

IMA Seminar Series 2009/2010

Contact:

Peer-Olaf Siebers
Phone: 01158466526
Email: pos@cs.nott.ac.uk

16 June 2010, 12.15pm-2pm, Atrium

IMA Research Group Poster Day

We would like to encourage all IMA PhD students and staff to produce a (or exhibit an existing) poster about their current or past research activities / projects. There will be a best poster award in form of an Amazon book voucher! If you would like to contribute, please send me your poster title by Friday, 12:00. Your poster needs to be ready on Monday (as a pdf file), so that it can be printed in time. Please send it to Steven Bagley (srb@cs.nott.ac.uk) by Monday, 16:00.

Everybody is welcome!
Food and drinks will be provided :).

Posters presented:

- Hala Helmi: The Performance of Monitoring the Routing Using SNMP on OSPF Protocol with Down State Neighbor: Using OPNET Simulator
- Jang Joon Park: Comparing the Effectiveness of Different Simulation Approaches for Self-Organized Criticality
- Christopher Roadknight: Simulating Traffic Flow at the Port of Dover
- Adam McMaster: Jump into Oblivion
- Aslam Ahmed: Multi-Paradigm Simulation of TRAPS
- Tao Zhang: Future Energy Decision Making for Cities - Can Complexity Science Rise to the Challenge?
- Jan Feyereisl: Learning Using Privileged Information - Colon Cancer Classification
- Graziela Figueredo: Comparison of SD and ABS for Immunosenescence
- Galina Sherman: Scenario Analysis, Decision Trees and Simulation for Cargo Screening
- Van Hieu Nguyen: Local Gabor Binary Pattern Whitened PCA: A Novel Approach for Face Recognition from Single Image Per Person
- Naisan Benatar: FLOAT-S: Fuzzy Logic Operated AuTonomous Sailboat

08 June 2010, 12.15pm-2pm, Room C60

Seminar by Peer-Olaf Siebers: Scenario Analysis, Decision Trees and Simulation for Cargo Screening

In this presentation I will demonstrate different probabilistic methods (scenario analysis, decision trees and different types of simulation) that can be used to produce estimates required for Cost-Benefit Analysis. We have applied all methods in a case study to investigate the impact of different policies on cargo screening processes in seaports, and to estimate the trade-off between costs and benefits when investing money in enhanced port security. The result of our efforts is a (draft) best practice guide that can advise analysts which method to use in different circumstances.

Seminar by Hazlina Hamdan: Adaptive Neuro-Fuzzy Inference System (ANFIS) in Modelling Breast Cancer Survival

Medical prognosis is the prediction of the future course and outcome of a disease and an indication of the likelihood of recovery from that disease. Soft-computing approaches including artificial neural networks and fuzzy inference have been used widely to model expert behaviour. Adaptive Neuro-

Fuzzy Inference System (ANFIS), which combines adaptive neural network capabilities with the fuzzy logic qualitative approach, has been proposed in the estimation of survival prediction. In this talk, I will describe the methodology by which ANFIS was used to model survival and present a comparison of this new method with existing methods in the capability to predict the survival rate in a given medical data set concerning survival of patients following operative surgery for breast cancer.

01 June 2010, 12.15pm-2pm, Room C60

Seminar by Konstantin Vikhorev (UoN AgentLAB): Real-time Agent Systems

Within the multi-agent system community, the Belief-Desire-Intention (BDI) model has come to be possibly the best known and best studied model of practical reasoning agents. However, while the BDI model provides a powerful model of human like reasoning for intelligent agent systems, it fails to provide a key element of agency, namely the ability to respond to changes in the agent's environment in a timely manner. A new approach to providing soft real-time guarantees for Belief-Desire-Intention (BDI) agents is presented. The meaning of real-time guarantees for BDI agents is also defined. As an illustration of the approach a new BDI agent architecture, AgentSpeak(RT), which allows the development of agents that guarantee (soft) real-time performance, is introduced.

Seminar by Van Hieu (Harry) Nguyen: Cosine Similarity Metric Learning for Face Verification

Face verification is the problem of determining whether two face images depict the same person or not. This is very challenging due to variations in scale, pose, lighting, background, expression, hairstyle, and glasses. Face Verification can be reduced to the problem of computing the distance between two vectors (faces) then using a threshold to conclude whether they are the same person. In this talk I will present a new method named Cosine Similarity Metric Learning (CSML) for learning a metric distance measure. CSML has three important properties: fast at training time, fast at testing time and very accurate compared to existing methods. The results on the state-of-the-art dataset Labeled Faces in the Wild (LFW) will be presented to verify our conclusion.

25 May 2010, 12.15pm-2pm, Room C60

Tutorial by Milena Radenkovic: Security in Delay Tolerant Networks

The talk will give an overview of security issues in Delay Tolerant Networks (DTNs). It will begin by explaining why the traditional security approaches for wired, mobile, ad hoc, or cellular networks are not applicable to DTNs. It will then describe current efforts by the DTN Security Work Group that are being standardised. It will conclude by identifying current open issues with DTN security.

Seminar by Shabbar Naqvi: An Investigation into the use of Fourier Transform Infrared Spectroscopy for the analysis of Breast Cancer Data Sets

Fourier Transform Infrared Spectroscopy (FTIR) is a relatively new technique that has been increasingly applied by researchers on different areas including medical sciences. In this talk, I shall give an update on my ongoing work which is to apply this technique on new breast cancer data sets with advanced computational methods of machine learning that are helpful in real clinical practice. I shall be explaining the key features of the data set used, the difficulties involved in data extraction, pre-processing required for such data set and future work.

18 May 2010, 12.15pm-2pm, Room C60

Tutorial by Tao Zhang: Modelling Office Energy Consumption - An Agent Based Approach

In this presentation, I will introduce an agent-based model which integrates four important elements, i.e. organisational energy management policies/regulations, energy management technologies, electric appliances and equipment, and human behaviour, for studying the energy consumption in office buildings. The model is developed based on the case of school of computer science building, Jubilee Campus, the University of Nottingham. With the model, we test the effectiveness of different energy management strategies, and solve practical office energy consumption problems. This model theoretically contributes to an integration of four elements involved in the complex organisational issue

of office energy consumption, and practically contributes to an application of agent-based approach for office building energy consumption study.

Seminar by Graziela Figueredo: Immune System Aging and Cancer - Defining a Simulation Strategy

Although there are various types of cancer treatments, none of these take into account the immune responses to cancer. Recent studies show that in vitro stimulation of T cells could help the treatment of real patients. As in all cases of vaccination, there are factors to be considered before the stimulation. One of them is the organism's immunocompetence. Our interest lies in the study of immunocompetence with age. We are trying to answer questions such as: How fit is the immune system to fight cancer given a certain age? Would an immune boost improve the effectiveness of a cancer treatment given the patient's immune phenotype and age? We believe that understanding the processes of immune system aging and degradation may help in answering these questions. Our goal is to understand these processes using two different simulation methods, system dynamics and agent based simulation. These simulation types can both be used to model interactions of entities within a population. Our modelling work presented here is concerned with understanding the suitability of the different types of simulation for the immune system aging problems. Therefore as a first step our research focuses on T cells, which are a major contributor to the immune system's functionality. In particular, we decided to look at naive T cells with age, as they play an important role in responses to cancer and vaccination. Of further interest is the number and phenotypical variety of these cells in an individual, which will be the case study focused on in this paper. We believe that the results obtained could help on the modelling of T cell populations inside tumours.

11 May 2010, 12.15pm-2pm, Room C60

Seminar by Noor Azizah KS Mohamadali: Modelling User Acceptance of Software Technology using AHP and Fuzzy AHP

Success or failure of system implementation largely depends on user acceptance of the technology. Thus, identifying factors that influence user acceptance of technology is crucial for any organization. First part of my research involves in developing a conceptual framework of user acceptance of technology focusing on software technology in healthcare sector. In this framework, we propose factors that may influence user acceptance. Second part of my research is in the area of multi-criteria decision analysis techniques. This involves investigating the suitable techniques that can be used to assign weights among different factors. The aim is to identify the most influential factors of user acceptance of technology. In my presentation, I will present the modelling of user acceptance factors by using two techniques which are AHP and Fuzzy AHP. These techniques will be compared in terms of the weights it assigns to the factors. I will also outline my future work.

Tutorial by Peer-Olaf Siebers: System Dynamics - Yet Another Simulation Modelling Method

System Dynamics (SD) is a rigorous modelling method that enables us to build formal computer simulations of complex systems and use them to design more effective policies and organisations. It is mostly used in long-term, strategic models and assumes high level of aggregation of the objects being modelled. In my tutorial I will introduce the ideas of SD modelling and I will show how to implement SD models in AnyLogic, a multi-paradigm simulation software package which is freely available for IMA research group members.

16 March 2010, 12.15pm-2pm, Room C60

John Rabone (Centre for English Language Education, UoN): The Use of Articles - An English Grammar Tutorial

This event is for foreign PhD students only! If you would like to attend this tutorial, please let me know and in addition please send a sample of your own writing of about 200 words to the presenter John Rabone (John.Rabone@nottingham.ac.uk). He also needs to know your first language. You should use the subject header "Use of articles" for your correspondence with John.

09 March 2010, 12.15pm-2pm, Room C60

Hongmei He (Intelligent System Lab, University of Bristol): Soft Computing Approaches Under the Framework of Hierarchical Decision Making or Classification System

With the development of AI, we can see there are a surprising number of the brain functions of the human Intelligent System (IS) are quite similar to those of an artificial IS, since most artificial ISs are modelled through naturally emulating human intelligence. A wide variety of approaches have been utilised in the functional design of artificial ISs. For example, fuzzy logic for robustness, decision trees for the transparency of reasoning, machine learning for knowledge learning, semantics for understandability, probabilistic reasoning, and neural computing, etc.

Our current research focuses on information fusion for decision making, classification and regression problems. A recently completed project was “Goal Seeking Heterogeneous Sensor Arrays”, which was part of the integrated project, “Shared Understanding and Human Computer Interaction (HCI) Theme”, sponsored by General Dynamics. We focused on the multiple attribute decision making or classification problems with goal-directed approaches to fusion systems, which involved the development of a high-order tasking model that disseminates user intent within heterogeneous sensor networks in order to elicit actionable information. A demonstration software (Multi-attribute Hierarchy Decision Making System) had been developed to present a platform on which a linguistic attribute hierarchy (LAH) embedded with Linguistic Decision Trees (LDTs) based on Label Semantics can be created, learned, and optimised.

The experiments showed that an optimal linguistic attribute hierarchy can not only greatly reduce rules for those databases with strong uncertainty and non-linear relationship between input attributes and the goal, but also achieve excellent results for decision making or classification.

02 March 2010, 12.15pm-2pm, Room C60

Tutorial by Daniele Soria: An Introduction to R: Statistics, Graphics and Data Mining

In this talk, I will provide a basic introduction to the R software. I will show how to install it and perform some elementary data manipulation. Then some descriptive statistics will be used to analyse a standard dataset. A demonstration of how to use different graphics tools and how to apply clustering methods will end this tutorial.

23 February 2010, 12.15pm-2pm, Room C60

Tutorial by Uwe Aickelin: The Last 10 Years of Artificial Immune System Research

The talk will cover the following topics:

- Introduction to 'real' Immune Systems
- What are Artificial Immune Systems?
- Which problems may they be suitable for?
- Some successful Artificial Immune System application examples:
 - Time Series prediction (e.g. oil prices)
 - Intrusion Detection (e.g. key logging on computers)
 - Fault Detection (e.g. breakdown of cash dispensers)
 - Preference Suggestion (e.g. people who like X might also like Y)
 - Robotic Navigation
- The future: Bio-sensors? Closer collaboration with clinicians?

Seminar by Chris Roadknight: Real World Data, Real World Problems

This talk will be a brief introduction to a diverse academic and industrial research history that includes sensor data management, active networks, computer vision and workplace monitoring. There will be common themes of real world data, lightweight AI processes and solution transparency. It will conclude with a brief discussion on future research directions within the IMA group.

16 February 2010, 12.15pm-2pm, Room C60

Tutorial by Jianyong Sun: Robust Mixture Modeling using the Pearson Type VII Distribution

Finite Mixture Models (FMM) have been widely used to model multivariate data sets. The mixture of Gaussians (MoG) is the most popular method for data clustering. However, MoG is not able to perform well on datasets with outliers. In this paper, we developed a novel robust clustering approach by modelling the data sets with mixture of Pearson type VII distribution (MoP). An EM algorithm is developed for the maximum likelihood estimation of the model parameters. Outlier detection criterion is derived from the EM solution. Controlled experimental results on synthetic datasets show that the MoP performs comparably if not better, on average, with the mixture of Student t-distribution in terms of outlier detection accuracy and out-of-sample log-likelihood, but the MoP is more stable.

Seminar by Andrew Grundy: Promoting Congestion Control in Opportunistic Networks

We are concerned with congestion aware forwarding of packets within opportunistic networks. We remove the reoccurring assumption of unlimited storage, making it evident that congestion is a prominent problem that needs to be addressed. We propose a rich, context-driven, distributed, congestion control algorithm that adaptively chooses the next hop based on contact history, contact statistics, as well as buffer statistics. Our work shows that congestion control is an essential component to be included in the transfer of data in opportunistic networks, which is achievable by disseminating and processing statistics concerning a nodes state of availability.

09 February 2010, 12.15pm-2pm, Room C60

Tutorial by Julie Greensmith: The Three R's of Research: Reading, (W)riting and Reviewing

There are three skills which are fundamental to research, no matter in which field you are working. These are the ability to read the work of others, the ability to communicate your research through written means and finally to be able to review the research of your peers. All of these skills are necessary to perform research in the correct manner. Additionally these attributes are synergistic: for example if you have an effective process for reviewing papers you can apply these principles to your own submissions and hopefully improve the standard of writing in your own publications. While there is no right way per se to perform these tasks, there are several tips and tricks for learning these skills and for making them work for you. I hope to provide some examples as to how I have achieved this previously. The focus of this talk is to explain my strategies for the "three R's" and to encourage the audience to share their strategies. This will be illustrated through examples of my work and the research of others.

Seminar by Mazlina Abdul Majid: Modelling Reactive and Proactive Behaviour in Simulation

In IMA Seminar, I am going to present the content of my paper which has been accepted for the Simulation Workshop 2010. In our research we investigate the simulation model behaviour of a traditional discrete event and combined discrete event and agent based simulation models when modelling human reactive and proactive behaviour in human centric complex systems. We have chosen a department store as our human centric complex case study system, where we studied the operations of a fitting room in the WomensWear department. We have looked at ways to determine the efficiency of new management policies for the fitting room operation through simulating the reactive and proactive behaviour of staff towards customers. After we finished the development of our simulation models and their verification, we carried out a validation experiment in the form of a sensitivity analysis. Then we carried out a statistical analysis where we compared the mixed reactive and proactive behaviour experimental results with some reactive experimental results from work previously published. Overall, we found for our case study that simple proactive individual behaviour can be modelled in both of simulation models, but that is having a bigger impact on the results of the combined discrete event and agent based simulation model.

02 February 2010, 12.15pm-2pm, Room C60

Tutorial by Jon Garibaldi: Introduction to Data Mining using Weka

In this tutorial, I will provide an elementary introduction to using the WEKA toolkit for clustering and classifying data. I will give a live demonstration of how to download and install WEKA; download standard datasets from the UCI Machine Learning Repository; and then use WEKA to apply a range of clustering and classification algorithms to the various data sets.

26 January 2010, 12.15pm-2pm, Room C60

1st Year PhD Presentations

All first year PhD students will give a short presentation on their research topic.

Aslam Ahmed: Multi-paradigm Simulation of Cellular Pathways

TRAPS (TNF receptor-associated periodic syndrome) is a dominantly inherited disease which is a result of missense mutations occurring in TNFR1 (TNF Receptor 1) gene. As a result of these mutations, patients suffer from inflammation and bouts of fever.

It was originally thought that TRAPS is a result of defective receptor shedding resulting in excess TNF. Current research is looking at the TNF receptor and ligand interaction leading to signalling clusters on the cell membrane which kick-start intracellular signalling process. This eventually leads to cell death.

My research area is based around the simulation of the receptor/ligand interaction and the intracellular signalling so that it can be used as a tool to determine the effectiveness of computer simulation as a means to understand the processes involved in TRAPS. Of particular interest is the multi-layered and multi-paradigm approach that will be used and an analysis of the approach in understanding its scope and limitations.

Adam McMaster: Adaptive Theme Park Rides: Responding to Thrill

Biosensors produce electrical signals in response to physiological changes in the body. Working with the Thrill Laboratory as part of the Day in the Park project, we are interested in developing techniques that make use of biosensors to measure individuals' responses to (potentially) thrilling situations and increase the enjoyment of each individual based on their responses. The long-term goal of the project is to investigate the possibility of using such techniques to develop theme park rides which are capable of adapting to the individuals who are riding them.

Sang Joon Park: Modelling & Simulation in Complexity

The study of complexity shows us that we can find a rule or a regulation in the complex system if we look at it closely. Therefore, there is a necessity of analytic tools which enables us to understand the interactions in the complicated systems because the systems are changed and evolved continuously, and the systems are inter-linked rather than separated one another. In order to study the complexities, a lot of methodologies are considered, and one of them is Modelling and Simulation (M&S). It simplifies the factors and their interactions in the complexity, and then simulating the model continuously until it is evaluated as an optimal answer for the complex system. The M&S and study of complexity is better approach to the complex system in terms of viewing the interactions among the factors dynamically. This approach can describe how the factors affect the system and how the system changes.

In my presentation I will first talk about M&S in complexity and then I will give a brief insight into my research topic: A study of the long-term energy mix with the introduction of a policy (feed-in tariff).

Hao Fu: Total Image Understanding

Image understanding is always the holy grail in computer vision research. To achieve this goal, the computer must have the ability to learn knowledge from a large repository of image datasets. There has already exist many large image collections on the website, such as Flickr, ImageNet, Labelme, etc. My research direction is how to utilise these image datasets and develop algorithms to teach the computer to learn knowledge from them.

Galina Sherman: Decision Trees vs. Simulation for Cost Benefit Analysis of Cargo Screening Processes

Cargo screening processes are used to detect different threats such as nuclear, chemical and radiological weapons, smuggling and contraband and sometimes even stowaways. While protecting against threats the port operators' interest is to keep the port performance as smooth as possible. To screen all sea freight is a challenging task because of the huge volume of goods that pass around the globe annually. Cost-benefit analysis provides a good tool to investigate different cargo screening scenarios.

In our research, we conduct a comparison between decision trees and discrete event simulation. We attempt to propose an innovative method for decision making while dealing with infrequent events (<1% of cases), such as the detection of illegal immigrants hiding on lorries. We would like to advance the use of simulation as a powerful tool at the operational and strategic level.

08 December 2009, 12.15pm-2pm, Room C60

Seminar by Jan Feyereisl: On the Importance and Incorporation of Additional Knowledge in Cluster Analysis

Analysis of data without labels is commonly subject to scrutiny by unsupervised machine learning techniques. Although abundant expert knowledge exists in many areas where unlabelled data is examined, frequently such knowledge is not incorporated into automatic analysis. Semi-supervised learning allows for the incorporation of additional knowledge with the help of labels or constraints. However it is the field of supervised learning and the recently proposed advanced paradigm of learning using privileged information, that provides an intriguing concept of incorporating special type of additional knowledge.

In this thesis we explore the question of importance and incorporation of such additional knowledge within unsupervised learning. Our analysis is performed from four different viewpoints, namely anomaly detection, cluster interpretation, visualisation and identification. The functionality of signal fusion and low-level pattern recognition in the human immune system is our inspiration. A more practical set of immunology derived techniques is developed, allowing for the fusion of additional information for improved anomaly detection (UR-STD), cluster interpretation and visualisation (StOrM). The success of these techniques within computer security and process behaviour scenarios encouraged further exploration of additional knowledge incorporation at a more general level. Adoption of the advanced supervised learning paradigm for the unsupervised setting instigates investigation into the difference between privileged and technical data. By means of our proposed a R-MAX method stability of the K-Means algorithm is improved and identification of the best clustering solution is achieved on an artificial dataset. Subsequently an information theoretic dot product based algorithm called P-Dot is proposed. This method has the ability to utilise a wide variety of clustering techniques, individually or in combination, while fusing privileged and technical data for improved clustering. Application of this P-Dot method to the task of digit recognition confirms our previous findings in a real-world scenario. Finally the nature of privileged information is investigated more formally and its association with the notion of data generators is revealed. Experiments using standard machine learning datasets uncover the hypothetical existence of disparate data generators, which can provide benefits for unsupervised learning when treated uniquely, i.e. equally. The incorporation of additional knowledge within cluster analysis can be beneficial, especially when generators are identified and treated separately and with regards to their nature.

Seminar by Daniel Soria: Novel Methods to Elucidate Core Classes in Multi-Dimensional Biomedical Data

During this seminar I will present my thesis work, which focuses on the development of advanced computational models for the classification of breast cancer into sub-types of the disease based on protein expression levels of selected markers. In particular, an original framework for the definition of core representative classes in a dataset was developed. The different steps and stages of this framework will be presented in detail, together with the most important results obtained in my work.

01 December 2009, 12.15pm-2pm, Room C60

Seminar by Iain Fraser: Reducing latency for real-time applications at the Internet edges

Residential broadband links are typically shared between family members or tenants, which can increase packet round trip times due to congestion. Online games require low latency updates to maintain synchronicity between the players. The delays caused by congestion reduce the playability of online games. This presentation will introduce the problem describing how aggressive TCP flows can cause large queuing delays at the ISP routers. It then describes the available techniques to alleviate the problem, which all require collaboration from the ISP. The presentation is concluded with an explanation of a novel technique we are researching that requires no support from the ISP.

24 November 2009, 12.15pm-2pm, Room C60

Tutorial by Robert (Bob) Oates: Robotics as Embodied Software

Robotics as a computer science discipline is a challenging field that requires a diverse set of solutions for dealing with uncertainty, sensor noise and conflicting information. This tutorial will introduce a brief history of robotics from fiction to fact and introduce some of the robots that are currently available in the university robotics lab. It will conclude with an exploration of implementing a simple algorithm on an NXT robot demonstrating some of the issues raised by attempting to embody computers.

17 November 2009, 12.15pm-2pm, Room C60

Tutorial by Guoping Qiu: Modeling User Intentions in Interactive Image Retrieval

Interactive image retrieval involves users labelling their desired example images. However, it is often some specific objects or regions in these example images that the users are really interested. In this talk, we present a hierarchical graphical model for automatically segmenting out user interested objects and regions in the example images. The hierarchical graphical model embeds image formation prior, user intention prior and statistical prior in its edges and uses a max-flow/min-cut method to simultaneously segment all positively labelled images into user interested and user uninterested regions. An important feature of the graphical model is that it contains a layer of visual appearance prototype nodes which form bridges linking similar objects in different images. This architecture not only makes it possible to use all example images to obtain more robust user intention prior but also greatly reduces the graph and computational complexity.

Seminar by Feng Gu: Theoretical Aspects of the Dendritic Cell Algorithm

As one of the emerging algorithms in the field of Artificial Immune Systems (AIS), the Dendritic Cell Algorithm (DCA) has been successfully applied to a number of problem domains. However, one criticism is the lack of a formal definition of the algorithm, which results in ambiguities for understanding the algorithm. Moreover, investigations of the algorithm have only focused on its empirical aspects, whereas other AIS such as Clonal Selection Algorithm and Negative Selection Algorithm have been theoretically analysed. Therefore it is necessary to provide a formal definition of the DCA for clearer and better presentation, as well as perform theoretical analysis of the algorithm to reveal its theoretical aspects. In this work, we define the DCA formally using set theory, predicate logic and functions. Moreover, theoretical analysis of the runtime complexity of the standard DCA and the DCA with segmentation are performed.

03 November 2009, 12.15pm-2pm, Room C60

Tutorial by Julian Zappala: Biologically Inspired Agent-Based Models: Finding Real Answers in Virtual Worlds

The challenges of understanding group-level animal behaviours such as spatial cohesion, co-ordination, action selection and consensus decision making have attracted a significant degree of interest and have stimulated much debate in recent literature. Many factors potentially determine how and why such behaviours can develop and function effectively, including group composition and properties of the environment. In behavioural ecology field-based, observational methods are the mainstay of research and have contributed much to our understanding of these systems in various species; however, these

approaches are not without their drawbacks and critics. In this talk we consider the history, construction and application of virtual environments and agent-based simulations. Through consideration of a case study we find how these technologies can contribute to, compliment, inform and enhance more established research techniques.

Seminar by Naisan Benatar: An Introduction to Robotic Sailing Systems

In this presentation I will introduce the concept of a robotic sailing vessel, its uses and applications. I will also present a type I fuzzy controller that has preliminary results to show that it is a viable solution to the problem of robotic sailing vessel control. I will then conclude by explaining the future work that I have planned for my research.

27 October 2009, 12-2pm, Room C60

Seminar by Haichang Gao: A Drawing Reproduction Graphical Password Strategy

Alphanumeric passwords are widely used in computer and network authentication to protect users' privacy. However, it is well known that long, text based passwords are hard for people to remember, while shorter ones are susceptible to attack. Graphical password is a promising solution to this problem. Draw-A-Secret (DAS) is a typical implementation based on the user drawing on a grid canvas. Currently, too many constraints result in reduction in user experience and prevent its popularity. A novel graphical password strategy Yet-Another-Graphical-Password (YAGP) inspired by DAS will be introduced in the presentation. The proposal has the advantages of free drawing positions, strong shoulder surfing resistance and large password space. Experiments illustrate the effectiveness of YAGP.

Seminar by Yousof Al Hammadi: Behavioural Correlation for Malicious Bot Detection

In the past few years bots, which are malicious programs, have become a major threat to the Internet community. These bots are remotely controlled by the attacker to perform different malicious activities such as issuing distributed denial of services attacks, keylogging, sniffing, spamming and extortion. In response to these threats, there is a growing demand for effective techniques to detect the presence of bots/botnets. Current existing approaches focus on detecting botnets rather than individual bots. In our work, we present a host-based behavioural approach for detecting botnets/bots based on correlating different activities executed by bots by monitoring function calls within a specified time window. Different correlation algorithms have been used in this work to achieve the required task. We start our work by detecting IRC bots behaviours using a simple correlation algorithm. A more intelligent approach of data correlation represented by Dendritic Cell Algorithm (DCA) is also used as a major part to detect a bot running on a system. The DCA performs multi-sensor data fusion on a set of input "signals", and this information is correlated with potentially anomalous "suspect entities" termed "antigen". This results in information which will state not only if an anomaly is detected, but in addition the culprit responsible for the anomaly. We also extend our work to detect peer to peer (P2P) bots which are the upcoming threat to Internet security due to the fact that P2P networks do not have a centralized point to shutdown or traceback, thus making the detection of P2P bots is a real challenge. Our evaluation shows that correlating different activities generated by IRC/P2P bots within a specified time period achieves high detection accuracy.

20 October 2009, 12-2pm, Room C60

IMA Research Group Meeting and IMA Seminar Series Introduction

In this first session of this term's IMA seminar series we will have a research group meeting followed by some information on the seminar series (including tips on how to present your work and how to give objective feedback to other presenters).

Tutorial by Tao Zhang: Social Simulations of Technology Adoption and Consumer Behaviour

Arguably beginning with Thomas Schelling's residential segregation model, the use of intelligent agents in social science has been prosperous in recent decades. Social simulation is a branch of complexity science blending various disciplines such as social psychology, economics, engineering and computer science. In the seminar, I will talk about agent-based social simulation, with a particular

focus on technology adoption and consumer behaviour in the electricity market. I will begin the seminar with a brief introduction to human agents and social simulation, and then use an example of my recent research, i.e. modelling smart keypad prepayment meter diffusion and electricity demand side management in Belfast, Northern Ireland, to demonstrate the process of constructing consumer agents and social simulation models.