



PhD Application Talks

7 May 2018 in MPI-INF 024

9:30 - 10:30

- **Aniket Roy:**
Multimedia Security through Digital Image Forensics
- **Sagar Verma:**
Egocentric Video Understanding
- **Stavros Petsalakis:**
Fine Grained Complexity: Exploring Reductions and their Properties

Coffee Break

11:00 – 12:20

- **Alberto Fiori:**
On consistency of the Minimalist Foundation
- **Burcu Sayin:**
An Analysis of Information Spreading and Privacy Issues on Social Networks
- **Ehsan Etesami:**
Modeling and Evaluation of Cloud Services Considering Live Virtual Machine Migration
- **Safia Kalwar:**
Performance And Cost Evaluation Of Privacy Preservation In Big Data Systems

Lunch



Aniket Roy

University: Indian Institute of Technology Kharagpur

Supervisor: Dr. Rajat Subhra Chakraborty

Title: Multimedia Security through Digital Image Forensics

Abstract:

In today's cyber world digital multimedia constitute the most frequently transmitted forms of information. Therefore maintaining the integrity and fidelity of multimedia contents is of utmost importance. Hence multimedia security has become an active research topic of late. In this talk, we focus mainly on digital image forensics. The two fundamental problems in digital image forensics are: (a) camera source identification and (c) image forgery detection. Camera source identification verifies the origin and authenticity of digital images. We address the camera source identification problem using Discrete Cosine Transform Residual (DCTR) features, Random Forest based ensemble classifier and Principal Component Analysis (PCA) based dimensionality reduction. Additionally, we have observed that such features are also effective for linear, nonlinear filtering and splicing based forgery detection in JPEG images. Theoretical justification along with experimental validation has been provided on several benchmark image datasets. Finally, we deal with the copy-move forgery detection with similar but genuine objects, which remains unexplored in the current literature. The performance of the state-of-the-art techniques reduces significantly in this particular case due to false positives. We have used Rotated Local Binary Pattern (RLBP) features and noise variance consistency property for effective copy-move forgery detection and localization with similar but genuine objects.



Sagar Verma

University: Indraprastha Institute of Information Technology,
Delhi – India

Supervisor: Dr. Chetan Arora

Title: Egocentric Video Understanding

Abstract:

Wearable cameras like the GoPro are one of the best selling cameras these days. The always-on nature and the first person point of view are the unique characteristics of such egocentric cameras giving access to the information not possible with traditional point and shoot cameras. However, even the classical vision tasks such as activity recognition and egomotion estimation becomes surprisingly difficult for such videos because of wild camera motion and unconstrained scene. I will talk about three of my works. First one is on recognizing different types of first-person action categories using a single spatiotemporal architecture. The second one is on learning activity from a sequence of actions. The third one is on creating a person's social graph from his/her daily life first-person video in an unsupervised way.



Stavros Petsalakis

University: Interuniversity Postgraduate Program ALMA,
Athens, Greece

Supervisor: Prof. Aris Pagourtzis

Title: Fine Grained Complexity: Exploring Reductions and
their Properties

Abstract:

Algorithmic design has been one of the main subjects of interest for Computer science. While very effective in some areas, this approach has been met with some practical dead ends that have been very problematic in the progress of the field. Classical Computational Complexity practices have also not been able to bypass these blocks. Understanding the hardness of each problem is not trivial. Fine-Grained Complexity provides new perspectives on classic problems, resulting to solid links between famous conjectures in Complexity, and Algorithmic design. It serves as a tool to prove conditional lower bounds for problems with polynomial complexity, a field that had seen very little progress until now. Popular conjectures such as SETH, k-OV, 3SUM, and APSP, imply many bounds that have been thought unprovable, and provide a new understanding of the structure and entropy of problems in general. The aim of this thesis is to contribute towards solidifying the framework for reductions from each conjecture, and to explore the structural difference between the problems in each case.



Alberto Fiori

University: University of Padua – Italy

Supervisor: Prof. M. E. Maietti

Title: On consistency of the Minimalist Foundation

Abstract:

In this thesis we prove the strong normalization property for the intensional level of the Minimalist Type Theory with the ξ -rule (for short mTT_{ξ}) in [Mai09].

The Minimalist Foundation is a two-level formal system ideated by Sambin and Maietti in [MS05] and completed by Maietti in [Mai09]. It is intended to be a foundation for constructive mathematics compatible with the most relevant foundations in the literature for either constructive or classical mathematics.

To meet our purpose we employ Tait's method of computability predicates in the untyped form used by Catarina Coquand in [Coq98] to prove strong normalization for the fragment of Martin-Löf Type Theory with the types of natural numbers, dependent products types and a universe (this proof is different from the one given by Martin-Löf in [ML98] and in [ML75] where he used the typed form of Tait's computability method).

Our main contribution is the generalization of C. Coquand's technique to work with indexed sum types and propositional equality types.

The normalization property is relevant for mTT_{ξ} as it is a way to give a computational semantics to the theory and as corollary to prove its logical consistency without relying on a classical set theory semantics. This implies the consistency on mTT as adding the ξ -rule only increases the judgments that can be proved in the calculus and the definition of canonical form is not changed.



Burcu Sayin

University: Izmir Institute of Technology, Turkey

Supervisor: Prof. Dr. Serap Sahin

Title: An Analysis of Information Spreading and Privacy Issues on Social Networks

Abstract:

With Social Networks (SNs), being populated by a still increasing number of people, who take advantage of the communication and collaboration capabilities that they offer, density of the information spread over SNs is increasing steadily. Furthermore, the probability of exposure of someone's personal moments to a wider than expected crowd is also increasing. That is why, analyzing the spreading area and privacy level of any information through a SN is an important issue in social network analysis.

By studying the functionalities and characteristics that modern SNs offer, along with the people's habits and common behavior in them, it is easy to understand that several privacy risks may exist, for many of which people may be unaware of. We address this issue, focusing on interactions with posts, using Facebook as the research domain. As a novelty, we propose an application tool which visualizes the effect of privacy risks we detected in Facebook and provides users to control their privacy. The proposed (and simulated) tool allows a Post Owner to observe the spreading area of his/her post, depending on the selected privacy settings. Moreover, it provides preliminary feedback for all Facebook users that have interacted with this post, to make them aware of the possible privacy changes, aiming to give them a chance to protect the privacy of their interactions on this post.



Ehsan Etesami

University: Sharif University of Technology – Iran

Supervisor: Prof. A. Movaghar

Title: Modeling and Evaluation of Cloud Services Considering Live Virtual Machine Migration

Abstract:

The proliferation of cloud services and drastic growing of IaaS data centers, encourage providers to adopt more intelligent approaches to save more energy and as a result, save more money. Today's novel techniques such as virtualization and live virtual machine migration, provide effective solutions to service providers to fulfill this need. However, investigate the effect of different resource management and virtual machine migration approaches in virtualized data centers, require great efforts. Therefore, we proposed a model based on Colored Petri Nets to investigate the effect of live virtual machine migration in cloud data centers. Our proposed model is able to graphically model the process of admitting web server applications, allocate physical resources, and serving incoming requests for each web server, considering live virtual machine migration technique. The model is capable of modeling the process of detection over-utilized and under-utilized servers and start the process of migration. We provided the results of power consumption of each physical machine, drop probability of incoming requests and the percentage of the SLA violation by the service provider. Our results have been verified using the CloudSim simulator. These results confirm that our proposed TCPN model can appropriately model the system and evaluate its performance more efficiently than the CloudSim.



Safia Kalwar

University: Politecnico Milano – Italy

Supervisor: Prof. Danilo Ardagna

Title: Performance And Cost Evaluation Of Privacy Preservation
In Big Data Systems

Abstract:

The Big Data is an emerging area applied to manage datasets whose size is beyond the ability of commonly used software tools to capture, manage, and timely analyze that amount of data.

Big data is gaining more and more attention since the number of devices connected to the so-called “Internet of Things” (IoT) is still increasing to unforeseen levels, producing large amounts of data which needs to be transformed into valuable information. Additionally, it is very popular to buy on-demand additional computing power and storage from public cloud providers to perform intensive data-parallel processing. In this way, security and privacy issues can be potentially boosted by the volume, variety, and wide area deployment of the system infrastructure to support Big Data applications.

The flip side of that coin is that the architecture used to store big data also represents a shiny new target of big data privacy issues for criminal activity and malware. Each new disruptive technology brings new issues with it. In the case of Big Data, these issues are related not only to the volume or the variety of data, but also to data quality, data privacy, and data security.

The focus of my talk is to provide a way for privacy of the big data. To find out the possible privacy threats to the big data and providing the appropriate solution to secure the data. And also measure the capability of the particular system that how much it is consistent to deploy the recommended solution and how much it costs to implement a particular solution. The goal of this talk is to provide measure of impact on the performance and cost of the particular system due to multiple privacy protection mechanisms.