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NEWSLETTER

Fall 2014

A Message from the Chair

By James Geller

As the temperatures are going up and down like a rollercoaster and Thanksgiving beckons, it is time for me as Chair of the Computer Science Department to summarize the events of the Fall semester. The semester started with two sad notes. Dr. Boris Verkhovsky, who spent almost 30 years at NJIT, teaching varied topics and doing extensive research on encryption, passed away in August. Modern methods of encryption are the only guarantee that our Web communications are safe from wanton destruction, malicious modification and criminal eavesdropping. There would be no e-commerce, no online banking and no government portals on the Web, were it not for safe, encrypted online communication. Dr. Verkhovsky's book on encryption appeared three weeks after his passing, and it is heart-breaking to know that he missed seeing it in print. (B. S. Verkhovsky: *Integer Algorithms in Cryptology and Information Assurance*, 2014, published by World Scientific)

The second sad note, although of course not at the same level, was that Dr. Mei Liu decided to leave us for a university closer to her family. I am personally saddened by this, because she was one of only two female professors in the Computer Science Department and because she was an important member of our Medical Informatics research group (called SABOC – Structural Analysis of Biomedical Ontology Center). We wish her good luck at her new place and we hope to continue our collaboration with her.

We also had good news with the start of the semester. We were able to hire away Dr. Kurt Rohloff from BBN, a famous technology company in Boston. Dr. Rohloff is an expert in Cyber Security and he hit the ground running, bringing grant money with him to NJIT. Together with Dr. Reza Curtmola, Dr. Grace Wang, and Dr. Cristian Borcea I have great expectations that Dr. Rohloff will develop a new center for Cyber Security research. I am also expecting that the Computer Science Department will be able to hire two new faculty members in Cyber Security, giving us critical mass to compete in
(Continued on page 2)

New Faculty



"I research and lead the technical development of secure and high-performance distributed computing technologies as part of research programs funded by federal agencies such as DARPA and the AFRL. I lead proposal-writing efforts that support my R&D activities. My research interests include secure cloud computing, fully homomorphic encryption (FHE), practical encryption, high performance distributed computing, Big Data, graph data analytics and rare event modeling."

Associate Professor Kurt Rohloff

A Message from the Chair Continued

this very important growth area of research and education. A search for these faculty members is currently under way. Furthermore, we have been authorized to search for ½ faculty member in Big Data, and I am not going to put in writing how you could hire ½ a faculty member. Watch out for my report one year from now.

The most important development during this Fall semester is that we are in the middle of starting three new clubs for Women in Computing. Yes three. By the time you are reading this, we hope to have at least one of them up and running. Why three? One Undergraduate Club for Women in Computing, one Graduate Club for Women in Computing and a chapter of ACM-W. ACM is the largest professional organization of computer professionals. Many universities, including NJIT, have student chapters of ACM. However, there are specific ACM chapters for women, and we are planning to create such a chapter. I would like to thank professors Grace Wang of CS and Yvette Wohn of IS and two outstanding CS students (among many, many) Jinisha Patel (UG) and Nafi Diallo (PhD) for these initiatives.

We have ambitious plans for Women in Computing. Right now, female enrollment in the College of Computing Sciences is on the order of 10%. This is *utterly unacceptable*. We should have as many women in CS classrooms as men. We are planning outreach activities in NJ high schools where our wonderful female students will stand in front of girls (and boys) who never even thought of Computer Science as a career choice and tell them: "If I can do it, you can do it."

Now comes the biggest news item of the semester. Computer Science **is hot again**. We have a record enrollment this Fall. Compared to Fall 2013, the number of CS Department students has increased by about 28%. Students from other colleges are trying to transfer into CS in record numbers. While I am overjoyed about this development, our advising staff, our teaching staff and our facilities have been strained. Long lines at advising are a problem. We know about it, and we are working on solving it, which will require active help from the university at large.

Let me segue into social media. On the weekend of Sunday November 9th, the College of Computing Sciences held a highly successful hackathon. I was there and took a few pictures, two of which I posted immediately on my professional Computer Science Facebook page. Yes, old people can have Facebook pages too! I am not updating it quite as often as I would like to, but please see (link below) not only the pictures of the Hackathon but also of the first Women in Computing meeting and my *very first lobbying trip*. Let me report from this trip.

On September 17th I took part in a Congressional Fly In, organized by the CRA (Computing Research Association). I had hoped to meet senators Menendez and Booker and Congressmen Payne and Frelinghuysen to tell them about the importance of funding Computer Science research through the National Science Foundation (NSF), the National Institute of Health (NIH) and DARPA (the Defense Advanced Research Project Agency). I also brought many glossy brochures about NJIT with me. Unfortunately, on September 17th important votes were held in Congress and I could only meet with the staff members of Senators Menendez and Booker and Congressmen Payne and Frelinghuysen. All four of them were receptive to my arguments, articulate in their responses and promised to pass on my glossies to their bosses. Let us hope that it will have a long term positive effect on Computer Science in general and on Computer Science at NJIT in particular. (See staff pictures on the right.)

I will close with wishing you successful finals, whether you need to take them or you need to grade them, and with my professional Facebook link:

<https://www.facebook.com/profile.php?id=100007766956255>



A new club has been started, Women in Computing. All CCS students are invited to join!



Katie Hazlett, Legislative Directory of Congressman Rodney Frelinghuysen



Jamiyl Peters (Congressman Donald Payne, Jr.'s staff member)



Rob Childers, Legislative Correspondent in the office of Senator Robert "Bob" Menendez.

Hack NJIT

More than 50 undergraduate students offered a first-hand glimpse into the innovations of the future at HackNJIT, a 24-hour hackathon hosted by the College of Computing Sciences at New Jersey Institute of Technology (NJIT) and the Association for Computing Machinery on Nov. 8 and Nov. 9, 2014.

“NJIT has a long history of partnerships with companies that recognize the central role of computing in science, business and industry,” said Marek Rusinkiewicz, Dean of NJIT’s College of Computing Sciences. “We are grateful to the many sponsors who support HackNJIT and invest in the future of computing and other high-technology businesses in New Jersey.”

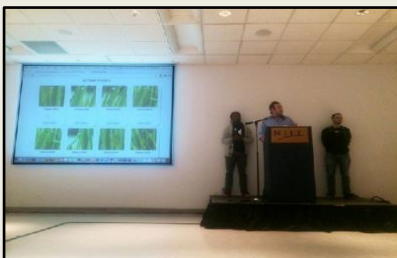
Sponsors of HackNJIT include AT&T, Yashi, ADDTEQ, Audible, eMazzanti Technologies, FDM Group, Genband, Hearst Magazines, Merck, North Jersey Federal Credit Union, ordr.in, and Tata Consultancy Services.

Representatives of the sponsoring companies were on hand to distribute promotional items, mentor the competitors’ progress, and provide information about potential career opportunities.

“The quality of mobile apps created through the HackNJIT demonstrates the talent of New Jersey’s technology community,” said J. Michael Schweder, Mid-Atlantic president, AT&T. “We applaud the undergraduate students who participated in the initiative which underscores the great demand for programmers, both amateur and professional, to create mobile apps to help drive the local economy.”

HackNJIT participants collaborated to engineer and code innovative computer applications and mobile apps, websites, and hardware hacks over a 24-hour time frame. The top three winners and their prize-winning entries were:

- **First place:** Thiago Couto, Lex Dreitser, Gabriel Esposito, and Isaiah Little for their Factory Fresh Food app
- **Second place:** David Awad and Nikolas Rassoules for BitCloud, a bitcoin-mining program
- **Third place:** Joseph Delgado for rly.sexy/mice, a multiplayer application that uses a cursor to play minigames



Special prizes from sponsors including NJIT’s Office of Technology Development were awarded to Binoy Patel for his project HipFood. Patel received \$500 from ADDTEQ using the hipchat API. The restaurant service API he used was provided by ordr.in, another event sponsor.

The BitCloud project team received a special prize from Yashi: Drone and GoPro. NJIT’s Office of Technology Development, who provided consulting assistance and introductions to university administrators on commercializing their app through the New Jersey Innovation Acceleration Center, awarded a prize to William Ruys, Tyler Shuhnicky, and Josef Mohrenwieser for their project “NJIT Schedule Builder for Students Who Can’t Make Decisions.”

Two teams who used APIS provided by GENBAND received iPad Airs from the company. First prize was awarded to the Heliograph team, comprised of Mohammad Salim, Jonathan Tan, and Mark Zgaljic. Zill Christian and Yassin Olabi of the 2v2 debug team received second prize.

GENBAND was on hand to promote Kandy, its real-time communications software development platform built from the company’s core telecommunications, presence, security and real-time technologies. GENBAND Senior Vice President of Enterprise Solutions and Product Line Management Carl Baptiste is a member of the College of Computing Sciences Board of Visitors.

“We are always excited to participate in a real authentic coding event,” said Patrick Asher, Vice President of Program Management, Cloud of GENBAND’s Kandy platform. “Since industry is working so quickly, we are excited to see what the young innovators of tomorrow will do.”

Computer Scientists Win a Major Grant to Network Mobile Devices in the Cloud

A team of computer scientists at NJIT has won a multi-year grant from the National Science Foundation to come up with a platform that would allow mobile devices to interact with each other with help from the cloud. The technology they are developing is designed to support collaborative applications in areas such as healthcare, safety, and social interaction, potentially benefiting millions of users.

The proposed mobile cloud computing platform would not only stimulate the creation of groundbreaking applications, it would also leverage the cloud to expand the processing power, network bandwidth, storage space, and battery life of individual devices.

“Our goal is to make smart phones smarter,” says Cristian Borcea, associate professor and Associate Chair of the Department of Computer Science, who is the grant’s principal investigator.

By networking mobile devices, a parent looking for a child lost in a crowd could conduct real-time searches of cell phone photos taken by people in the area, which are tagged with GPS location and time. The parent could send a query to find the location and time of the photos that include the lost child. To hasten the search and save battery power on individual phones, the image recognition processing would be done in the cloud.

With the expansion of sensing power contained in mobile devices, health officials could also use cloud-enabled networking to detect disease outbreaks in real time, allowing them to move quickly and precisely to contain the spread of an epidemic.



Associate Professor Cristian Borcea

Over the next three years, Borcea and three colleagues from the Department of Computer Science will create a mobile phone avatar, a software surrogate of the phone that would live in the cloud and synchronize with the phone, write a program that permits devices to interact, and figure out ways to improve application functionality and performance in the cloud.

“There are mobile-device clones in the cloud, but as yet no architecture that accommodates distributed computing,” Borcea says. “The cloud was designed to support enterprises, not mobile devices. If our technology is successful, the number of applications could expand dramatically and so we will also be thinking about how the structure of the cloud would have to change to support this.”

Computer Science Department Named as One of the Top 25 to Study Video Game Design

NJIT has been named as one of the top 25 schools on The Princeton Review’s recently published list saluting the best undergraduate schools to study video game design for 2014.



The schools were selected based on a survey conducted in Fall 2013 of 150 programs at institutions offering video game design coursework and/or degrees in the United States, Canada, and some countries abroad. NJIT was ranked 22nd in the list of 25 undergraduate schools in the nation offering the best programs in video game design.

“We are honored that The Princeton Review has chosen NJIT as one of the top 25 universities for Game Design in 2014,” said Marc Sequeira, Coordinator of Game Development and University Lecturer in the Information Technology Program in NJIT’s College of Computing Sciences. “NJIT’s gaming programs offer a vibrant community of designers and developers, artists and programmers, scientists and industry partners. Our course offerings reflect an emphasis on strong, individual skill-sets as well as interdisciplinary, team-based projects. And, our students graduate with strong practical skills, developed in hands-on laboratory and studio environments.”

NJIT offers two degree programs where students can specialize in Game Design: The Bachelor of Science in Information Technology and the Bachelor of Arts in Digital Design.

NJIT Wins Jersey Apps Challenge



A mobile app created by NJIT students that gives middle and high school basketball teams a searchable database of performance statistics is the winner of the New Jersey Apps Challenge, an innovation contest initiated two years ago by former U.S. Sen. Frank Lautenberg (D-NJ) and the Federal Communications Commission (FCC).

Called Scoutlit, but listed in the app store under the name "Basketball Stats Keeper," the program allows coaches and parents to track players' and teams' progress over several seasons. Over 45,000 teams have registered with the service, which lets users digitally record player statistics on the app and automatically sync them with the website. Data points include shots made and missed, fouls, steals, blocks, and offensive and defensive rebounds.

The contest was launched at a 2012 event in New Jersey at which Lautenberg and then-FCC Chairman Julius Genachowski were joined by leaders from New Jersey's education, business and technology communities to announce new initiatives to spur high-tech innovation in New Jersey. Three universities – NJIT, Stevens Institute of Technology, and Rutgers University – participated in the challenge, which was open to students, faculty members and recent graduates.

A panel of judges evaluated the entries based on several metrics, including overall utility and potential commercial success.

Lautenberg's vision was to stake a claim for New Jersey as an apps development "Silicon Valley," and he saw university-related innovation as key to this ambition.

"Before devoting his life to politics, Frank spent several decades building an IT company in New Jersey and understood well from his own experience the vital role that innovative technologies play in advancing not just our prosperity, but our quality of life as well," said Bonnie Englehardt Lautenberg, the senator's widow. "He was enthusiastic about the New Jersey Apps Challenge because it was designed to do exactly that – to spur high-tech innovation and economic growth in his home state. He also thought it critical that we give young people the tools and the opportunity to carry on the great Garden State tradition

Less than two years after its 2012 launch, Scoutlit became the number one basketball stats-keeping app on both Google and Amazon out of about 50 competing products, and it has been downloaded in all 50 states and every continent except Antarctica. This past season it was among the top 1 percent of the most downloaded Android sports apps.

FAA Grants Permission to Test Unmanned Aircraft Systems

More than two years ago, NJIT Professor Michael Chumer was testing Unmanned Aircraft Systems (UAS) that were deployed in California yet able to send video into his emergency management network at NJIT. The video clearly showed that the UAS could be used to enhance both emergency response and public safety in the State of New Jersey.



The question then arose: How does NJIT bring this untapped potential to New Jersey?

The answer, surmised Chumer, was to apply for permission to use the UAS in New Jersey from the Federal Aviation Administration, which has a Certificate of Waiver/Authorization (COA) process. He started the process nine months ago and on May 8 the FAA awarded the university a COA, making it the first New Jersey university and first public institution in state granted permission to test the UAS. NJIT will use the airstrip on the U.S. Coast Guard Training Center in Cape May to test the systems.

"This (COA) process was a learning experience for me and NJIT," said Chumer, director of the Crisis Communication Center and of UAS Applied Research at NJIT. "As we proceeded through the application, we learned a lot about what data is required to safely integrate UAS technology within the National Airspace."

NJIT will work closely with the State of New Jersey Office of Homeland Security and Preparedness as well as the State Office of Emergency Management to develop UAS capabilities. It will also aim to weave that capability into the state's emergency response operations.

NJIT is a partner in the Mid-Atlantic Aviation Partnership (MAAP), housed at the Virginia Polytechnic Institute and State University, which last year was designated one of six test sites authorized to develop procedures to ensure the safe integration of the UAS into the National Airspace.

NJIT partners with Japan's National Institute of Informatics (NII)



New Jersey Institute of Technology is currently collaborating with the National Institute of Informatics stationed in Tokyo, Japan. This partnership is intended to develop annual or multi-annual exchange programs including:

- Joint research projects;
- Academic staff, researchers and Ph.D. student exchanges;
- Joint curriculum development;
- Continuing education;
- Seminars, conferences and the like;
- Technical assistance activities and scientific exchanges

Associate professor Vincent Oria will frequently travel to NII, representing NJIT and collaborating with various projects. Some are listed below.

Dimensionality and Scalability Issues in High Dimensional Spaces

(Research conducted in collaboration Michael Houle, NII, Tokyo, Japan and the following NJIT PhD students: Jichao Sun and Xiguo Ma)

For many fundamental operations in the areas of search and retrieval, data mining, machine learning, multimedia, recommendation systems, and bioinformatics, the efficiency and effectiveness of implementations depends crucially on the interplay between measures of data similarity and the features by which data objects are represented.

When the number of features (the data dimensionality) is high, similarity values tend to concentrate strongly about their means, a phenomenon commonly referred to as the curse of dimensionality. As the dimensionality increases, the discriminative ability of similarity measures diminishes to the point where methods that depend on them lose their effectiveness.

One fundamental task, arising in applications of multimedia, data mining and machine learning, and other disciplines, is that of content-based similarity search. For such applications, features are often sought so as to provide the best possible coverage across a range of anticipated queries. However, for any given query, only a relatively small number of features may turn out to be relevant. When the dimensionality is high, the errors introduced into similarity measurements by the many irrelevant feature attributes can completely overwhelm the contributions of the relevant features.

Annotation Propagation in Image Databases Using Similarity Graph

Funded by JSPS, the Japan Society for the Promotion of Science; Michael E. Houle, National Institute of Informatics, Japan, Shin'ichi Satoh, National Institute of Informatics; In collaboration with Vincent Oria and Jichao Sun (PhD student), NJIT

Computer users around the world share images and videos on a daily basis, of such events as graduations, weddings, birthdays, and travel. City centers, sensitive sites, business and residential buildings are being monitored daily through cameras for security reasons. In news, multimedia data represent the main information channel. In all these cases, the search by users for particular images is mainly done manually. The general problem with images and videos is that their digital representations do not convey any meaningful information about their content.

An interpretation needs to be added to the raw data either manually or automatically. Manual annotation of images and video is tedious, and automatic inference of the semantics of images and videos is not an easy task. In several major applications of images and videos, the semantics involve the recognition of human faces. Face annotation can be cast as a standard classification problem: Given a set of face images labeled with the person's identity (the gallery set) and an unlabeled set of face images from the same group of people (the probe set), we seek to identify each person in the probe images. So far this problem has been tackled from the pattern classification and machine learning point of view, where it is known as *face recognition*. Classifiers are known to work better when trained with large training sets.

Unfortunately, large training sets are generally very expensive to compute, due to the high degree of human intervention required. The aim of this project is to reduce the high cost of human intervention by relying on the redundancy of faces in the probe set to propagate the identities provided by the gallery set. In addition, we propose to propagate location information based on the image background and a classification-based access method in scenarios where the aim is to determine whether a given face is among a set of faces of interest.



Associate Professor Vincent Oria

Past Seminar of Interest

On October 15th, Dr. Guiling Wang hosted *Mr. Harry Xu*. Mr. Hanping Xu is currently the Managing Partner at Allendale Capital Partners, LLC, a hedge fund focusing on Global macro long/short strategies in trading equities, bonds, options, futures, commodities, and currencies. Between 2003 and 2013, he was the President of FlexSoft Inc. He was also the VP of Societe Generale and JP Morgan. Mr. Xu received his M.S degree in Computer Science from New York University and B.S degree in Physics from University of Science and Technology of China.

In his seminar titled *The Dragon Slayer – From Physics and Computer Science to Wall Street*, Mr. Xu talked about his career path on Wall Street as someone with a physics and computer science background. He shared his insights and valuable lessons learned as an insider along his 20 year career in the financial industry, which could be very helpful for students who are interested in a career in the financial industry specifically or career advice in general.



The GITC Building, home of Computer Science

In Memoriam

By Samuel Verkhovsky

My father, Boris S. Verkhovsky is known among computer scientists as an expert on discovering ways to code or encrypt information using a mathematical entity known as an elliptic curve.

He passed away on August 24, 2014 before reaching the age of 81 after a very long battle with prostate cancer. A lifelong academic, he wrote a book, the subject of many years of research, published 11 days after his passing, titled 'Integer Algorithms in Cryptology and Information Assurance'.

Born in 1933 in Odessa, he grew up during the harsh times of Soviet Communism and Stalinism. His father, a tank commander was killed in the advance on Berlin at the age of 31, when my father was still a boy. He lost his only sibling, a brother, when they were still children. Additionally, anti-Semitism was rampant in the Soviet Union. Despite quotas limiting entry of Jews into academic institutions, my father excelled and obtained a doctorate in applied mathematics jointly from the Academy of Sciences of the former USSR, Moscow, and Latvia State University. He became a group leader of the Academy's Central Institute of Economics and Mathematics after stints at the Research Institute of Computers, Moscow, and the Research Institute of Radio-electronics, Novosibirsk.

Immigrating to the US at the age of 40 he pursued his career at Princeton University, IBM TJW Research Center, Bell Laboratories, the University of Bridgeport, University of Colorado and then joined the faculty at NJIT in 1986, his last posting.

He holds several awards for his works as a teacher and researcher in computer science, including the Outstanding Scholastic Contribution Award of the International Conference on Systems Research, Informatics and Cybernetics; the Meritorious Award of the International Congress on Applied Systems Research & Cybernetics and the Research and Development Award of the Academy of Sciences of the USSR. He is a recipient of the Blaise Pascal Medal for Science and Technology.

He is survived by his daughter, Ekaterina Anastasia and me, his son Samuel Boris. We are profoundly proud of his lifetime achievements and dedication to his field.

Professor Boris Verkhovsky



Sources

Some articles in this newsletter were taken from our online news feed. To read more high quality articles about the CCS department visit:

<http://cs.njit.edu/news/index.php>

About Us

The Computer Science Department is part of the College of Computing Sciences. The College comprises about one fifth of the NJIT student population. The department offers a full range of degree programs in Computer Science (BA/BS, MS and PhD), in addition to special programs such as Cyber Security and Privacy (MS), Bioinformatics (BS, MS), Software Engineering (MS) and Computing and Business (BS, MS). The Bioinformatics degree is also available in a pre-med option.

The mission of the Computer Science Department

- Provide quality undergraduate and graduate education in both the theoretical and applied foundations of Computer Science and train students to effectively apply this education to solve real-world problems thus amplifying their potential for lifelong high-quality careers and give them a competitive advantage in the ever-changing and challenging global work environment of the 21st century
- Conduct research to advance the state of the art in Computer Science and integrate research results and innovations into other scientific disciplines
- Provide Computer Science education and training to students in other departments at NJIT and Rutgers-Newark, and
- Provide Computer Science expertise to the people of New Jersey and the nation

The vision of the Computer Science Department

- Build a strong research and teaching environment that responds swiftly to the challenges of the 21st century.

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