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## Featured researcher: Neda Hamid

In 2014 I started my tertiary career as an Associate Professor at the Canadian University of Dubai in the Departments of Engineering and Business. I had the opportunity to teach and gain experience from both departments. Being part of such a dynamic environment allowed me to apply my IT skills in business domains, and using my techy jargon in business classes turned out to be a blessing for many of my students.

Before this, I was a technology instructor for six years at a private International Baccalaureate school in Amman, Jordan. During this time, I was able to complete a PhD in Computer Science from De Montfort University in the UK, specialising in data mining and online

computer security. My motivation to pursue my PhD was my interest with the amount of significantly growing offline and online data for businesses, the trends of data driven businesses and the spontaneous and unknown knowledge that this data can produce. This data conceals vital information that can be used by decision makers in their business processes. The way of discovering and extracting the hidden and valuable information from the online and offline data manually by domain experts is extremely hard, time-consuming, and requires care and experience. This is simply because the available data is normally huge in size and with great dimensionality. Therefore, intelligent software (data

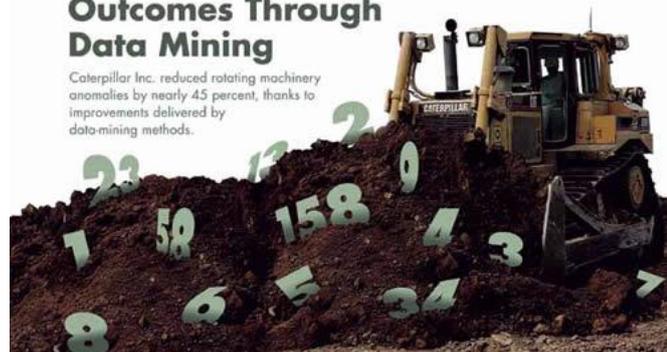
mining tools) is utilised to automatically find the useful information from data which grants businesses the confidence in making key decisions. What's great about data mining is that it is a multidisciplinary field consisting of many contributing scientific domains related to computing, mainly artificial intelligence, databases, and mathematics (statistics and probability). And it can be applied in Marketing, Medicine, Business, Social Sciences etc. So my PhD research plan was to develop new predictive data mining algorithms to produce useful and accurate knowledge for the decision-makers in different domains.

I have 75 citations, ten journals and conferences including the development of a new data mining predictive model called the multiclass associative classification (MAC) algorithm. The publication I'm proudest of is the application of MAC to real phishing data called "Phishing detection based associative classification data mining" that was published in the *Journal of Expert System with Applications* in 2014. For



### Predicting Quality Outcomes Through Data Mining

Caterpillar Inc. reduced rotating machinery anomalies by nearly 45 percent, thanks to improvements delivered by data-mining methods.



this particular paper I collected the data myself, over 1,500 websites, from sites such as PhishTank for the phishy websites and Yahoo directory for the legitimate websites. So now you're asking, "What is phishing?" Phishing is a kind of web threat by impersonating a website of a genuine enterprise with the intention to fraudulently obtain confidential information such as social security numbers, passwords and bank account numbers. A report published by Gartner in 2011, a research and advisory company, shows that phishing attacks are rapidly increasing. Gartner estimated that theft through phishing attacks costs US banks and credit card companies around \$2.8 billion annually. So in my view phishing is not only a financial problem but is a typical classification problem where the goal is to predict whether or not a website is phishy or legitimate based on certain features.



A typical day of research for me is simply reading many – and I mean many – articles. Some could be useful; some are not. I try to find problems or room for development in that given area where machine learning could be of service in applications



such as web security, heuristics, medical data, etc. Keeping up-to-date with current trends and research developments is really important in my field. As we speak, the trend is developing, and therefore I must keep up with today's demanding data age. Once I analyse findings from many sources I then begin summarising them and searching for relevant data to begin test runs in WEKA, (Waikato Environment for Knowledge Analysis) by dabbling with parameters of classification and tree models, analysing the attributes via feature selection methods, just to get enough "knowledge fuel" to start drafting a new article. It's certainly not an overnight task. What's great about data mining is that I get frequent emails and visits from colleagues of other departments wanting some insight into data they have. The first question I ask is, "What do you want to know?" Some have no idea what they're looking for; they want derive the unknown from this data and then that's when the digging begins.

So what's trending now in data mining? Big data, and distributed data mining: pretty much mining anytime anywhere without the need of big bulky servers in your location. Heard of cloud computing? Well, that's what it is: mining large-sized data on the cloud. The main purpose is to maintain and analyse data distributively as a scalable solution. Plus, nowadays the data is in different physical locations, for intellectual property reasons, for organizational reasons or because it is too large to be in a single physical location. Thanks to 'R', another open source language and environment for statistical computing and data analysis, and the new version of WEKA 3.7, such tasks in research can be done by plugging in Weka's Distributed Hadoop package.

My current research aims are to take my skills and knowledge further by focusing on applied data mining, in particular the area of autism, feature selection, data mining in education and optimising my algorithm MAC on big data. Big MAC anyone?

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*"the goal is to predict whether or not a website is phishy or legitimate"*

## Are you cyber-aware?

by Dr Michael Watts & Dr Neda Hamid, IT programme

### Data mining

In the last few years, the amount of offline and online data stored in different business domains has been significantly growing (Song & Wu, 2009). Those data sets conceal vital information that can be used by decision makers in their business processes. The method of discovering and extracting hidden and valuable information from online and offline data manually by domain experts is extremely hard, time-consuming, and requires care and experience. This is simply because the available data is normally huge in size and with great dimensionality. Therefore, intelligent software (data mining tools) are utilised to automatically find the useful information from data which grants businesses the confidence in making key decisions.

Data mining is a multidisciplinary field consisting of many contributing scientific domains related to computing, mainly artificial intelligence (AI), databases, and mathematics (statistics and probability) (Witten & Frank, 2002). There are many definitions for data mining; for example, Song & Wu (2009) defined data mining as the process of producing new patterns from large data sets utilising intelligent methods. We have defined data mining as a science

that is concerned with revealing unseen information in a user-preferred format from data for specific use.

### Social engineering

Social engineering is a fancy word for hacking a person with the intention of gathering sensitive data and exploiting it. This can be done using traditional conning ways, to get sensitive information from a person by gaining that person's trust through manipulation or electronically. Social engineering is unsafe to corporate and personal data, because once a scammer has gained access, you won't know what they'll do with it. Scammers work by season. For instance, around tax season scammers have a field day sending out tax reminders claiming they are the IRS. During the Christmas season when people do lots of online shopping, they may receive an email say from Amazon or a bank believable enough for the consumer to fall into the phishing trap and submit their sensitive data.

### Phishing attacks

Have you ever received an email warning you that your account has been compromised and that you should immediately "click here" to resolve it? Or from your bank requesting immediate attention about a possible threat to your account? How about an email from a courier

company asking you to track your package ... but you're not expecting a package, so you click anyway and thanks to wishful thinking, this link has just redirected you to a trustworthy-looking site, that looks like, say, DHL but in reality you've just been phished. These emails have been designed to look like official emails from a trustworthy site but are actually bogus and sent by scammers. They'll usually ask you to click on, install or download something in an attempt to capture your personal details, or install spyware on your computer. This is called phishing. Phishing is a form of social engineering that can be done electronically.

A phishy website is an impersonation of a legitimate site that aims to deceive you into giving up your portal credentials, such as username and passwords, so that scammers can access your bank details or any other logins. Phishy links often hide behind legitimate-looking websites such as Paypal.com and Ebay.com.



"Of course this website is safe. As an extra measure of security, they make you sign in with your Social Security number, mother's name, your bank account, home address, phone number and date of birth."

*“theft through phishing attacks costs US banks and credit card issuers an estimated \$2.8 billion annually”*

A report published by Gartner Inc (2011), a research and advisory company, shows that phishing attacks continue to escalate. Gartner estimates that theft through phishing attacks costs US banks and credit card issuers an estimated \$2.8 billion annually.

Phishing is a crime. A UK cybercriminal who was behind a £750,000 bank phishing scam was imprisoned for five years. The scam started by sending a number of phishing emails to many recipients. These emails were designed to trick recipients into revealing their online bank credit details. After the recipients' details have been taken, they were then either sold on cyber black markets, or used to undertake fraudulent activities.

Since all websites have common features such as URL length, SSL, number of dots in a URL, certificate authority, it is difficult to differentiate between a legitimate and a phishy website even by security experts. Some scammers even manipulate the URL by adding a prefix or suffix to the legitimate one, like <http://andreas-kloss.eu/verkopen.marktplaats.nl>. Hence intelligent methods are designed that minimise the risk of phishing activities by detecting the type of a browsed website based on a certain numbers of features. These features have been identified after thorough experimentation and statistical analysis.

**How to spot a phishing email**

- 1 Does the email come from a legitimate source? Are there any

spelling mistakes? Do the colours look different than usual? Are there design anomalies?

- 2 How did they address you? “Dear Yahoo User”, “Dear Fredzee667”, “Dear ANZ user”? Banks will always address you by your formal name, eg Milton Hall, Kartik Khan.
- 3 Are you being asked to provide personal details? Your bank would never ask you for your password. In fact, most genuine sites won't ask you for sensitive information via email.
- 4 Do you sense the URL isn't quite right? Sometimes hackers will buy a URL similar to a bank or company URL to trick you into clicking it, e.g [www.paypall.com](http://www.paypall.com) or [www.anz-bank.co.nz](http://www.anz-bank.co.nz)

An example of a phishing email (Sheridan College, n.d.):



- 5 Does it actually look like a real email address? Try googling it to see if it's been mentioned on the internet as an official or spam email address. Believe it or not, you'll find loads of people enquiring like you.
- 6 Does it sound too good to be true? How can you win the lottery, if you haven't even participated? Who on earth would give you one million dollars for nothing?

### Data mining techniques

Website phishing classification is a trending task in data mining. It relates to the ability to classify whether or not a website is phishy by assessing its features. Many researchers have applied popular data mining methods such as decision trees and classification-based algorithms to accurately identify a phishy website.

A popular classification based method, associative classification (AC), is one of the promising approaches that can make use of features extracted from websites to find patterns among them. This approach normally devises classifiers that are accurate, so that the decision-making process becomes reliable simply because decisions are made based on rules discovered from historical data intelligently. Although plenty of applications are offered for combating phishing websites, few of them make use of AC.

Phishing is a typical classification problem, in

which the goal is to assign each test data (new website) one of the predefined classes (phishy or legitimate). Precisely, once a website is loaded on the browser, a set of feature values will be extracted from it. Those features have a strong influence in determining the type of the website, by comparing them to rules that have been previously found by the AC algorithm from the historical data (former labelled websites). Then the chosen rule's class will be assigned to the browsed website and an appropriate action will take place.

### Keeping your workplace cyber-aware

The best way to keep your organisation safe from any form of social engineering attack is the old-fashioned method of education and awareness, and of course utilising anti-phishing software. Employees need to be trained as they are the weakest link.

Companies should include phishing attacks and anti-phishing policy as part of their IT policy, and they must review periodically to include any new types of cyber-attacks.

Organisations should also test employees, by having a third party conduct a social engineering experiment to seek employees' reactions and awareness. These kinds of experiments help to keep employees on their toes and more likely to avoid web threats. This works like a fire drill, educating people not to open suspicious emails, even if they seem to come from within the company.

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“The usual stuff — a new virus from the Joker, spyware from the Penguin, malicious code from Cat Woman, another phishing scheme from the Riddler.”

## Conferences

17 – 18 August 2016  
Tourism Export Council of New Zealand  
Annual Conference  
Wairakei Hotel & Resort, Taupo  
[www.tourismexportcouncil.org.nz/events/annual-conference](http://www.tourismexportcouncil.org.nz/events/annual-conference)

11 – 13 September 2016  
20th accounting, financial and  
economic research conference  
Novotel Canberra  
[expertactions.com/index.php/about-expertactions/careers-home/role-at-expertactions](http://expertactions.com/index.php/about-expertactions/careers-home/role-at-expertactions)

21 – 23 September 2016  
Research and Innovation in Classroom  
Assessment: International Perspectives  
Stamford Plaza, Brisbane  
[www.RICAconference.com.au](http://www.RICAconference.com.au)

11 – 13 October 2016  
Hospitality NZ's Annual Conference  
and Future Leaders Day Events  
SKYCITY, Auckland  
[www.hospitalitynz.org.nz/events/annual-conference.html](http://www.hospitalitynz.org.nz/events/annual-conference.html)

17 – 19 November 2016  
Association for Language Testing and  
Assessment of Australia and New  
Zealand (ALTAANZ) conference  
University of Auckland  
[www.altaan.org/altaan-conference-auckland-2016.html](http://www.altaan.org/altaan-conference-auckland-2016.html)

19 November 2016  
ALANZ Symposium 2016  
*Applied Linguistics: Questions for Our  
Field, Questions for Our Time*  
Massey University, Palmerston North

24 – 26 November 2016  
6th International Conference on  
Languages, Literature and Linguistics  
(ICLLL 2016)  
Sydney  
[www.iclll.org](http://www.iclll.org)

29 November – 1 December 2016  
New Zealand Tourism and Hospitality  
Research Conference (NZTHRC) and the  
3rd Halal Marketing and Tourism  
Research Symposium  
University of Canterbury  
[conferenceteam.co.nz/NZTHRC2016](http://conferenceteam.co.nz/NZTHRC2016)

5 – 9 December 2016  
Australian Statistical Conference 2016  
*Big data; Mining, Analysing, Teaching*  
Hotel Realm, Canberra  
[asc2016.com.au](http://asc2016.com.au)

6 – 8 December 2016  
International Conference on Educational  
Technologies 2016  
RMIT, Melbourne, Australia  
[www.icedutech-conf.org](http://www.icedutech-conf.org)

29 – 30 December 2016  
International conference on  
entrepreneurship (ICE-16)  
Shangri-La Hotel, Sydney  
[iierd.org](http://iierd.org)

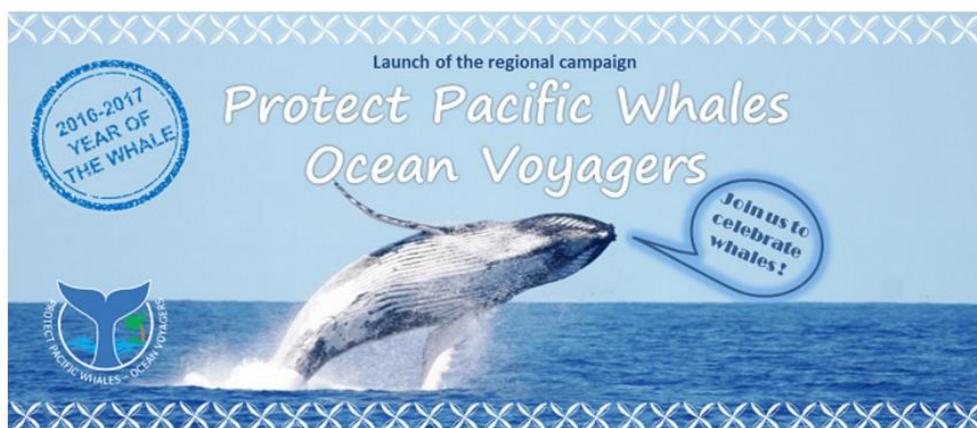
4 - 5 January, 2017  
133<sup>rd</sup> International Conference on Social  
Science and Economics (ICSSE)  
International Institute of Engineers and  
Researchers (IIER)  
Park Regis, North Quay, Brisbane  
[theiier.org/Conference2017/Australia/1/ICSSE](http://theiier.org/Conference2017/Australia/1/ICSSE)

7 – 10 February 2017  
27<sup>th</sup> annual Council for Australasian  
Tourism and Hospitality Education  
(CAUTHE) conference  
University of Otago  
[cauthe.org/services/conferences](http://cauthe.org/services/conferences)

14 – 17 February 2017  
 'Whales in a Changing Ocean'  
 conference  
 Government of Tonga, Vava'u  
 Environment Protection Association  
 (VEPA), Secretariat of the Pacific  
 Regional Environment Programme  
 (SPREP), and AIS  
 Tanoa International Dateline Hotel,  
 Tonga  
[www.sprep.org/yearofthewhale](http://www.sprep.org/yearofthewhale)

25 – 26 March 2017  
 4th International conference on trends in  
 multidisciplinary business & economic  
 research  
 (TMBER -2017)  
 Novotel Hotel Sydney  
[globalilluminators.org/conferences/tmber-2017-sydney](http://globalilluminators.org/conferences/tmber-2017-sydney)

15 -16 April 2017  
 Sydney Conference on Interdisciplinary  
 Business & Economics Research (SIBR  
 2017)  
 "Advancing Knowledge from  
 Interdisciplinary Perspectives"  
 Vibe Hotel, Sydney  
[sibresearch.org/sibr-sydney-conference-call.html](http://sibresearch.org/sibr-sydney-conference-call.html)



1 – 4 July 2017  
 International Conference on Information  
 Technology and Applications (ICITA  
 2017)  
 Hilton Hotel Sydney  
[www.icita.org/2017](http://www.icita.org/2017)

19 – 20 July 2017  
 New Zealand Hotel Industry conference  
 The Langham, Auckland  
[www.cmnz.co.nz/nzhic-2016](http://www.cmnz.co.nz/nzhic-2016)

## Research outputs by AIS staff

**Addison, A., & Taumoepeau, S.** (2016). Who needs training? A Tongan tourism case study. Presentation at the Vaka Pasifiki Education Conference, Honiara, Solomon Islands, July 5-6.

**Brown, A.** (2016). Barriers to learning the English *th* sounds. Part II: The relative importance of the two sounds. *Speak Out! (Journal of the IATEFL Pronunciation Special Interest Group)* 54, 6-14.

**Han, B. & Watts, M.** (2016). Predicting the academic performance of international students on an ongoing basis. *29th Annual CITRENZ (Computer and Information Technology Research and Education New Zealand) Conference*, July 11-13, 2016. Wellington, New Zealand.

**Kelly, R., Losekoot, E., and Wright-StClair, V.A.** (2016). Hospitality in hospitals: The importance of caring about the patient. *Hospitality & Society*, 6(2), 113-129. doi: 10.1386/hosp.6.2.113\_1

**Losekoot, E., & Lugosi, P.** (2016). A New Zealand airport customer experience model. In U. McMahon-Beattie & S. Boyd (Eds.) *CHME2016 Conference: Inspire, Innovate, Succeed within Hospitality Management* (pp 102-113), Belfast, UK: Ulster University Business School. Awarded best theme conference paper.

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**Spring, J.** (2016). Sustainable wildlife tours and the concept of awareness. *National Association of Interpreters International Conference*, Wellington, 3 – 7 April.

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[www.ais.ac.nz](http://www.ais.ac.nz)

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- Towner, N.** (2016). Community participation and emerging surfing tourism destinations: a case study of the Mentawai Islands. *Journal of Sport and Tourism*, 20(1), 1-19.
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## About Auckland Institute of Studies ...

Auckland Institute of Studies is a unique tertiary institution with a distinctive international focus. Since its inception, this developing institute has attracted students and staff from countries around the world and has now developed a number of close relationships with leading educational institutions internationally.

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Postgraduate Certificate in Business Administration

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Diploma in International Business (Level 6)  
Diploma in International Business (Level 5)

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Bachelor of Information Technology  
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Diploma in Information Technology (Level 5)

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Diploma in Hospitality Operations Management (Level 6)  
Diploma in Hospitality Operations (Level 5)

English as a Foreign Language  
English for Academic Purposes  
IELTS Preparation  
Cert TESOL

The AIS research newsletter (ISSN 2357-2426) aims to establish and foster collegial partnerships in common research interests, through high quality research outputs and sharing research ideas and resources. Correspondence about the newsletter should be sent to Christine Edwards at the above address, or email [christinee@ais.ac.nz](mailto:christinee@ais.ac.nz). The editor is Dr Adam Brown ([adamb@ais.ac.nz](mailto:adamb@ais.ac.nz)).