Newsletter

College of Physical and Mathematical Sciences

January 2008

In this issue:

The Second Semi-Annual Computer Science Demo Day

The Second Semi-Annual Demo Day gave 14 students in four separate groups the opportunity to present the research that they have been working on all semester. The first place, $600 grand prize, went to Dr. Mark Clement's "PathGen" team. Team members Amanda Berber, Kendell Clement, Daniel Ence, and Chris Merris presented research they have done in the field of bioinformatics--using computational sciences to work towards a cure for diseases and disorders including Downs Syndrome.

Dr. Parris Egbert's team, consisting of Daniel Adams, Brandon Clawson, Mirza Garibovic, David Hansen, and Daniel Olsen took home the $300 second prize for the creation of an animated racing game and their use of physics, real-time programming, and computer graphics therein.

The third place prize went to Topher Fischer, who made up Dr. Eric Mercer's one-man team, and worked on software model checking.

And Dr. David Embley's team, Jonathan Baker, Hilton Campbell, Jordan Crabtree, and Steven Ivie, received the fourth place award for their work on Genesis, a family history software tool which allows historians to easily conduct research and upload genealogical information from a multitude of online databases.

Microsoft generously donated the prize money for the participants and provided pizza and drinks for all who were in attendance.

Students interested in participating in CS 598R and the Winter 2008 Demo Day semester met together on Thursday, January 10 in the CS conference room to discuss plans for next semester. The participating professors announced the projects they would be sponsoring for Winter 2008 and gave students the chance to sign up to participate through CS 598R. We're looking forward to seeing the results of their semester of hard work at the next Demo Day in April.

Math

February 29, 2008 - Utah Conference on Undergraduate Research (UCUR) co-hosted by BYU and UVSC. http://www.ugs.utah.edu/urop/ucur/index.htm

Celestial Mechanics Seminar (MWF 10-11:50, 297 TMCB)

Dynamical Systems Seminar (T, 10:00, 297 TMCB) https://math.byu.edu/info/dynsys_semlist.php

Kirby Calculus Seminar (WF, 4:00, 294 TMCB)

Department Colloquium (T, 4:00, 1170 TMCB) https://math.byu.edu/info/semHome.php

S-Rings Seminar (Th, 12:00, 297 TMCB)

Stochastic PDE Seminar (Daily 1:00, 297 TMCB)

Topology and Geometric Group Theory Seminar (TTh 2:00, 294 TMCB)

Statistics Department Names Recipients of Fellowship

Dr. Scott Grimshaw and Dr. Gilbert W. Fellingham have been named as recipients of the Statistics Department 2007 Fellowhips.

Dr. Grimshaw has proved himself to be an innovative and dedicated scholar, with high standards, an outstanding and exciting teacher, and a dependable and active citizen of the university. He has provided insightful and innovative extensions to the statistical body of knowledge and has demonstrated the relevance of these extensions by using them to solve practical problems. The breadth of Dr. Grimshaw's contributions to the statistical literature is particularly impressive. He has contributed in process mentoring and experimental design, as well as in the area of likelihood inference, statistical education, and various areas of application.

Dr. Grimshaw's teaching averages have been consistently above department, college, and university averages. In 2005, he was honored by students with the department's Teacher of the Year award. Dr. Grimshaw has served the department well, and currently serves as the department's Associate Chair and Graduate Coordinator.

Dr. Fellingham is a committed scholar and researcher who strives for excellence in everything he does. His research and analysis have been published not only in the best statistical simulation, actuarial science, and sports analysis venues, but also in the best scientific sports journals associated with physiology, exercise, training, rehabilitation, medicine, metabolism, and nutrition.

Since his arrival in the department in 1990, Dr. Fellingham has brought an energy to the classroom that resonates well with his students. He was honored by students in 2002, 2004, and 2006 with the department's Teacher of the Year award.

Dr. Fellingham has had numerous department committee assignments, all of which he fulfills with commitment and distinction. He has served the profession by working on committees, organizing meetings, and serving in all the offices of the local Chapter of the American Statistical Association; he was recently elected as President of the American Statistical Association's Section of Statistics in Sports.

Dr. Fellingham's achievements are the result of dedicated hard work, setting a good example for all who follow in his footsteps in receiving this award. He has earned the department's respect and this nomination.

Spring Research Deadline

Students need to have their abstracts submitted online by midnight on February 29th at

cpms.byu.edu/springresearch/submitsrabstract

The 22nd Annual Spring Research Conference will be held on Saturday March 15, 2008 from 8am –2pm

A Free Continental Breakfast Will be Served

Implicit Affinity Networks:
New Research from the Computer Science Department

Matt Smith, a PhD candidate researching with Dr. Christophe Giraud-Carrier in the BYU Computer Science Department, presented a research paper at the Workshop on Information Technologies and Systems (WITS) in December. The Workshop, in its seventeenth year, is well-known and prestigious within a growing body of cross-disciplinary scholarship which incorporates computer science, business, and the social sciences to interrogate various social issues.

WITS had a 32% acceptance rate, publishing only 36 papers in its proceedings. Smith's paper, Implicit Affinity Networks, was one of the few to be presented during the workshop as part of the social networking session. Smith was also one of only five presenters to be nominated for best paper award.

Smith, Dr. Giraud-Carrier, and the students researching in the Data Mining Laboratory pioneered the concept of implicit affinities, a method of making connections between individual entities that are not explicitly linked. Smith's research involved a study of the blogosphere and focused on linking the blogs through the content in each posting. Using latent Dirichlet allocation (LDA), Smith extracted topics from over 19,000 blog entries authored by about 2,000 bloggers. For example, one topic was created from blog postings using the phrases "Rudy Giuliani," "John McCain," "White House," "Mitt Romney," "Homeland Security," "Al Qaeda," and "Hillary Clinton." Another category was made up of postings which mentioned "fourth quarter," "stock symbol," "cash flow," and "net income." Using this information, Smith was able to create links between different bloggers who had no previous connections, solely based on the content of their blogs.

Smith's research and the concept of implicit affinities allow social scientists to explore and compute social capital in a revolutionary way. With the influence and omnipresence of the internet, a multitude of social networking devices have been introduced, including, among others, LinkedIn, MySpace, and Facebook. However, these programs rely on explicit affinities—each user must manually connect himself or herself with other users to find "friends" and associates. The innovative concept of implicit affinities, however, automatically creates connections based on common interests, a phenomenon known as "bonding" in the social sciences.

This new method of calculating social capital within a community gives a sense of trends within a community and allows one to see how tightly knit a given community is. Implicit affinities allows for bonding as well as bridging—creating connections between people who have different, yet complementary, interests and skills.

Smith's research has the potential to influence a variety of fields. The concept of implicit affinities opens the door for viral marketing, allowing companies to craft their marketing campaigns to target specific groups of people. It also has the potential to affect political organizations and campaign strategies, and it may even hold influence in the medical domain. For example, Smith hopes that implicit affinities will allow people with medical diseases and disorders to join up with others to create support and information-sharing groups.

Matt Smith was raised in Provo. He and his wife Camille have a one-year old baby boy. Upon graduation, Smith hopes to spend a few years in industry, either at a well-known organization such as Google or at a smaller start-up. Eventually, he would like to follow in the footsteps of his father, a mechanical engineering professor at BYU, and enter the world of academia.

For more information on the Data Mining Laboratory's research, please visit http://dml.cs.byu.edu/wiki/

College Publications

Chemistry & BioChemistry

Ireneusz Nowak, John F. Cannon, and Morris J. Robins,"Addition of Difluorocarbene to 3',4'-Unsaturated Nucleosides: Synthesis of 2'-Deoxy Analogues with a 2-Oxabicyclo [3.1.o] hexane Framework", JOC,**72,**532-537 (2007).

Ireneusz Nowak and Morris J. Robins, "Trifluoromethylation of Alkenyl Bromides and Iodides (Including 5-Iodouracils) with $(CF_3)_2Hg$ and Cu ("Trifluoromethylcopper")[1", JOC **72**, 2678-2681 (2007).

Ireneusz Nowak and Morris J. Robins, "Synthesis of 3'-Deoxynucleosides with 2-Oxabicyclo [3.1.0] hexane Sugar Moieties: Addition of Difluorocarbene to a 3',4'-Unsaturated Uridine Derivative and 1,2-Dihydrofurans Derived from D- and L-Xylose[1] JOC,**72,** 3319-3325 (2007).

Frank Visser, Lijie Sun, Vijaya Damaraju, Tracey Tackaberry, Yunshan Peng, Morris J. Robbins, Stephen A. Baldwin, James D. Young, and Carol E. Cass,"Residues 334 and 338 in Transmembrane Segment 8 of Human Equilibrative Nucleoside Transporter 1 are Important Determinants of Inhibitor Sensitivity, Protein Folding, and Catalytic Turnover", Journal of Biological Chemistry"**,282**, number 19 (2007).

Jiangqiong Liu and Morris J. Robbins, "S_NAR Displacements with 6- (Fluoro, Chloro, Bromo, Iodo, and Alkylsulfonyl)purine Nucleosides: Synthesis, Kinetics, and Mechanism[1", JACS Articles,**129**,5962-5968,(2007).

Morris J. Robins, Ireneusz Nowak, Stanislaw F. Wnuk, Fritz Hansske and Dunatu Madej, "Deoxygenative [1,2]-Hydride Shift Rearrangements in Nucleoside and Sugar Chemistry: Analogy with the [1,2]-Electron Shift in the Deoxygenation of Ribonucleotides by Ribonucleotide Reductases[1",JOC,**72,** 8216-8221 (2007).

Douglas Henderson and Lutfeld Bari Bhuiyan, "Evidence for a Second Contact Value Formula for the Electric Double Layer", Molecular Simulation, **33**, 953-957 (2007).

Andrew M. Duffin, Jeremy A. Johnson, Mark A. Muyskens, and Eric T. Sevy, "Competition between Photochemistry and Energy Transfer in UV-Excited Diazabenzenes. 4. UV Photodissociation of 2,3-, 2,5-, and 2,6- Dimethylpyrazine".J.Phys.Chem A,**111,** 13330-13338, (2007).

Jaron C. Hansen, Bradley A. Flower, John F. Stanton,"Computational study of the vibrational and electronic spectroscopy of a $HO_2 - H_2O_2$ complex",TheoChem,**05-045,**10.1016 (2006).

Everett H. Meyer, Sho Goya, Omid Akbari, Gerald J. Berry, Paul B. Savage, Mitchell Kroneenerg, Toshinori Nakayama, Rosemarie H. DeKruyff, and Dale T.Umetsu, "Glycolipid activation of invariant T cell receptor^{+} NK T cells is sufficient to induce airway hyperreactivity independent of conventional CD4^{+} T cells, PNAS,**103,** 2782-2787,(2007)

Jeffrey Macedone, Andrew Mills, Jordan Olsen, Neil Radicic, Rebecca Nielsen and Paul Farnsworth,"Characterization of supersonic expansion and high resolution imaging of plasma composition near the sampling cone of an Inductively Coupled Plasma Mass Spectrometer, Spectrochimica Acta ,**61**,686-695; 1031-1038; 1039-1049,(2007).

Computer Science

P. L. Hellewell, T. W. van der Horst, and K. E. Seamons. Extensible Pre-Authentication in Kerberos. 23rd Annual Computer Security Applications Conference (ACSAC), Miami, FL, December 2007.

H. Carroll, P. Ridge, M. Clement and Q. Snell, "Phylogenies Scores for Exhaustive Maximum Likelihood and Parsimony Scores Searches", International Journal of Bioinformatics Research and Applications (IJBRA) 3(4) 2007 pp 493-503.

Hyrum Carroll, Wesley Beckstead, Timothy O'Connor, Mark Ebbert, Mark Clement, Quinn Snell, David McClellan. "DNA Reference Alignment Benchmarks Based on Tertiary Structure of Encoded Proteins", Bioinformatics, 23(19) 2007, p 2648-2649.

Mark Ebbert, Timothy O'Connor, Wesley Beckstead, Mark Clement, David McClellan. "Pharmacogenomics: Analyzing SNPs in the CYP2D6 Gene Using Amino Acid Properties" , International Journal of Bioinformatics Research and Applications (IJBRA), 3(3) 2007.

N. Rungta, H. Carroll, E. Mercer, R. Roper, M. Clement, Q. Snell. "Analyzing Gene Relationships for Down Syndrome with Labeled Transitions Graphs", Proceedings of Formal Methods in Computer Aided Design (FMCAD), November 2007,

Geological Sciences

Lira, R., Poklepovic, M.F., and Dorais, M.J. (2008) Solid inclusions of magmatic halite and sylvite in felsic granitoids, Sierra Norte, Córdoba, Argentina. Lithos, 99, 363-384.

Mathematics

Gary L. Musser, William F. Burger, Blake Peterson, Mathematics for Elementary Teachers: A Contemporary Approach, 8th Edition, John Wiley and Sons, 2008.

Roger C. Baker, "Sums of Two Relatively Prime Cubes", 2007, Acta Arithmetica, 129..2, 103-136

Physics and Astronomy

Rose, M. B. and Hintz, E. G., "A Search for Low-Amplitude Variability in Six Open Clusters Using the Robust Median Statistic", 2007, Astronomical Journal, 134, 2067-2078.

McElroy, K., Davis, R.C., Hawkins, A., "The effect of contact length on adhesion between carbon nanotubes on silicon dioxide", 2007, Applied Physics Letters, 91, 233119.

Statistics

Christensen WF, Dillner AM, Schauer JJ, and Reese CS (2007). "Clustering composition vectors using uncertainty information," Environmetrics, 18, 859-869.