# CHAPTER 10

# COMPUTER SCIENCE

## Doctoral Theses

01. AGARWAL (Charu)
**Design of Digital Watermarking Schemes for Gray-Scale Images and Uncompressed Video Using Soft Computing Techniques.**
Supervisor : Dr. Arpita Sharma and Dr. Anurag Mishra
Th 22856

*Contents*

1. Introduction 2. Mathematical foundations 3. Gray-scale image watermarking using fuzzy inference system and firefly algorithm 4. Gray-scale image watermarking using ga-bpn hybrid architecture 5. Gray-scale watermarking using hybrid fuzzy-bpn architecture 6. A novel scene based robust video watermarking scheme in dwt domain using extreme learning machine 7. conclusions and future scope of the present research work.

02. BANSAL (Abhishek)
**Steganogrphic Techniques Inspired by Mathematical Chess Problems.**
Supervisor : Dr. Sunil kumar Muttoo
Th 23142

*Abstract*
*(Verified)*

The steganography refers to the embedding secret message into inconspicuous cover object e.g. image, video, audio, and map. The fundamental requirements of steganography are good visual quality, high embedding capacity, and undetectability. The mathematical chess problems are formulated using chessboard and chess pieces. These problems belong to recreational mathematics. However, it may utilize to find the optimum solutions to various problems like a travelling-salesman problem, network flow problem, congestion control problem, and cryptographic methods. The chessboard is a type of checkerboard having black and white cells that contain 64 cells and arranged an 8 × 8 matrix. It contains six different chess pieces: king, queen, rook, bishop, knight, and pawn. Each chess piece has its own unique way to move. Some famous mathematical chess problems are eight queen problem, knight tour, rook polynomial, dominant problem, kings graph, knight graph, rook graph, which have a connection to graph theory and combinatorics approach. Thus, the study of chessboard graphs, the solutions of certain chessboard problems and the counting of the total number of possible solutions is found useful for steganography. In this thesis, the research is focused on the idea to use n × n binary block of the cover as a chessboard and utilized various solutions of mathematical chess problems to implement steganographic techniques with an improvement of basic fundamental requirements. This thesis presents various steganographic techniques which embed the secret information inspired by mathematical chess problems. The eight queen solutions, knight tour, knight-queen chessboard problem, rook attacking problem helps to minimize the distortion in order to improve the basic requirements of steganography. This thesis also presents a steganographic technique to hide information in vector layer while extracting from raster layer. This method is very useful for sharing contextual intelligence in geographic context.

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1. Introduction 2. Steganography using eight queen solutions 3. Steganography techniques based on eight queen solutions to improve capacity 4. Data hiding using optimal placement of queen along closed Knight tour 5. Secure data hiding using randomly selected closed knight tour 6. steganographic technique inspired by rook 7. Data hiding in vector layer while extracting from raster layer 8. Conclusion and future work. Annexures. Bibliography.

03. BHATIA (Manjot Kaur)
**Techniques For Security in Grid Computing.**
Supervisor : Dr. Sunil kumar Muttoo and M.P.S. Bhatia
Th 22858

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1. Introduction 2. Literature review 3. Task scheduling in grid environment 4. User authentication in grid environment 5. Secure group communication in grid environment 6. Secure group messege transfer stegosystem. 7. An image steganography method using spread spectrum technique 8. Conclusions and future scope.

04. DATT (Aparna)
**Framework for Monitoring Cloud Compute Infrastructure.**
Supervisors : Dr. Anita Goel and Dr. S C Gupta
Th 23117

*Abstract*
*(Verified)*

Compute services in cloud are used to provide infrastructural resources to the consumers in form of virtual machines (VM). To create VMs of the desired configurations, CPU, storage and network resources are virtualized. Provisioning and management of VMs is responsibility of the compute provider. Complex infrastructure and processes exist at the backend to support VM provisioning and management. Infrastructure monitoring is required for measuring physical and logical resources associated with compute. Monitoring of compute infrastructure requires elicitation of specific parameters that need to be measured for infrastructure. Currently, monitoring of compute is carried out by third party monitoring tools, APIs in built in compute, and through middleware being used (if any). A clear description specifying parameters considered in these for monitoring of cloud compute infrastructure could not be found. In absence of specified set of parameters, ad-hoc mechanisms are used for identifying monitoring parameters and identified parameters may not be comprehensive. There is a need for specifying parameters for monitoring of compute infrastructure, to ease selection of parameters required for monitoring. NIST architecture defines a service orchestration component that performs the task of arranging, coordinating and managing compute resources for providing cloud services to the users. Although, the different layers for service orchestration are defined in NIST reference architecture; a generic detailed architecture compute is not defined.There is an absence of a generic detailed architecture of compute that defines the components, internal processes and their interactions at layers for service orchestration. In this thesis, we focus on “what to” monitor for infrastructure monitoring of compute component of cloud. We propose - (1) Monitoring checklist for compute infrastructure, and (2) Generic detailed architecture of Compute. We have developed a generic framework for monitoring of cloud compute infrastructure. We have also developed infrastructure monitoring frameworks for specific monitoring activities in cloud.

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1. Introduction: Framework for monitoring cloud compute infrastructure 2. Compute and infrastructure monitoring 3. Monitoring checklist for cloud compute

infrastructure 4. Generic detailed architecture of compute 5. Framework for monitoring cloud compute infrastructure 6. Frameworks for specific infrastructure monitoring activities 7. Conclusion and future work. Appendices. References.

05. PRAGYA (Jain)
**Framework for Infrastructure Monitoring of Object Storage in Cloud.**
Supervisor : Dr. Anita Goel and Dr. S C Gupta
Th 23118

*Abstract*
*(Verified)*

Object storage services in cloud provide reliable, available, scalable and cost effective solution to users for storage of data in cloud. Data storage and management of underlying resources is responsibility of cloud provider. A complex infrastructure and processes exists at backend to support data storage and their management. Monitoring of object storage cloud infrastructure is required to efficiently operate the system and to manage its increasing complexity. Infrastructure monitoring helps in determining attributes related to hardware and software resources in system and their associated processes to improve resource utilization and their management. Monitoring of object storage cloud infrastructure requires availability of what to monitor for it. Due to absence of what to monitor, there are issues involved during infrastructure monitoring of object storage cloud. To monitor object storage cloud infrastructure, third party monitoring tools are commonly adapted. The tools focus on monitoring of specific features and provide only a limited solution for monitoring in cloud. A description of what is being monitored in these tools for cloud infrastructure could not be found. There is absence of defined set of monitoring parameters for object storage cloud infrastructure, even academically. There is a need of identifying what needs to be monitored for object storage cloud infrastructure, to ease selection of parameters required for monitoring. In this thesis, we focus on what to monitor for object storage cloud infrastructure, for which we have proposed infrastructure monitoring checklist and generic detailed architecture of object storage cloud based on service orchestration component of NIST cloud computing reference architecture. We have developed generic framework for monitoring object storage cloud infrastructure. We have also developed infrastructure monitoring frameworks for specific activities of object storage cloud based on the proposed generic framework. The activities for which specific frameworks are developed are – capacity planning, capacity management, troubleshooting, performance management.

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