



## Security starts here

Working to build the first line of defense

*also in this issue:*  
Operation Citadel · DCSI 2013



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UNIVERSITY**

*Inspiring Minds*

*Faculty of  
Computer Science*

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### Dean's Message

Over the years, we have graduated thousands of students from our Faculty and these alumni are spread around the world. Our alumni are in Canada, the USA, India, Brazil, Singapore, China and many other countries. Whenever I visit these places and meet with our alumni, I am given a warm reception (and usually some really good food!).

Recently, I was in Toronto for a Dalhousie alumni event and met with a number of our alumni. The event was geared towards alumni of all Faculties from all graduating years. Although it was packed, I still managed to find most, but not all, of our alumni who attended.

One of the questions that we grapple with is how do we network with these alumni? How do we keep them informed on what we are doing in the Faculty? How can we get these people more involved? For instance, if a student goes to Brazil on an exchange program, it would be nice for them to have contact with someone in Brazil who has a direct connection to Dal. Similarly, if a student goes to Ottawa on a co-op work term, it would be nice for the student to have a contact there.

There are many ways that our alumni can "give back" to the Faculty, but somehow we have to improve our communications and networking (people not hardware) with our alumni.

Any suggestions? Please drop me an email ([shepherd@cs.dal.ca](mailto:shepherd@cs.dal.ca)).

*On the cover: security superheroes from the NIMS lab (l.-r.) Stephen Kelly, Fariba Haddadi, Nur Zincir-Heywood, Vahid Aghaei Foroushani, Malcolm Heywood*

# Welcome to NIMS Lab



We call them the Network Information Management and Security Group; also known as NIMS lab. Tucked away in their headquarters on the 2nd floor of the Goldberg Computer Science Building, Nur Zincir-Heywood and Malcolm Heywood have become a fundamental staple within the Faculty of Computer Science.

Their lab is equipped with twenty brilliant graduate and undergraduate students who dare to imagine systems that work autonomously!

Their work is never complete. With the endless use of mobile devices, tablets, laptops, desktops, network management and security has become a big issue all around the world. We sat down with Nur, Malcolm and two of their students, Fariba Haddadi and Stephen Kelly, to learn about how they combat these novel threats.

### What type of research do you do in your lab?

In the NIMS Lab, we do research on autonomous systems. These are systems that try to learn and monitor their own behavior. We study how these systems monitor their behavior and how they modify themselves depending on the feedback from the environment. If we

can understand the behaviour that we observe in these computers, then we can understand the people who are using these computers.

One example of an autonomous system would be network management. In this case the network traffic represents the environment and the agent interacts with that environment. These agents pinpoint suspicious traffic. Whether the traffic is actually malicious is left up to the human to decide.

### How do you "train" your agents?

In our lab we create test bed environments where we make the agents run against each other. For example, we use robotic soccer as a test bed. The idea is you have a group of agents who do not know how to play soccer, but, through interacting with one another they slowly learn, through trial and error, how to build the appropriate skills. They achieve this through their environments. How transferable are the agent skills? How well can we generalize these agents? Will the agents that we train work in another network? For example, if you learn to pass the ball, that's one transferable skill. Then you can learn something else to compliment the skill.

# — security starts here



Another example we have is the agents are trained to detect malicious URLs. We're not sure how bad these URLs are, but they can be detected. A URL is a combination of characters, and our agents are trained to detect one character at a time. Once you reach the end of the sequence we ask the agents if they think this is a malicious URL or not.

## How would you describe a user's level of trust when they log onto a WiFi network at a coffee shop?

The average user probably doesn't think that anyone is going to hack them. They trust what they see. If they see a familiar WiFi name, or a familiar person working in the coffee shop, they trust that it's safe to use the Internet. The average user is aware that there are certain security systems in place to protect them, but people still make mistakes.

For example, we ran a "Red team vs Blue team game" last year to understand how susceptible users were to an attack. As part of the study, one of our students asked her friend to log onto her computer using her password. Without questioning the request, the friend typed in her username and password, which

our research student then recorded and stored. This is just one example of mistakes people tend to make.

## What type of insight have you gained in how attackers operate?

Attackers look for computers that are vulnerable. They don't just attack because they want your credit card number. They attack because they also want to make use of the resources on your computer. Bigger attacks typically aim to bring down some type of a larger service. They want to make that service vulnerable so that they can get through its security system. For example, the idea of a botnet attack is to target as many machines as possible, perhaps thousands of them, "zombiefy" them and then use them for an even bigger attack.

The "Master" of these attacks is very difficult to locate. They're not using just one computer they're using multiple servers. They're also using multiple versions of their own systems so that they can't be traced.

## Why have these attacks become more frequent in the last few years?

The use of social media has become more prevalent in recent years. Sites such as Facebook and Twitter are completely open to the public. They're repositories for personal information. Social media is one of the most used targets for attackers. Users browse their friend's profile page, click on a link and don't actually know where they're linking to. Hackers start using social media to pick up on generic characteristics, things that may not interest you in email addresses. Regular users are not aware this may be happening.

## What can users do to better protect themselves?

1) First and foremost, don't trust everything you see. Users don't always look at URLs when they've entered a site. They may think they're using the same regular webpage they use everyday, but they're not. For example, your URL must always be "HTTPS" if you want to transfer any personal information. If it only reads "HTTP," don't transfer the information.

2) When it comes to using your credit card on the Internet, make sure you're using a card that has a low limit. You should also try and limit the number of computers you use to access your online banking.

3) When you leave your house, turn off your wireless connection. Only use your wireless network when you need to. Attackers look for any open doors when trying to hack into your system, and if your WiFi is on all day you're more susceptible to an attack.

## What do you hope to achieve in the next five years?

In the future we plan to continue working on our autonomous systems to make them more and more aware of their environment. We want to create a system that is helping the person using that system to detect problems and resolve the issue. We want to build a system that lasts. The system will last because it understands its mission, and what the user wants it to do.

## Why does this type of research interest you?

In our lab, we are interested in discovering "emergent behaviours." Security is an interesting application domain in which there are many forms of emergent behaviours. Attempting to design systems capable of autonomously looking within these environments is very exciting for us.



## Cisco helps out with a new Networking Security Lab

Dr. Nur Zincir-Heywood has been teaching the graduate level course Network Design and Management CSCI 6706 for several years. Back in 2005, she had the idea that students might learn more by participating in an active environment where they could put their knowledge into action. So she challenged them to a friendly game and divided the students into two competing teams – the red team would attack and the blue team would defend.

If the red team could succeed in infiltrating the network of the blue team and either crash the blue team's computer, or install their own user account on the blue team's computer then the red team would win. If the blue team could prevent this, then they would win.

This proved to be very motivating – not only were students learning about the strengths and vulnerabilities of networks, but they were exercising creativity in devising new attacks or defences while learning about the hardware and software that they were using. Soon the undergraduates in one of her other courses (CSCI 3171 Computer Networking) heard about the game and wanted in. So, part way through the game, a mystery third team appeared. This team could attack

*Attack and defend: as part of Dr. Nur Zincir-Heywood's Network Design and Management course, students are challenged to a friendly game. Red team's goal is to infiltrate and crash the blue team's network.*

any of the first two teams. In that first year, the undergrads won the game by a clever spoof email which coaxed passwords out of some of their older opponents.

Fast forward to 2013 and the game has become an important teaching tool and an established part of the course. By this time, however, it had become apparent that a dedicated space was needed if the competitors were to be able to compete without disrupting the studies of other

students. Up-to-date equipment was also needed to enable students to understand the strengths and weaknesses of today's networks.

The Dean of Computer Science approached Cisco, one of the world's leading companies in networking technologies and presented them with the problem. Instantly recognizing the importance and value of the Network Design and Management course, Cisco graciously contributed a range of equipment and technologies towards the new Cisco Network Security Lab at Dalhousie. With new routers, switches, firewalls, intrusion detection systems, intrusion prevention systems, network management software and virus checkers, Cisco met and exceeded Dr. Zircir-Heywood's wish list.

The equipment from Cisco has now arrived in Halifax. There will be an extensive installation period but we hope to have the lab up and running by Autumn 2014. As well as being used for the competitive games in the Network Design and Management course it will be an important tool for both research and education. The lab is open to anyone doing research in this field or teaching courses in networking. Dr. Srinivas Sampalli is another faculty member who is looking forward to using the new lab.

Thanks to the generous contribution from Cisco our students will have access to a unique environment in which they can learn with the most up-to-date tools. They will be motivated to think practically and creatively about security issues and they will form the next generation of people who will build the secure systems of the future.

## Our new specialization in Data Science

If you're taking a Bachelor of Computer Science Degree you have the option to acquire expertise in a focused area, a specialization, which is designed to demonstrate to employers your strengths in a given area. These specializations are not majors or minors, but separate certificates that you can earn by choosing your electives from within a defined group of courses. We currently offer specializations in Graphics, Gaming and Media; Artificial Intelligence and Intelligent Systems; and Communications Technologies and Cyber Security. This year we are adding another to that list with our specialization in Data Science.

Data Science is a hot topic these days, with much discussion in the media about how data is gathered, protected, analyzed, and put to use. The modern digital economy produces so much data that the current supply of skilled people can't keep up with the demand for expertise. There are currently more jobs than applicants in this area, a trend that is predicted to continue for several years.

In order to qualify for the Specialization in Data Science students will have to complete three courses: **The Process of Data Science**, **Cloud Computing** and either **Web Intelligence** or **High Performance Computing**; and then a further three electives from a longer list of courses, all relevant to the field of data science. Although not all of these courses are offered yet, students can choose electives this year from the ones available and wait until next year for the additional courses to be offered.



# Operation Citadel strikes Nocturne

Festival goers invited to join mixed reality game to save Halifax historic site

If you were at this year's Nocturne: Art at Night festival, you may have been called into service to help save the Halifax Citadel National Historic Site from an enemy attack

An antagonist of the future traveled back in time to the colonial era and planted a futuristic bomb within the fort. Soldiers of the past were unable to defuse the bomb themselves. Present day Halifaxians were required to make contact with the soldiers and help save the future of Halifax.

Confused?

The Faculty of Computer Science teamed up with Parks Canada to help this year's Nocturne goers tap into their history in a mixed virtual reality game called "Operation Citadel." The game, developed by Assistant Professor Derek Reilly and his research team, was played collaboratively and simultaneously from both the Halifax waterfront and Halifax Citadel National Historic Site at this year's Nocturne festival.

## Collaborating across space – and time

Here's how it worked: participants on Citadel Hill played the part of present



*Operation Citadel: (L-R) Assistant Professor Derek Reilly with game developers Mohamad Tawakol and Mohamad Salimian*

day Halifaxians, using a tablet to peer through the walls of the fort and into the past. Their mission was to make contact with their counterparts on the Halifax waterfront.

Down on the waterfront, participants played the part of soldiers from the past who were patrolling the Halifax Citadel. Using a projector screen, players were

able to virtually peer within the walls of Citadel Hill and then use their bodies to control the movement of the soldiers.

Participants at both locations, connected digitally, worked together to locate the ammunition room where the bomb had been planted and had to figure out how to defuse the explosive.

"We wanted a game that would be engaging, fun and also relevant to where we are in Halifax," says Dr. Reilly. "We wanted to take advantage of the historical sites and historical richness of Halifax because mixed reality games are about blending the real world with the virtual world."

## A creative collaboration

Dr. Reilly says the game, which is based in the year 1812, would not have been possible without Parks Canada.

"They were extremely helpful in not just giving us the background about the history of the Halifax Citadel but providing us with access to do network tests and to plan out how our event would occur during Nocturne," says Dr. Reilly.



As well as offering new ways for visitors on Citadel Hill to interact with the site itself, “Operation Citadel” also helped Dr. Reilly and his research team study how people interact with computers away from desktops and laptops.

“Mixed reality games have been very useful because they engage the public, and we can observe how they use or don’t use certain tools for interacting with computers,” he says. “The benefit is that in one night we get more people using interactive techniques or devices than we could possibly recruit in a month in a lab.”

### “Tweetrtris” successor

This wasn’t Dr. Reilly’s first appearance at the Nocturne Festival. At last year’s event, attendees saw the Medjuck Architecture Building on Spring Garden road transform into a giant GameBoy screen for Reilly’s interactive art-tech game, Tweetrtris.

Tweetrtris, a collaborative mashup of Twitter, Tetris and yoga, allowed participants to play games of whole body tetromino (Tetris shape) making.

The game won the 2012 Nocturne Artistic Award.

This year’s Operation Citadel game also proved to be a huge success with lines so long, event organizers had to turn people away at the end of the night.

“I think it was fun, because it was set in local history, so we sort of played with the idea that the invincible fort Halifax was being threatened and we needed to save it,” he says. “I think the ability, during the event, for people to collaborate across space was fun. They didn’t know who they were working with, but they knew that they were working with someone down at the waterfront while they were on Citadel Hill.”

*Game participants played the part of soldiers from 1812, collaborating with present-day Haligonians to locate and defuse a bomb placed within the walls of the Citadel*



## From Lagos to Halifax – from student to entrepreneur



Tokunbo Makanju began his graduate school experience at Dalhousie in the fall of 2005. It was an experience that began just the way he thought it would. Culture shock, acculturation, making new friends, learning to live in a new country; these were all things that he expected after moving to Canada to start graduate school. Its ending, however, was something that he could never have imagined. A PhD degree, an award winning thesis and a budding start-up.

It all began with a thought; a simple thought that led to a decision that it was time for him to pursue a graduate degree. After completing a degree in Computer Science at the University of Lagos, Tokunbo got a job working as an IT Systems Analyst.

“I loved my job initially but after a while I got bored with it. I felt it wasn’t challenging enough,” he says.

So the decision was made to pursue a Master’s degree in Computer Science in Canada.

“My initial plan was to complete my Master’s and return to work,” he states.

However, with encouragement from his supervisors, Dr. Nur Zincir-Heywood and Dr. Evangelos Milios and of course some more thought, Tokunbo decided to go on and pursue his PhD. The research topic was ready-made – it was a spin off of work he had done previously during his Master’s. He had helped develop part of a prototype application to assist system administrators manage and better utilize the information in their log data. He was particularly drawn to the topic as it dealt with a problem that he was familiar with from his prior job.

“The time spent during my PhD was not unlike any other. I had my highs and lows and there were times I just wanted to quit,” he concedes.

In spite of this he had a number of significant accomplishments. During the course of his PhD, Tokunbo published a total of twelve papers in top quality journals and conferences from around the world. His best by far was his publication titled “Clustering Event Logs using Iterative Partitioning” which he presented at the Association

of Computing Machinery’s flagship data mining conference, KDD, in 2009. KDD is a premier data mining conference and attracts high quality participants from both academia and industry. That year the conference took place in Paris.

“Publishing was by far the most enjoyable part of being a PhD candidate. Not for the joy of publishing but for the joy of travelling...” he chuckles.

Each publication presented an opportunity to travel. He ended up visiting 18 cities in 10 countries around the world during the course of his graduate education.

Dr. Makanju’s PhD thesis, “Exploring Event Log Analysis with Minimum A Priori Information,” was a joint winner of this year’s prestigious IEEE IM/NOMS PhD dissertation award. The competitive yearly award is awarded to the best PhD thesis completed within a 12 month period in the area of Network Operations Management. The competition is open to researchers from around the world. This year the award was given out at the IEEE IM Conference in Ghent, Belgium.

“If there was anything that I could say made me feel that my time at Dal was well spent, I would have to say it was winning this award” says Dr. Makanju.

With his time at Dalhousie complete, Tokunbo now spends time working for a budding Halifax startup, topLog Inc. Tokunbo co-founded topLog with fellow Dalhousie PhD candidates Ozge Yeloglu and Patrick Laroche in March 2013. topLog Inc. represents an attempt to commercialize his award winning thesis. While it is still early days for topLog, the company is already showing a lot of promise. It has secured an office space at Volta Labs, a startup incubation space located on Spring Road in downtown Halifax. They have been featured in the *Chronicle Herald* and have succeeded in attracting venture capital funding.

“It has been an exciting journey – one for which I have no regrets. All I wonder now is where my thoughts will lead me to next....”



# Computing close to home

Dalhousie Computer Science In-house Conference (DCSI) showcases research

While some may say the ICT industry is a male dominated world, this year's Dalhousie University Computer Science In-House Conference (DCSI) proved that theory wrong.

Of the twenty contestants entered into this year's annual event, six contestants walked away with awards. Of those six winners, four were female.

This year's two-day DCSI event was held in September and featured research presentations from both students and faculty members. The conference was an opportunity to showcase the vast diversity of research being done within the faculty while also providing students with first hand experience in presenting their projects at a conference.

Event organizers partnered this year with Dalhousie's Women in Technology Society (WITS) to help promote the event. It was a strategic move event organizer Raghav Sampangi said helped pave the way for a very successful two days.

"It was an exciting opportunity because it encouraged more female participation and it was nice supporting WITS in their mission," said Sampangi. "It was very encouraging to have so many women win this year, and this will hopefully encourage more women to get into research."

Passionate about the event and the opportunities it can provide, Sampangi said DCSI provides student with the ultimate learning experience.

"Research is so important, because with or without our knowledge, we do it everyday, and we're not even aware," he said.

Whether it's Googling the latest features on the new Iphone 6, comparing prices on a Canon Rebel, or planning your next vacation, Sampangi said people are constantly seeking new information.

"One thing I have learned in this process is that just because we are in

computer science, we should not stop being inspired by the ideas outside of computer science," he adds.

Sampangi says this was one of the reasons he re-started DCSI in 2012. After being in hibernation for five years, he was encouraged to bring the Conference back to life.

"It's an excellent opportunity for all of us to see what type of research the other person is doing. It encourages a community of researchers within the faculty," he said.

This year's event focused on some of the newer areas of research within the faculty of computer science; areas such as Data Science. The event also included a keynote lecture by Dr. Rob Beiko on "Biology's Big Data Revolution."

Sampangi says he's been overwhelmed by the support and enthusiasm DCSI has generated, and he hopes will continue to generate in the future.

"Both years, this is one thing that I have found. It's just that everyone cares, everyone is helpful. It feels really nice to feel like you belong."

## Beyond Term Clusters: Assigning Wikipedia Concepts to Scientific Documents

Ozge YELOGLU, Evangelos MILIOS, Nur ZINCIR-HEYWOOD  
Faculty of Computer Science, Dalhousie University, Halifax, Canada



**MOTIVATION**

- How can we automatically label scientific publications and their authors using only the text of scientific publications?
- Can we create a set of terms and Wikipedia concepts for a set of scientific documents of a specific domain?
- Can we assign these sets of Wikipedia concepts to individual documents of the same domain as topic labels?

**METHODOLOGY**

**Data Sets:**

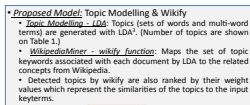
- Over 150,000 abstracts of Computer Science documents from the ACM Digital Library.
- Ground truth is the author assigned ACM Category labels.
- 1,615 full papers of University of Tilburg (UvT) Collection.
- Includes scientific publications from: Economic Research, Arts, Economics and Business Administration, Law, Philosophy and Social and Behavioral Sciences.
- Ground truth is the author assigned set of broad topics as explained in the dataset<sup>1</sup>.

**Methods:**

- Baseline:** CNC & EM & Log-Likelihood
- Keyterms are extracted with CNC keyterm extraction method.
- These keyterms are clustered into 120 clusters using Weka's Expectation Maximization (EM) method.
- Keyterms in each cluster are ranked with the Log-Likelihood (LL) method of Text-NSI package<sup>2</sup>.
- Input: a list of keyterms with their frequencies.
- Runs LL to compute a "score" for each keyterm.
- The higher the score, the less evidence there is in favor of concluding that the words of the keyterms are independent.
- Keyterms, along with their scores, are output in descending order of this score.

**Proposed Model: Topic Modelling & Wikify**

- Topic Modelling - LDA:** Topics (sets of words and multi-word terms) are generated with LDA<sup>3</sup>. (Number of topics are shown on Table 1.)
- Wikify function - wikify function:** Maps the set of topic keywords associated with each document by LDA to the related concepts from Wikipedia.
- Detected topics by wikify are also ranked by their weight values which represent the similarities of the topics to the input keyterms.



**RESULTS:**

**1) Mapping Term Sets to Wikipedia Concepts:**

- Concepts are generated by wikifying the keyterms extracted from the documents.
- Evaluation of the extracted Wikipedia concepts:
  - Every ACM category in the ACM dataset and its subcategories are wikified where these category and subcategory titles are the inputs to wikify function.
  - Compare ranked Wikipedia concepts of:
    - ACM categories and
    - keyterm clusters.



Table 1: Mean Average Precision@3 of proposed model on the ACM dataset when only words, multi-word terms and both are used as inputs for wikification.

Number of Topics	Words	Terms	Words, Terms
100 Topics	0.68	0.67	0.76
50 Topics	0.71	0.77	0.80
20 Topics	0.88	0.84	0.90
10 Topics	0.97	0.92	0.95

**For UvT collection;**

- Broad topics are assigned to the authors of the documents as their expertise areas. Assumptions:
  - Documents of the author represent his/her expertise.
  - These broad topics can be extracted from the set of documents he/she published.
- Evaluation:
  - Top 5, 10 and 20 ranked Wikipedia concepts of each set of terms generated by LDA and
  - Top 5, 10 and 20 keyterms extracted from the documents ranked by Log-Likelihood

Table 2: Number of matches between 115 gold-standard broad topics of UvT Collection and Log-Likelihood terms and Wikipedia Concepts.

Method Name	Top 5	Top 10	Top 20
Log-Likelihood ranking	3 (2.6%)	5 (4.4%)	8 (7%)
Topic-Modelling/wikify	18 (15.6%)	30 (26%)	38 (33%)

**2) Assigning Categories to Documents:**

Assigning Wikipedia concepts to a test document is done on the basis of a training set of documents providing the context of the assignment:

- Each test document is assigned to a set of terms by LDA and then its corresponding Wikipedia concepts (set of terms are wikified).
- These concepts are compared with the wikified ACM categories of each document using P, R and F values.

Table 3: Precision-Recall-F@3 Results on ACM Test-2006 Data.

Method	Precision	Recall	F <sub>1</sub>
100 Topics	0.34	0.62	0.42
50 Topics	0.36	0.64	0.44
20 Topics	0.38	0.68	0.46

**DISCUSSION:**

- Our approach is able to assign Wikipedia Concepts to the scientific publications in an automated manner, removing any need for human supervision.
- Domain specific taxonomies are used for evaluation.

## 2013 DCSI Winners

**The DCSI Cup:** Dr. Evangelos Milios

**Best Presentation:** Magdalena Jankowska

**Best Poster:** Ozge Yeloglu

**Honorable Mention (Presentations):**

Raheleh Makki Niri

**Honorable Mention (Posters):** Jeevitha

Mahendiran

**The 2013 DCSI Prize for Prolific and**

**Plenitudinous Paper Presentation:**

Jayagopal Narayanaswamy

# Who wrote that book?

Magda might be able to tell you

Authorship analysis is a research field dealing with a specific type of text analysis, namely the analysis of the author writing style. It deals with various types of questions related to the authorship of a text including:

“Who among candidate authors wrote a given text?”

“Were given documents written by the same person?”

“Is this document a plagiarism of another text?”

“What is the gender of the author?”

Authorship analysis has applications in forensics, security, plagiarism detection, business intelligence, and literary research.

An interesting example of such an authorship analysis that recently received media attention, was the case of *The Cuckoo's Calling*, a detective novel by a first-time writer named Robert Galbraith. *The Sunday Times* reporters, following an anonymous tip, carried out an investigation on whether the real author of the book was J. K. Rowling, the author of the Harry Potter series. Part of the investigation constituted two automatic stylistic analyses by two experts in author attribution, Patrick Juola of

Duquesne University and Peter Millican of Oxford University. Their results indicated that the book was stylistically more similar to the previous work by Rowling than to detective books by three other British female authors. As a consequence, J. K. Rowling was confronted by *The Sunday Times* and admitted that she wrote *The Cuckoo's Calling*.

Authorship analysis is the context of most of the doctoral research performed by Magda Jankowska, a third year PhD student in the Faculty of Computer Science, and a member of the Visual Text Analytics group. With her supervisors, Dr. Evangelos Milios and Dr. Vlado Keselj, they proposed a visual analytic tool called RNG-Sig for comparing text documents on sub-word level and applied it to the analysis of authorship style of literary works.

The tool is based on the Common N-Gram (CNG) classifier, a classification algorithm proposed by Dr. Keselj and his colleagues that has been successfully applied to author detection tasks. It is based on character n-grams – overlapping strings of consecutive characters from a text. Such character strings, despite being so low-level and simple,

proved to be very powerful features for authorship attribution. They also have the merit of being language independent. The visual tool RNG-Sig provides insight into the inner workings of the CNG classifier, aiming at presenting in a visual way the “reasons” of the algorithm decision as well as visualizing the dissimilarities between documents at the level of character n-grams, and providing a linkage between these strings of characters (which are often not easy to interpret) and words or phrases. The tool also enables a user to manually adapt the classification process.

Magda has been also working on an automatic method for a task called authorship verification. In this task one is presented with a set of a few texts of a single author and is asked whether the same person wrote another document. Magda and her supervisors approached the problem by proposing a measure of similarity between the “unknown” document and the entire set of the documents of the known authorship. This measure utilizes the same character n-gram based dissimilarity between documents the CNG classifier uses.

Their method has been submitted to the PAN 2013 competition in author verification. Magda is looking forward to her further work on character n-gram based classification and combining the automatic methods with visualizations that enable human insight and interactions.



Magda Jankowska's PhD research centers around authorship analysis.

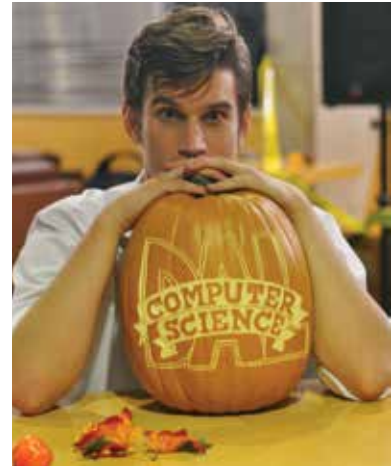
# News & Notes



*Congratulations to our 2013 Fall Computer Science graduates*



*Dr. Rob Beiko's keynote, "Biology's Big Data Revolution," was enthusiastically received.*



*Students mark their territory at this year's Computer Science Homecoming event.*



## Dr. Srimi Sampalli recognized for leadership and innovation



For those in the Faculty of Computer Science, Dr. Srimi Sampalli has always been, what many students call, "a superstar."

Throughout the years, his love for teaching and breakthrough research in wireless technology has ranked him alongside some of the brightest minds in Nova Scotia.

This year, Srimi's cutting-edge work was once again recognized at the 11th annual Discovery Awards for Science and Technology.

The Discovery Awards, presented by the Discovery Centre, honours individuals and companies whose outstanding work

has helped make Nova Scotia a leader in science and technology.

This year's award ceremony was held on November 21st.

Selected as one of 3 finalists for the "Innovation Award," the nomination came on the heels of Srimi's new startup company, Wi4Tech Inc. The new company was born out of his current lab, MYTech Lab ("EMerging Wireless Technologies Lab) in the Faculty of Computer Science.

Wi4Tech.Inc. is co-founded by Srimi, his graduate students Musfiq Rahman and Gaurav Sharma, and Bob Thomas, an entrepreneur and President and CEO of

Progeny Software, who will be guiding the business aspects of the company.


In the past year, the MYTech Lab and Wi4Tech team have developed three new innovative mobile tools that use a secure and reliable platform that integrates smartphones, near field communications (NFC) technology and cloud computing.

The first is an NFC-based smartphone tool for drug allergy and drug interaction detection that can prevent medication errors before they occur (developed by graduate student of MYTech Lab, Maali Alabdalfath). The second is a social media network that has the potential to curb cyberbullying. The third is a mobile tool that uses a wireless emergency locator for search and rescue operations. The second and third innovations are the result of the work by the Wi4Tech team.

Congratulations to Srimi on being selected as a finalist at the 11th annual Discovery Awards.

Do you know a high school student  
who is planning for university?

Invite them to test drive a degree in  
Computer Science or Informatics.



# COMPUTER SCIENCE DAY

**SAT** **8** For high school students,  
**FEB** their parents, friends  
and teachers

**INTERACTIVE SESSIONS · LUNCH · PRIZES**

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