

Courses Taught in English

1 Evolutionary Computation

Course Topics

- Introduction to Evolutionary Computation and search methods
- Representations
- Genetic algorithms
- Selection, cross-checking and mutation techniques
- Evolutionary strategies and evolutionary programming
- Differential Evolutionary
- Multi-objective optimization

Bibliography

1. David Goldberg, The Design of Innovation (Genetic Algorithms and Evolutionary Computation), Springer, 2002.
2. Yu, Xinjie, Gen, Mitsuo, Introduction to Evolutionary Algorithms, Springer, 2010.
3. Franz Rothlauf, Representations for Genetic and Evolutionary Algorithms, Springer, 2006.

2 Performance Evaluation

Course Topics

- Foundations of Probability and Statistics: sample space, events, combinatorial analysis, conditional probability, event independence, Bayes Law, aleatory variable, discrete and continuous aleatory variables, probability density function, cumulative distribution function
- Simulation and experiments: introduction, generation of aleatory variables, queue simulation algorithms, calculation of measurements of interest, average and sample variance, confidence interval.
- Markov chains
- Queuing theory

- Further topics: statistical inference, long tail, power laws, correlation

Bibliography

1. Trivedi, K. S., Probability & Statistics with Reliability, Queuing and Computer Science Applications, 2001.
2. Harchol-Balter, M., Performance Modeling and Design of Computer Systems: Queueing Theory in Action, 2013.
3. Montgomery, R., Applied Statistics and Probability for Engineers, 2006.
4. Le Boudec, J.-Y., Performance Evaluation of Computer and Communication Systems, 2010.
5. Ross, S. M., Simulation, 2006.
6. Ross, S. M., Introduction to Probability Models, 2007.

3 Distributed Systems

Course Topics

- Distributed systems models and architecture
- Middleware and interaction paradigms (client-server, publish-subscribe, group communication, message queues, tuple spaces, shared memory, streaming)
- Basic principles: clock synchronization, global states, coordination, consensus, concurrency control
- Failure tolerance, replication and distributed transactions
- Non-functional properties of distributed systems
- Ubiquitous computing
- Utility computing
- Big data: storage and processing; Big memory; real time processing for BIG computing
- Scalability: processing large numbers of simultaneous requests; large scale distributed systems

Bibliography

1. George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair. Distributed Systems: Concepts and Design. Fifth Edition, Addison Wesley, 2011
2. Andrew S. Tanenbaum, Maarten van Steen. Distributed systems: principles and paradigms. 2nd Edition, Pearson Prentice Hall, 2007
3. Selected readings

4 Digital Image Processing

Course Topics

- Foundations of digital imaging
- Image transformations in the spatial domain
- Image transformations in the frequency domain
- Image restoration
- Color processing
- Wavelets and multi-resolution processing
- Image compression
- Mathematical morphology
- Segmentation
- Image representation and description
- Object recognition

Bibliography

1. Gonzalez, R.C. & Woods, R.E. - Digital Image Processing, 3rd Ed. Prentice Hall, USA, 2008.
2. Pratt, W. K. - Digital Image Processing, 4th ed. USA, Wiley Interscience Pub., 2007.

5 Graph Theory and Applications

Course Topics

- Introduction
- Trees and distances
- Pairing
- Connectivity
- Network flows
- Graph coloring
- Planar graphs
- Selected topics: perfect graphs, intersection graphs, dominant sets, independent vertex sets

Bibliography

Reinhard Diestel - Graph Theory. Springer 1997.

Douglas West - Introduction to Graph Theory. Prentice-Hall, 2001.

J. A. Bondy and U. S. R. Murty - Graph Theory with Applications. North-Holland, 1976.