

As noted by Necaise [4], virtual machines offer several advantages over dual boot configurations. In this configuration, processes may be running in the Linux virtual machine while another user accesses the graphical Windows environment. As also noted, the largest drawback to this configuration is the added overhead of virtualization. However, in this work it is felt that the benefit of continuous multi-system availability outweighs the advantage of additional computational power within a limited time window.

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An SNMP Agent Software Suite Design and Implementation for SCADA Systems

Yingbing Yu

Austin Peay State University

This paper presents the design and implementation of an SNMP agent software suite (including a server, client and the agent itself) to collect network related information in the automation system. The agent is deployed in a SCADA (Supervisory Control and Data Acquisition) system, which is used extensively to monitor and control process throughout the utility industries. SNMP (Simple Network Management Protocol) is a network monitoring and control protocol in application layer to facilitate the exchange of information between network devices.

To collect the data such as radio strength, IP gateway status, processor status and so on, a server software is developed to connect with the SCADA control processor to get information in real time. A client program is further designed to communicate with the server via Microsoft .Net Remoting technology to retrieve updated values. Both the client and server software are running in managed environment using the .Net Framework.

The purpose of the agent is to response the SNMP GET/SET commands from the enterprise management software (HP OpenView) and to send enterprise-specific traps (SNMP V1 and V2) to notify any changes of the SCADA system. The agent software is written in C++ using Microsoft WinSNMP library and Win32 APIs and runs in unmanaged environment. Since the agent is running in the same machine as the client software, it communicates with the client via Windows standard inter-process communication method. We have chosen MSMQ (Microsoft Message Queuing) for the implementation because it is supported in both the managed and unmanaged environment. After the agent gets the data (wrapped in XML messages) from the client side, it will extract the information and encode as SNMP OIDs (object IDs) and send to the enterprise management software in the format of SNMP PDU (Protocol Data Unit).

Modeling Paradigm Blindness

Steve Donaldson

Samford University

Humans perceive their world via a set of prevailing paradigms that range from mundane to life-changing. Paradigm blindness occurs when a current paradigm prevents the recognition and adoption of a new, more beneficial paradigm. Clearly such a phenomena is a cognitive event and critical questions pertain to the criteria under which paradigm blindness develops and the extent to which it may be overcome. This presentation suggests how Kohonen self-organizing feature maps can be employed to model paradigm blindness as a means to explore these critical questions. The insights obtained are compared to those potentially available from other simulation environments and the ramifications for educators and any individuals who aspire to creative enterprises are discussed.

Automatic Mapping of Applications onto Reconfigurable Computers

Xuejun Liang

Jackson State University

Reconfigurable computers that use co-processor boards based on the Field Programmable Gate Array (FPGA) can offer significant performance advantages over conventional processors because the FPGA can be tailored to the particular computational needs of a given application. They have been used for accelerating various applications in many different fields, such as digital signal processing, image processing, and cryptography. Recently, the capacities of FPGAs have risen to levels that make them suitable for high-end scientific applications, which require 64-bit floating-point operations. However, mapping high level algorithms onto FPGAs is a formidable barrier to the use of reconfigurable computers by software programmers. In this presentation, an architecture-aware and domain-specific approach is proposed to facilitate software programmers to develop their applications on reconfigurable computers more productively and efficiently. With the proposed approach, the process of mapping applications onto FPGAs is divided into two tasks. First, generate a coarse-grained domain-specific RA (reconfigurable architecture) on top of FPGAs for a specific application domain, which is a set of applications that share some similarities in computation and/or are used together in a common field. Second, compile a user application in a specific domain into an FPGA design targeting to the corresponding domain-specific RA. A generic architecture template (GAT) is given as a framework of generating domain-specific RAs and compiling applications. Examples of domain-specific RAs and their relations with GAT are presented. Meanwhile, the related work is also discussed.

A Pipeline for Searching Relevant Articles for a Research Topic on the PubMed Database and for Subsequent Text Mining

Tzusheng Pei, Raphael D. Isokpehi,
and Hari H. P. Cohly

Jackson State University

PubMed is a suitable database for biologists and researchers in other disciplines to search literature effectively. Our project is to design and implement a tool for searching literature in biology on the PubMed Web site and do subsequent text mining. Extraction of articles from the PubMed Web site needs suitable input for searching. A naïve user needs good exercises before actually working on the PubMed database, such as where and what input string should be supplied and what database should be selected in the PubMed corpus. A tool in Perl is currently under implementation. The final Perl script will make the process easy for searching relevant articles on a research topic in the PubMed corpus. When this tool is run, it will ask the user to supply a related string for searching as the input or take input from a file. This tool, as a software robot, will establish an Internet connection to the PubMed Web site and pass the search string to the PubMed Web server. The Web server will extract all the relevant articles from the PubMed database according to the supplied string. Then the Web server will return an HTML source file with links to the relevant articles to the end-user Web browser. This tool will follow each link to extract the abstract and the reference section of the article from PubMed or other Web site. The result is an HTML file back to this tool and will pass through a filter program to delete the HTML tags and generate a text file. Then it will go over all articles one by one in the reference section to extract each cited article's abstract from the PubMed or other Web site. Finally a list of articles with title, author(s), and abstract for each will be generated as a corpus in the form of text file.

For this project, four seed articles related to the Arabidopsis CHX gene family will be supplied, and a corpus of titles/abstracts in the form of text file relevant to this gene family will be generated using this tool. The corpus as a text file generated by this tool will feed in a text mining pipeline for removing stop words, stem words and generating bag words. The output from this pipeline will be used for identifying recurring biological terms/topics and for other semantic analysis.

An Introduction to JGAP: A Framework for Genetic Algorithms

Ken R. Adcock, Jr.

UPS Supply Chain Solutions

In the Java community, frameworks have long played a central role in applications development. The ability to use frameworks such as Hibernate and Spring are now a prerequisite skill for most Java developers. A framework exists as a set of reusable generic code libraries that developers can use to address common tasks. These libraries provide a standardized infrastructure for building applications or solving a particular problem. Frameworks speed development time by enabling developers to focus more of their creative efforts on implementing specific business logic.

The framework approach has made its way into the world of evolutionary algorithms such as genetic algorithms. Genetic algorithms are a popular search technique that mimics the evolutionary process of natural selection to arrive at good solutions to difficult optimization problems. It is here where some interesting questions become apparent.

A well designed framework must be constructed in a manner to fit scenarios that cannot be fully anticipated by the framework writers. A quick examination of genetic algorithms reveals there are in fact basic tasks that would be good candidates for incorporating into a framework. However, generic algorithms by nature must be very domain-specific in order to solve most problems. One could easily argue that writing a framework for genetic algorithms would be an extremely challenging task. Therefore, an examination of how an actual framework-oriented approach to genetic algorithms would work is worthwhile.

As a test case, this presentation will examine a Java-based framework for Genetic Algorithms named JGAP (Java Genetic Algorithms Package). More specifically, an examination of the conceptual and technical underpinnings of JGAP will be discussed. This presentation will also examine the statement made on the JGAP website, which states that JGAP was designed to be easy to use “out of the box.”

A Study of Undergraduate Preferences and Experiences in Online Fashion Shopping

Tony Pittarese

East Tennessee State University

Since online stores must compete against traditional retailers, it is useful to study differences in shopper experiences and preferences in those two environments. This comparison can point out flaws or problems in present online opportunities, and also reveal future targets for improvement. For this comparison to be meaningful, viable stores selling similar merchandise must exist in both environments, and those sharing their insight should have experiences shopping both online and offline for the targeted products. Ideally, the products themselves should not be commodity or standardized products, but rather custom products providing interesting elements for comparison.

Current undergraduate college students represent the first generation to have achieved buying power during an era where both physical and online shopping alternatives were equally available and therefore represent an interesting audience for study. Although there are many potential industries that could be targeted for study, it can be reasonably assumed that all target audience members have experience in clothes shopping. Fashion products are successfully retailed online, preference is based upon criteria which vary among individuals, and products have interesting inter-product relationships. 236 undergraduate college students were surveyed about their experiences and preferences in online shopping in general, and their particular experiences in online fashion shopping versus physical store fashion shopping. Study participants were asked 32 questions of varying types. Many interesting differences in their experiences in the two environments were noted. Although many statistics indicated higher levels of overall satisfaction and perceived product quality in online purchases, the overwhelming majority of participants indicated a preference for shopping in physical clothing stores. In this session a wide array of survey results will be presented, with a focus on those that provide interesting comparisons between the online and physical shopping environments.

Improving User Control of Personal Data Release

Syed Raza

Talladega College

The paper to be presented concerns the case of a user who visits an online business to obtain service. One privacy cost to a user who requests a service is the need to provide personal information. The situation at the time of the visit is not ideal: proximity to obtaining the service, time pressures and absent of clear alternatives may induce compliance to the data release. This paper proposes that the user visit an online privacy agent (PA) in advance of the immediate need for service. The PA would have data about alternative service providers (stores) as well as pre-approved information requirements for the service at each store. The user would be able to select a store, and then the PA would have the user load the needed data in a repository that would release the selected personal data to the store only when certain cryptographic keys match. The keys would be encrypted (by the PA) into a token that the user would provide when he requests the service. Thus, the privacy policy decisions are made in a more favorable situation than when the user is at the store requesting the service. This project involves issues of user control of privacy, cryptography, pre-approved contracting and computer aided decision-making.

Fast Image Mosaicking Using Multicore CPUs

Ray Seyfarth

University of Southern Mississippi

The University of Southern Mississippi is participating in a project with the Joint Airborne Lidar Bathymetry Technical Center of Excellence (JALBTCX) which is a joint effort funded by the US Army Corps of Engineers, the Naval Research Laboratory and NOAA to improve processing of Lidar data. The Lidar data is collected from an airplane along with digital photographs collected once per second during Lidar collection. These digital photographs serve as a means of determining the land cover for Lidar points during data cleaning and are a valuable data source when assembled into a mosaic.

JALBTCX has been preparing mosaics using a commercial software package which required about 4 hours to assemble a typical mosaic. By streamlining the processing of the data and utilizing multiple CPU cores, this processing time has been reduced to approximately one minute without loss of quality. This talk focuses on the techniques used to speed up the processing of mosaics.

GUS: Grading Using Subversion

Roland H. Untch

Middle Tennessee State University

This talk describes GUS, an assignment management system suitable for use in both distance education and traditional campus settings. This system does not require a web server for network communication and runs on multiple platforms, including Windows, Mac OS X, and Linux. GUS is constructed atop Subversion, an open-source revision control system. A key feature of this new system is that both assignment collection and return is facilitated; this two-way transport is essential in a distance education environment. Additionally, two interfaces have been developed that allow GUS to provide a paperless grading environment. One interface uses the Portable Document Format (PDF) and Adobe Acrobat Pro for marking assignment submissions. The other interface uses PowerShell to produce OneNote 2007 documents. Both interfaces promote pen-based grading with a Tablet PC. System design, grading experiences, and future work will be described.

A Task-Set Approach for Teaching an Online Programming Course

Jeffrey Roach

East Tennessee State University

In the summer of 2008, Introduction to Java Programming was delivered in an online format for the first time at the Computer and Information Science department at East Tennessee State University. Online delivery of this programming course posed a number of challenges with content delivery, student assessment of learning, and student engagement. These challenges were addressed by adapting a novel student-oriented task-set approach that seemed to have worked well. This presentation is a summary of the approach used, the challenges faced and overcame, and the experiences gained from delivering such a course.

The challenges were specifically related to the various factors of the course offering and the students' experiences. Introduction to Java Programming was a special topics course offered under the CSCI4957 and CSCI5957 rubrics. It was offered over a ten-week period to undergraduate and graduate students with at least two semesters of programming in a different language. The students were expected to have fundamental imperative programming skills such as: declaring variables, defining variables using the assignment operator, using the three control structures, using functions and procedures, and using a basic data structure such as an array. Additionally, graduate students must have completed data structures in order for the course to be considered as a graduate elective. Two graduate and fourteen undergraduate students signed up for the course with varying backgrounds. Some had C++ as their previous language and the others had Visual Basic. Both sets used an IDE (Integrated Development Environment) as the programming interface with C++ students developing console-based applications and the Visual Basic students developing visual applications. Even though the course ended with eleven students, the task-set approach worked well for content delivery, for assessing student learning, and for engaging and motivating the students. An informal questionnaire revealed that the students enjoyed the approach and found it beneficial.

(Mis)Adventures in Cyberspace: Teaching and Learning Online

Beth Walker

University of Tennessee–Martin

“An online course? Like, how do you keep ’em from cheating?”

“Tutoring online? Does that even work?”

“Once you get everything online, the rest is easy, right?”

Online course delivery is the wave of the future, but there is still stigma attached to, as well as myths and misunderstandings about, online courses. To complicate matters, the technology sometimes hinders as much as it helps. A writing teacher discusses her experiences—good and could-be-better—as both a designer of and student in online courses. Topics include planning and scheduling the work load, handling written assignments, discussion board and quizzes, and using WebCT, Blackboard, and Breeze Live online tutoring software. This session is suitable for new instructors as well as for those seasoned professionals who have yet to take the plunge into online instruction or conferencing.

Converting an Online C++ Course from WebCT to Desire to Learn (D2L)

Ken R. Adcock and Syed Hasnain

Cleveland State Community College and Tennessee Board of Regents

The Tennessee Board of Regents (TBR) selected D2L as a course management system (CMS) replacement for WebCT after a lengthy and formalized evaluation processes. Coupled with changing the CMS was a directive to adopt a new quality management system. The quality standard adopted was based on the Quality Matters product that was developed from a three-year grant by the Fund for the Improvement of Postsecondary Education (FIPSE). Demonstrated will be the resulting D2L version of the course and an overview of the resulting course structure. Discussed also will be the challenges encountered with this effort and the lessons learned and probably soon forgotten.

Encouraging Teamwork by Giving Large, Ambitious Projects – Will it Work?

Bob Bradley

University of Tennessee–Martin

Teamwork and project management: these are two very important skills that our students will need, whether in graduate school or in the workforce. Unfortunately in most of their classes, our students do not get the opportunity to work on large projects nor do they get to work together in teams.

This semester I am helping our students gain some experience in these areas by running our Senior Seminar capstone class as if it were a small company. I presented the class with the company's main goals and then broke the class up into three separate teams, each working on one of those goals. A team leader was chosen for each team. The first team (the website team) would create a new Web 2.0 website (XnaDownload.com) that would be a community site for XNA video game developers, allowing them to upload their own code and games, and to post links to related sites. The second team would create three or four functional XNA/Xbox video games and a reusable common class library that would be hosted on the website. The third team would create graphical content (2D and 3D) that would be used by the games, by the website, and would be shared on the website for others to use. Prototypes for both the website and the games were to be completed within one month, and full working versions would have to be completed by the end of the semester. I told them I would not be “teaching” them how to do it, but it all had to be done. Each week, they had to fill out weekly TPS reports describing what they had done, and we would meet to discuss progress and goals. I would not lecture, but I would provide them with lots of books, tools and software.

With such a large goal set for them and with such short deadlines, my students were forced to work together and to manage their time wisely. One of my students said with a smile, “You managed to take a small one-hour class and turn it into a ten-hour class!” During this presentation, I will talk about the progress of the class and project. This presentation will also focus on using tools such as Microsoft's Visual Studio Team Foundation Server, Google Docs and Blackboard to encourage teamwork in your classes.

Misreading the Obvious: Why Women Are Not Choosing Computer Science As a Major

T. F. Higginbotham

Southeastern Louisiana University

It took eight years to convince my wife to marry me, so what follows should be taken with a grain of salt.

I have been counseling the ladies for forty+ years concerning their professional ambitions, which may give me some insight to their thinking.

Many are unwilling to pursue a career in which they will be unable to have a home and family. Sixty hour weeks is not going appeal to them. And they know that to progress fully in their careers that may be demanded of them. Also, they know that often times they will not be compensated for their overtime.

The other side of the coin is what men are willing to do. Are they willing to give up home and family to further their careers? In Louisiana, there are many jobs on the oil rigs for roughnecks, 12 day stints with 12 hour shifts. A significant premium is required to get them onto the rigs.... Surprise, they want to home with their wives and families. They do not think of home and family too much as young men – yet they actually do. They know to get the lady, they are going to have achieve something.

The young ladies have a much clearer understanding of what they want out of life than the gentlemen, witness watching 4 12-age girls discuss their weddings in the local bookstore. They are concerned about being over-educated, hence not desirable on the marriage market. My comment to this has always been, “If you are smart enough to do this major, you can get most anyone you want. One of my ladies took up skeet shooting so she could meet people who she might like to marry Took her a year to find one. A number of them took classes to find someone.

Hosting a Successful Technology Camp for Females

Michaele Laws and Kellie Price

East Tennessee State University

Although there is an increase of career opportunities in science and technology fields, current research continues to reflect the under-representation of women in these areas. Results from thriving summer camps at ETSU indicate that efforts to reverse this trend must be initiated at an early stage in the education process. This presentation will target college faculty, staff, or graduate students with an interest in mentoring young females in the area of science and technology. Presenters will provide information and resources needed to plan and execute a summer camp for young females ages 10-13 years. Examples of hands-on exercises and activities that have been successfully implemented for three years during “Girls in Science and Technology” (GIST) camps at East Tennessee State University (ETSU) will be presented and discussed.

Lessons from Kolb for an MIS Class

Denise Williams

University of Tennessee–Martin

Many universities have a class in the business core focusing on management information systems or MIS. After attending a workshop on Kolb's Learning Styles and hearing some of the benefits reported in the literature, an effort was made to utilize the lessons from the workshop in this particular course. Specifically, lessons from the workshop relating to presenting material in various ways to support enhanced learning have been applied in teaching course concepts. Lessons from the experience and the perceived impacts will be presented.

Toward a Verifying Compiler, a Grand Challenge for Computer Science

David Frazier

East Tennessee State University

In 2003, Tony Hoare revives the idea of a verifying compiler as a grand challenge for computer research. To be a grand challenge, Hoare enumerates several criteria, including that the challenge be fundamental, astonishing, testable, revolutionary, and feasible. Examples of other grand challenges in computer science include a championship computer program, which has been completed, and the Turing test, which has not.

The idea of a verifying compiler is easy enough to describe. A verifying compiler is one that guarantees the correctness of a program before running it. Not just the syntactic correctness, which compilers have always done, but actual program correctness. Does the program do what it is intended to do?

There are three basic categories of program error. The first is syntactic error. These errors are caught by all compilers. The second class of error is run-time errors. Compilers cannot check for these types of errors, but a rigorous testing of the program should discover these errors. The final type of error is a logical error. This is where the program performs without any obvious error, but simply does not do what it was intended to do.

An example may be instructive. In 1999, the Mars Climate Orbiter crashed because of an error in the control program. The programmer had not translated units of measure correctly. The program compiled without errors, and was able to pass tests to detect run-time errors. From the standpoint of the compiler, the program was perfectly valid. The problem was that it was not correct. It did not do what it was designed to do.

There have been several approaches to solving this problem. My presentation will discuss some of the projects working on this challenge, and the status of their research.

Using Postscript in an Organization of Programming Languages Course

Jim Clark

University of Tennessee–Martin

Postscript is a stack-based, purely interpreted programming language first used to generate device-independent graphics for laser printers. Even today, it is the de-facto standard page description language used by desktop publishers and is the basis of platform-independent “PDF” files. As a language that most students are not familiar with, postscript provides interesting variations on names, types, bindings, parameters, scope, and other areas of interest in programming language design and implementation. A student team was to “teach” the language to their fellow classmates, discuss some of the above principles in relation to the language, and assign an “interesting program.” The latter idea “seemed like a good idea at the time” but had decidedly mixed results. An overview of the language is given in the context of common principles taught in a comparative programming language course.

Nifty Problem: Counter-Battery Radar

Richard S. Johnson

University of South Alabama

Counter-Battery Radar is a scalable assignment suitable for CS1 and other courses such as programming for engineering students where a problem based on a 'real' physical system is desired while retaining a manageable level of difficulty. The assignment involves processing a dataset containing radar coordinate data: azimuth, elevation, and range, which model a partial trajectory for incoming mortar rounds or rockets. These values must be converted into Cartesian map coordinates so basic ballistics can be used to determine the POO, Point of Origin, needed for counter-attack by friendly forces.

From the CS perspective, the assignment can be implemented using parallel arrays and procedural programming, or OOP with an array of Coordinate objects, or even as a Trajectory class containing a collection of Coordinates and all associated methods for processing them. Visualizing the trajectory data would add another level of challenge.

From an engineering perspective, the mathematics involved actually decomposes into no more than 2D trigonometry. By neglecting air resistance, the required physics is made fairly minimal and can be readily supplied to the students with the assignment. More knowledge about what the dataset includes (peak, Point of Impact) can be used to further simplify, or by absence complicate, the underlying physics and resulting program.

Assignment details for this unfortunately topical problem, and a solution, are provided as well as a discussion of different variations.

An Effective Approach to Teaching an Object-Oriented Systems Analysis and Design Course

Emery Gathers

University of Tennessee–Martin

With a global, turbulent, and dynamic business environment, the role of information technology in business has changed. The adoption of object orientation has not resulted in the dramatic paradigm shift that was predicted. Instead there has emerged a hybrid approach to systems and their development. The approach encompasses some aspects of both traditional and object-oriented systems development. Although the approach focuses on object-oriented systems analysis and design and it adheres to ULM standards, it contains elements from other approaches, such as elements of rational database design, that remain a part of systems development in business organizations. The overall organization of the course begins with basic foundational material and follows a systems development cycle, which allows for a logical progression of topics. This cycle is designed to be high level and consists of four steps: planning, analysis, design, and implementation. The course is taught with the assumption that the students have taken an introductory course on computer systems and have experience writing programs in at least one programming language, preferably an object-oriented language.

Finding a Home for the Quantitative Methods Course

Vernon L. McGlone and Teresa A. McGlone

University of the Cumberlands and Eastern Kentucky University

Quantitative Methods (QM), also known as Management Science/Operations Research (MS/OR), has traditionally been one of the core courses in undergraduate and master's level programs in several program areas, most notably the business curriculum. However, the number of QM courses offered has been declining for nearly 20 years, amid a great deal of debate concerning its purpose and usefulness. Both academics and practitioners in the field have been seeking ways to reverse this trend in order to insure the relevance of QM courses.

A number of changes in the traditional method of teaching QM have been proposed and to some degree implemented. These include changes in the specific subjects taught in the course, trending to a hybrid approach with statistics and information systems, changes in the method of instruction, with increasing reliance on information technology approaches rather than pure mathematics, and changes in the academic department responsible for the course. Increasingly, QM is being taught as part of Information Systems rather than as part of Management or as an independent area of study.

We discuss the extent of these changes and some of the reasons for their necessity. We also propose some ways of restructuring QM in order to retain its relevance, focusing upon its integration into an Information Systems framework.

So You Want to Issue Security Certificates?

Katherine H. Winters

University of Tennessee–Chattanooga

One of the fastest growing fields in Computer Science is Information Security and Assurance. This growth is demonstrated in two areas, the job demand for qualified applicants and the enrollment in security related courses by students. The United States Office of Homeland Security through the National Security Agency, NSA, grants educating institutions, which meet a specified set of criteria, the right to issue certificates in a variety of areas. The Department of Computer Science and Engineering, CSE, recently successfully underwent that process. On the first attempt, CSE successfully received the rights to grant two certificates CNN 4011: Information Systems Security Professionals and CNN 4012: Senior System managers. This presentation will describe the process and experience, how it achieved success on the first try, and some pitfalls. It will briefly touch on the courses it used to satisfy the criteria.

Will the Laptop Programs at Bethel College Continue?

Jim Johnson

Bethel College

It has been reported that there are more than 50 colleges and universities that have some type of laptop computer program for their students. Bethel College of McKenzie, Tennessee, is one of those. This presentation will address its programs, including the positive aspects and problems that have occurred as well as the program extension to Bethel College's new MBA program.

SQL Techniques for Applications

B. Wayne Walters

University of Southern Mississippi

This presentation will discuss the importance of database skills for computer professionals. There are many small to medium sized businesses that are looking for employees that have a broad range of technical skills. These generally include an individual that can maintain servers, desktops, networks, internet/email, software installations, third-party programs, and perhaps some small locally developed computer programs.

At the University of Southern Mississippi (USM), our Information Technology (ITC) curriculum is structured to address many of these business needs. We offer both networking and software options to our students. Our students begin learning networking skills from our CISCO Academy and develop initial programming skills from our School of Computing's, Computer Science courses.

The ITC database course, SQL Techniques for Applications, has a hands-on approach that different from that presented in the Computer Science curriculum. The ITC database course has an applied emphasis on querying a database. This presentation will discuss the subject content of the SQL Techniques for Applications course and other database related courses that follow.

Designing a Professor's Blog

Brian Toone

Samford University

Faculty web pages provide a mechanism for distributing information to a wide audience that includes colleagues, current students, and prospective students. Viewing a faculty web page is convenient for the visitor—the page is accessible via a link on the department web page or a quick Google search. For many faculty members, however, the process of maintaining and updating web page content is cumbersome and time-consuming. As a result, the content quickly becomes out-of-date.

Some universities are turning to content-management systems (CMS) as a partial solution to this problem. Duke University, for example, has developed a CMS[1] that provides a web interface for faculty and staff to publish and maintain information about current scholarly activities on department and faculty web pages. While usage of such a CMS facilitates maintenance of certain aspects of a faculty web page, the total cost for installation, support, and training may be prohibitive. Therefore, faculty at many universities are left on their own with respect to the task of updating their personal faculty web page.

I am currently investigating an alternative solution to the problem of keeping faculty web pages up-to-date through the development of a tool that will allow faculty members to incorporate “a professor's blog” into an existing web page. I am experimenting on my own faculty web page[2] to determine the feature set that is most relevant to the typical workday of a professor as a researcher, instructor, and faculty member. Some of the early benefits and results of this work include the ability to easily keep content up-to-date, expand the depth and breadth of content covered, and provide visitors to my faculty web page with a mechanism for leaving comments in order to promote active discussion of current research and teaching topics.

[1] <http://fds.duke.edu/db/help/overview.html>

[2] <http://faculty.samford.edu/~brtoone/alive>

Lights! Camera! Action! Making Computer Graphics Fun

Otha Britton

University of Tennessee–Martin

Over the years, the area of computer graphics has attracted students for many different reasons. One of the hot reasons at present is the interest in computer games. Movies such as “Toy Story” and “A Bug’s Life” have stimulated additional interest. Most textbooks in computer graphics, however, are geared toward teaching the basics of computer graphics with an eye toward making cubes rotate, drawing spheres with appropriate lighting systems, and the like. Much time is spent on the mathematics behind all of this. While these are good for preparing students for further work in computer graphics, they do little to make graphics “fun.” Shalini Goval-Pai, who was on the modeling team for “Toy Story” and was the technical director for “A Bug’s Life,” wrote a textbook for Springer publishers with a stated purpose of making graphics fun for the undergraduate student. Using this textbook in UT Martin’s Computer Graphics class, students first learn the basics of 2D graphics and then immediately begin writing games in 2D. After a few basics of 3D graphics, including transformations, lighting models and texture models, students are led into writing 3D games. To cap off the course, the students then utilize the free PLE version of the Academy Award winning modeling software Maya to develop life-like scenes which are then combined to form a short movie. This approach has excited the students and has them actually asking for additional assignments.

Computer History Myths Debunked

Wayne Summers

Columbus State University

Most of us introduce historical anecdotes in our computer science lectures. We may tell our students that

- i) Joseph-Marie Jacquard invented the punched cards, or that Herman Hollerith invented the punch cards, or
- ii) that Charles Babbage invented the first computer, or
- iii) that Charles Babbage didn't build the first computer because the technology of his time was not sophisticated enough to support his requirements, or
- iv) that Ada Lovelace was the first programmer, or
- v) that 20th Century computers were developed independent of the work of Charles Babbage.

While teaching the History of Computing in England, the author and his students discovered that many of the historical anecdotes that are taught in computer classes are not historically accurate and in some cases actually false.

The author explores the research findings from his students and he during a History of Computing course that was taught as a study-abroad program. This presentation will share their insights as they explored early computing history.

Context and Keyword Highlighting of Web Based Documents

Ronald Zucker

East Tennessee State University

This presentation introduces a new form of web annotating consisting of double highlighting using both keyword and context. Context highlighting is the ability to mark the text that surrounds the key words or phrase. Highlighting is usually personal and tacit; that is, highlights are typically brief and of limited use (to all but the person doing the highlighting) when viewed without context. Web scraping is a form of capturing larger portions of text to make a summary that can be personal, public, and explicit.

To test the benefits and costs involved in keyword and context highlighting, one group of participants used a prototype browser called HighBrow that is capable of highlighting both keywords and the supporting context. HighBrow automatically creates an index of keywords and a context summary containing both the context and highlighted keywords (i.e. the main reason the context was selected), thus offering a hybrid of highlighting, indexing, and web scraping.

Results of two separate experiments will be presented. The first experiment determined that active readers: benefit based on test results, liked the abilities of context highlighting, and found it easy to use. The second experiment determined the usefulness of keyword and context highlighting to others.

This presentation also demonstrates that people using a context/keyword highlighter highlighted keywords that were statistically significantly smaller in size than people using traditional highlighting techniques.

Biometrics for Authentication and Recognition: Issues and Concerns

Shamim Khan

Columbus State University

The most important task in information assurance is user authentication for securing access to information (“Am I who I claim to be?”). An even more challenging task is that of recognition (“Who am I?”). The well-established method of using passwords for authentication is becoming increasingly vulnerable due to the sheer number of passwords one has to remember these days. At the same time, the need for efficient and reliable identification for the purposes of fighting crime and threats to national security these days is greater than ever.

In recent decades, the use biometrics for both authentication and recognition has become an active area of research and development. Biometrics refers to a variety of identification techniques which are based on some physiological and behavioral characteristic. The growth of biometrics has resulted largely from the deficiencies of traditional knowledge-based (something I know) and token-based (something I possess) techniques. Passwords can be forgotten, shared, or observed. Tokens, such as smart cards and magnetic stripe cards can be lost, stolen, duplicated, or left at home. Only biometric authentication bases identification on an intrinsic part of a human being. The two most popular biometrics in use currently are those based on fingerprint and facial images. Since biometrics cannot be shared or lost, they are much less susceptible to compromise.

But how reliable are biometric-based methods? Apart from possible practical difficulties associated with the acquisition, storage and processing of biometric data in an efficient and secure manner, the issues of user acceptance and privacy are major considerations in the development of any system based on such a method. This paper highlights the reasons for the increasing popularity of biometrics and gives an outline of the prevalent technology. It takes a critical look at some of the major concerns about biometric technology that accompany its many advantages.

A Study of the Sterol Compositions in Dinoflagellates Using Cluster Validation

Cen Li and Jeff LeBlond

Middle Tennessee State University

In many science and engineering problems, clustering analysis is used as the first step in explorative data analysis. Many clustering algorithms have been developed using different similarity measures, clustering control schemes, and cluster selection criteria. Yet far less work has focused on systematic cluster validation that evaluates the quality of the clusters and generates the optimal clusters for data.

This work presents a systematic approach for cluster validation. The approach works as a meta-clustering engine that summarizes validation results from multiple clustering systems. The two main steps are: (1) finding the optimal number of clusters for data, and (2) selecting the optimal clusters that has the highest overall quality value. A group of representative clustering systems including the K-means, the UPGMA, Gaussian model based Bayesian clustering, and the self-organization map clustering, has been selected. Clustering results of varying sizes generated from these systems are evaluated using both the internal and the stability measures. The internal measures compute the correctness of data to cluster assignment, the compactness of the clusters, and the separation between clusters. The stability measures compute the stability of the cluster structure by clustering data that has been systematically perturbed by noise. The optimal number of clusters for the data is identified based on these validation measures. The optimal cluster is then selected among clustering results of the optimal size.

This approach has been applied in clustering the sterol compositions in dinoflagellates, with the goal to investigate the correspondences between the dinoflagellates sharing similar sterol compositions and their evolutionary histories. The cluster validation system provided important evidence about the clusters of different sterol compositions. This led to the study conclusions that suggest that the sterol composition of dinoflagellates has been determined, to a certain extent, by the evolutionary diversification of this lineage.

Performance Comparison between Computing Neural Network and Traditional Mathematical Models to Estimate Daylily Hybrid Characteristics

Ramana Gosukonda and Masoud Naghedolfeizi

Fort Valley State University

The purpose of this research is to determine a suitable model to predict features of Daylily (*Hemerocallis* spp.) hybrids from features of known patterns of pod and pollen parents. This research could help daylily growers to choose proper parents for better hybrid.

Initially with a limited available data set (230 patterns), multiple linear regression and artificial neural network models (ANN) were employed to predict the characteristics of daylily hybrids. Features such as height, diameter, and ploidy were included in the initial training and testing. Each pattern contains five fields of input data and two fields of outputs. The input data includes ploidy and the heights and diameters of both parents and the outputs consist of height and diameter of the hybrid plant (child). Data pre-processing was performed to meet the format requirements of ANN and regression models. Backpropagation ANN models with Kalman filter (KF) learning algorithm were used to develop nonparametric models between the input and output data sets. These networks were compared with the linear regression models. Initial results obtained from both models indicated that regression models had a relatively better accuracy in predicting unseen patterns.

Recently, we have been able to increase the data to 1200 patterns for better investigation of the initial results. The data is currently being processed to reduce the data redundancy and noise and to form training and testing patterns. Once the patterns are identified, they will be used in ANN and regression models to investigate the performance of each model. In addition, we are planning to perform statistical analysis of the data and investigate if the statistical distributions of features in parents correlate with those of child. Further, once a suitable model is identified, the research work will be extended to include more characteristics of daylily plant such as blooming habit and sequence, color of the flower, and foliage.

Panels and Roundtable Discussions

Using Science Fiction to Teach Computer Science

David Frazier, Dan Perry, and Donald Sanderson

East Tennessee State University and Northeast State Community College

Motivating students is a challenge faced by all faculty. The focus of this panel will be the different ways that have been employed by the panel members to motivate students to learn computer science by citing examples from science fiction. Each panel member will bring their own unique perspective

David Frazier

David has incorporated ideas from Cyberpunk literature such as “Neuromancer” and the “The Difference Engine”, and from Sci-Fi movies such as “The Matrix” to demonstrate concepts in Web Design and Security classes. David, along with Jill LeRoy-Frazier, presented a paper entitled “Talking Heads and Intuition: Artificial Intelligence and Gödel’s Incompleteness Theorem in William Gibson’s Neuromancer” at the Twentieth Century Literature Conference held in Louisville, KY, in February, 2002.

Dan Perry

Dan is a long time fan of science fiction and movie buff. He has used scenarios from movies such as “War Games” and “The Net” in security lectures. “2001: A Space Odyssey” becomes a starting point for looking at artificial intelligence. Discussions on privacy issues often involve examining technology in relation to movies and books such as “1984”. Dan has found that relating current issues to popular movies and literature helps to engage students in class.

Don Sanderson

Don has twice taught a course on The Computer Science of Science Fiction, in which he used examples from SF literature and Movies in which students examined CS topics such as: AI, Databases, Networking and the Internet. They looked at predictions of these technologies from various time periods, and analyzed their accuracy in terms of the technology then, and the technology now. The course also looked at the history of computing through science fiction, and the public’s perception of computers and computer scientists.

Conference at a Glance



	Azalea Room	Dogwood I
7:30 AM	Morning Coffee – Poolside	Morning Coffee – Poolside
8:00 AM	Welcome and Keynote Address	
9:00 AM	Coffee Break – Poolside	Coffee Break – Poolside
	Session I – PhD	Session I – UG4
	Chair: Shamim Khan	Chair: Cen Li
9:15 AM	Graylin Trevor Jay (60)	Jesse Smith Jr. (26)
9:35 AM	Matthew Thornton (61)	Smith, Harper, Montgomery (27)
9:55 AM	David O’Gwynn (62)	Corum, Glendowne, et. al. (28)
10:15 AM	Bruce Johnson (63)	Austin Areaux (29)
	Session II– PhD & Masters	Session II – UG4
	Chair: Wayne Summers	Chair: Jeff Gray
10:40 AM	Richa Tiwari (64)	James Howard (30)
11:00 AM	Jong Kwan Lee (65)	Iyatiti Mokube (31)
11:20 AM	Hua Zhong (46)	Gregory Brazda/Benjamin Dennis(32)
11:40 AM	Rong Zhou (47)	Justin Moore (33)
12:00 PM	Lunch – Poolside	Lunch – Poolside
	Session III – Masters	Session III – UG4
	Chair: Tzusheng Pei	Chair: Tony Pittarese
1:00 PM	Xiaofei Nan (48)	Julie Paige (34)
1:20 PM	William T. Watson (49)	Wesner, Garner, et al. (35)
1:40 PM	Feiqiong Liu & Li Yang (50)	Amos Smith (36)
2:00 PM	Madhulika Kamboj (51)	Anthony Morris & Mark Jones (37)
2:20 PM	Break – Poolside	Break – Poolside
	Session IV – Masters	Session IV– UG4
	Chair: Jim Vandergriff	Chair: Vicki Hightower
2:35 PM	Brian Sulcer (52)	Jason Cornwell (38)
2:55 PM	Vikas Singh & Praveer Bahri (53)	John William Ingle (39)
3:15 PM	Michael Baldwin (54)	Mark Stahl & Craig Craven (40)
3:35 PM	Alma Cemerlic (55)	Alvin McClerkin (41)
	Session V – Masters	UG4
	Chair: Anant Honkan	Chair: Nancy Smithfield
4:00 PM	NagaRakesh Vallamkondu (56)	Benjamin Harvey (42)
4:20 PM	Amelia Hale (57)	Taylor J. Klotz (43)
4:40 PM	James Clark Church (58)	Kimberly Davis (44)
5:00 PM	Business Meeting – Hospitality Suite	
7:00 PM	Awards Banquet – Magnolia Room	

	Dogwood II	Magnolia
7:30 AM	Morning Coffee – Poolside	Morning Coffee – Poolside
9:00 AM	Coffee Break – Poolside	Coffee Break – Poolside
	Session I – Professional	Session I – Professional
	Chair: Joyce Crowell	Chair: Kathy Winters
9:15 AM	Ze Zhang (68)	Yingbing Yu (72)
9:35 AM	David Brown (69)	Steve Donaldson (73)
9:55 AM	Jiang Li & Nancy Smithfield (70)	Xuejun Liang (74)
10:15 AM	Young, Binkley, et al. (71)	Pei, Isokpehi, & Cohly (75)
	Session II – Professional	Session II – Professional
	Chair: Ashraful Choudhury	Chair: Denise Williams
10:40 AM	Ken R. Adcock (76)	Roland H. Untch (80)
11:00 AM	Tony Pittarese (77)	Jeffrey Roach (81)
11:20 AM	Syed Raza (78)	Beth Walker (82)
11:40 AM	Ray Seyfarth (79)	Ken R. Adcock & Syed Hasnain (83)
12:00 PM	Lunch – Poolside	Lunch – Poolside
	Session III – Professional	Session III – Professional
	Chair: Ken Adcock	Chair: Ramana Gosukonda
1:00 PM	Bob Bradley (84)	David Frazier (88)
1:20 PM	T. F. Higginbotham (85)	Jim Clark (89)
1:40 PM	Michael Laws & Kellie Price (86)	Richard S. Johnson (90)
2:00 PM	Denise Williams (87)	Emery Gathers (91)
2:20 PM	Break – Poolside	Break – Poolside
	Session IV Professional	Session IV – Professional
	Chair: Ray Seyfarth	Chair: Brenda Parker
2:35 PM	Vernon McGlone & Teresa McGlone (92)	Brian Toone (96)
2:55 PM	Katherine Winters (93)	Otha Britton (97)
3:15 PM	Jim Johnson (94)	Wayne Summers (98)
3:35 PM	B. Wayne Walters (95)	Ronald Zucker (99)
	Session V – UG 2/Panel	Session V – Professional
	Chair: Brian Toone	Chair: Jim Johnson
4:00 PM	Carbini, Thomas, Nguyen, & Arinez (22)	Shamim Khan (100)
4:20 PM	Gibson, Tran, Foo, & Wijono (23)	Cen Li & Jeff LeBlond (101)
4:40 PM	Frazier, Perry, Sanderson (104)	Gosukonda & Nagedolfeizi (102)
5:00 PM	Business Meeting – Hospitality Suite	
7:00 PM	Awards Banquet – Magnolia Room	

Notes



