

One Week
"Faculty Development Program"
on
Emerging Trends in Computational Intelligence
(June 18-22, 2018)

Sponsored by
Dr. APJ Abdul Kalam Technical University, Lucknow



Babu Banarasi Das
Northern India Institute of Technology
Lucknow

Report on One Week “Faculty Development Program” on Emerging Trends in Computational Intelligence

(Under TEQIP, Phase-III)

Babu Banarasi Das Northern India Institute of Technology, Lucknow
(June 18 – 22, 2018)

A one week Faculty Development Program (FDP) on “Emerging Trends in Computational Intelligence” COIN-2018 under TEQIP, Phase-III was held at Babu Banarasi Das Northern India Institute of Technology, Lucknow under the sponsorship of Dr. APJ Abdul Kalam Technical University Lucknow from 18th June to 22nd June, 2018. The FDP aims to provide opportunities to faculty members to enrich their teaching skills and research in the field of computational intelligence. The FDP was attended by 60 participants of different engineering departments of various colleges.

The programme intended to develop the knowledge of participants for simulation with advanced software in the relevant field for inculcating learning values in students and guiding and monitoring their progress. Computational intelligence is well established paradigm that deals with theory, design, applications and development of biologically and linguistically motivated computational models.

INAUGURAL SESSION – June 18, 2018, 10:00am

The event began with the inaugural speech of Dr. A. K. Mittal, Hon'ble Vice Chancellor, BBD University, Lucknow focusing on the importance of enhancing knowledge of the faculty members to inculcate learning values in students. Thereafter, the Chief Convener of this FDP Dr. V. K. Singh, Director (Engg.) BBDNIIT welcomed the dignitaries and faculty members from across the country present at the event.



The following esteemed personalities were present on the inauguration of the program:

- Prof. (Dr.) A.K. Mittal, Hon'ble Vice Chancellor, BBD University, Lucknow
- Dr. J.C. Bansal, South Asian University, New Delhi
- Prof. (Dr.) Shailendra K. Saraf, Director (Pharmacy)-BBDNIIT, Lucknow

- Mr. Pradeep K. Saxena, Director(Finance)-BBD University, Lucknow
- Mr. Ajay Sharma, Director(Purchase)-BBD University, Lucknow
- Prof.(Dr.) S. Ahmad Ali, Dean Applied Science, BBD University, Lucknow
- Prof.(Dr.) Monica Mehrotra, Director, BBDEC, Lucknow
- Prof. Rajiv Gupta, Dean-Pharmacy, BBD University, Lucknow
- Prof.(Dr.) Reena Srivastava, Dean Comp. Appl., BBD University, Lucknow
- Prof. Mohit Kr. Agarwal, Dean Architecture, BBD University, Lucknow
- Prof.(Dr.) Sushil Pande, Dean Management, BBD University, Lucknow
- Prof. S.K. Maurya, COAE, BBD University, Lucknow
- Prof.(Dr.) Nitin Jain, Head Corporate Rel., BBD Group, Lucknow
- Prof.(Dr.) Vijay Prakash, Dy. Registrar (Conf.), BBD Group, Lucknow

TECHNICAL SESSIONS DAY 1-JUNE 18, 2018

Session I-Speaker-1: Dr. J. C. Bansal, Ph. D. -IIT Roorkee

South Asian University, New Delhi (A University Established by the South Asian Association for Regional Cooperation (SAARC)-Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka) New Delhi, India (Editor-In-Chief, International Journal of Swarm Intelligence, Inderscience Publications)



The first session began with a lecture by Dr. J. C. Bansal, Assistant Professor, South Asian University, New Delhi on Swarm Intelligence for optimization. In this session participants learned about the basics of computational intelligence, the framework of agents, evolutionary computation, artificial immune systems and the various computational intelligence techniques.

The evolutionary algorithms implement mechanisms inspired by biological evolutions such as reproduction mutation, recombination, natural selection and survival of the fittest. Dr. Bansal explained the importance of swarm intelligence by using spider monkey optimization technique. This technique is based on fission fusion social structure of spider monkeys of South America.

Session II-Speaker 2: Mr. S. N. Sahoo

B.Tech.-BITS Pilani / Scientist-SF, ISRO Telemetry Tracking and Command Network, Lucknow



Mr. S. N. Sahoo, Scientist/ Engineer- SF, ISRO talked about the Intelligence Space System Operations (MoM) and Satellite based positioning, Navigation and Timing IRNSS & GAGAN. He discussed the importance of computational intelligence in space system operations specifically the Mars mission. He showed eye catchy videos on the ROOMBA Robot- an automated multi room navigation vacuum cleaner robot and the various phases in the launching of satellite to Mars.

He gave a comparative study on how the computational intelligence could be used at various fields like robotics, docking of space crafts, data analytics, asteroid mining and remote mission to mars (MoM). He gave an insight on the automated, autonomous and intelligent autonomous systems in order to find more creative solution to ambiguous problems.

TECHNICAL SESSIONS DAY 2-JUNE 19, 2018

Session I-Speaker-3 : Dr. Ajeet Kumar, Ph. D. IIT Kharagpur

Delivery Manager-Rail Transportation System Assurance Expert L&T Technology Services, Bangalore



The second day Dr. Ajeet Kumar, Delivery Manager, RAIL transportation, system assurance expert, L&T Technology services, Bangalore gave the practical knowledge on application of software reliability Assurance models using Fuzzy Logic approach. He discussed about the systematic and random failures.

Dr. Kumar gave an insight on smart cities for optimizing energy, minimizing waste for more environmental friendly surroundings. He told the importance of reliable, safe and secure software systems for use in various industrial applications. He inspired the participants to improve the teaching system so that it could be more helpful for the industry.

Session II - Speaker 4: Dr. Y. N. Singh, Ph.D.- IIT BHU, M.Tech-IIT Kanpur

Department of CSE, Institute of Engineering and Technology, Lucknow



The post lunch session was addressed by Dr. Y.N Singh, Professor, Department of CSE at Institute of Engineering Technology, Lucknow. He explained the importance of pattern recognition, machine learning methods and its applications such as safety and security from fraudulent attacks. Biometric technology is an automated use of physiological or behavioural characteristics present in human beings to determine or verify the identity of individuals. Biometric authentication systems are being used with a trust to support identification experts in the digital society. The security of a system can be threatened by presenting a non-live or fake biometric sample for authentication.

Thus, he discussed different techniques which have been proposed in the past to address the problem of vitality detection from biometrics. The physiological biometric characteristics include face, fingerprints, iris and hand geometry, while the behavioral characteristics include signature, handwriting, voice, speech, gait etc. He explored the feasibility of the physiological signals to use as biometrics whose accuracy is calculated to be 99%. In particular, he focused on the Electrocardiogram (ECG) as such its potential to use as a candidate of biometrics especially vitality-enabled biometrics. He explained his work on vitality enabled novel identity recognition system using the ECG signal. This can easily visualize the subject dependent features in the ECG signal collected in different sessions.

TECHNICAL SESSIONS DAY 3-JUNE 20, 2018

Session I-Speaker-5 : Dr. Manoj Tripathi, Post Doctorate-University of Western Ontario, Canada, Ph.D.-IIT, Roorkee

Associate Professor, Department of Electrical Engineering, IIT, Roorkee



The third day began with the introduction on Artificial Neural Network (ANN) and its application for power transformer differential protection given by Dr. Manoj Tripathi, Associate Professor, Department of Electrical Engineering, IIT Roorkee.

The lecture introduced modeling of ANN, properties of ANN, its training, and factor affecting the performance analysis of ANN. It covered Hidden Markov Model (HMM), multilayer perceptrons, Radial basis functions neural network, probabilistic neural network, radial basis probabilistic neural network, Elmen neural network and Neuro-fuzzy technique.

From a signal processing perspective, it is imperative to develop a proper understanding of basic neural network structures and how they impact signal processing algorithms and applications. He focused on the application of artificial neural networks to pattern classification.

Session II-Speaker-6 : Dr. Kirti Seth

School of Computer & Information Engineering INHA University, Tashkent, Uzbekistan



Thereafter, the lectures were continued by Dr. Kirti Seth, Associate Professor in School of Computer and information engineering, INHA University, Tashkent, Uzbekistan. She discussed various nature inspired optimization techniques such as ant colony optimization, particle swarm optimization etc. Through examples, she explained a solution to the Knapsack problem using genetic algorithm.

The genetic algorithms have wide range of applications ranging from DNA Analysis, machine learning, game playing and robotics. She gave a basic structure of genetic algorithm for selecting the best possible solution to a problem.

TECHNICAL SESSIONS DAY 4-JUNE 21, 2018

Session I - Speaker-7 : Dr. Shiv Prakash, Ph. D. from JNU, Delhi,
POST Doc-IIT Delhi

Centre for Advanced Studies, Dr. A. P. J. Abdul Kalam Technical University, Lucknow



The fourth day began with the lecture of Dr. Shiv Prakash, Centre for advanced studies, AKTU, Lucknow. He discussed on science and engineering applications using soft computing. The participants got valuable information on Internet of Things (IoT) and Internet of connected vehicles (IoV) centric research.

He further discussed how soft computing could be used for various science & engineering applications and to encounter the technical challenges such as security, sensor constraints, localization dependency on GPS. He explained the fault tolerance embedding using virtualization oriented security in IoT and edge computing enabled light weight security for IoT.

Session II - Speaker-8 : Dr. Pawan Tiwari, Ph. D. from JNU, Delhi

Department of Computer Science & Engineering, IET, Lucknow



The sessions were then continued by Dr. Pawan Tiwari, Department of CSE, IET, Lucknow. He explained rigid boundary based distributed Genetic Algorithm (RBDGA). RBDGA is a variant of Genetic Algorithm (GA) that works well for Euclidean TSP. GA is currently being used to obtain the

near-optimal solution of those NP-class problem for which very little information is available but as problem size increases, solution provided by GA may not be as good as offered by other existing evolutionary algorithm.

Thus, he discussed his work which introduces how GA can be improved and applied to Euclidean TSP Problem. Proposed algorithm by him showed its efficacy in terms of accuracy over recently published HEFLS and many other variants of PSO.

TECHNICAL SESSIONS DAY 5-JUNE 22, 2018

Session I-Speaker-9 : Dr. G. N. Pillai, Ph.D.-IIT Kanpur/
Post Doc- Ulster University, UK
Professor in Department of Electrical Engineering, IIT Roorkee



The fifth day was addressed by Dr. G. N. Pillai, Professor in Department of Electrical Engineering, IIT Roorkee. His talk was based on Neuro-Fuzzy Inference Systems which are widely used in function approximation problems, like system modeling, because of the universal approximation capability. Neuro-Fuzzy Inference Systems combine the advantages of learning capability of neural networks and knowledge representation of fuzzy systems.

He started the session by explaining the Artificial Neural Network (ANN) and Extreme Learning Machines (ELM) which is based on learning without iterative tuning. He further discussed the basics of fuzzy logic which includes fuzzy sets and fuzzy relationship through different methods. He then combined both the algorithms and focused on neuro-fuzzy systems, adaptive neuro-fuzzy inference systems (ANFIS) and Elementary Learning ANFIS (ELANFIS) which is used for better results and accuracy.

Session II -Speaker-10 : Dr. Pramod Kumar Singh, Ph.D.-IIT Kharagpur
Associate Professor at Atal Bihari Vajpayee - Indian Institute of Information Technology &
Management Gwalior



The sessions were then continued by Dr. Pramod Kumar Singh, Associate Professor at Atal Bihari Vajpayee Indian Institute of Information Technology and Management, Gwalior, MP. He gave a comprehensive overview of swarm and evolutionary algorithms and multiobjective optimization. He started the session by giving a brief overview of nature inspired computing methods for search and optimization of different problems.

He focused on Genetic Algorithm (GA) which comes under evolutionary algorithm and artificial bee colony (ABC) algorithm which is a swarm algorithm. He also explained about clustering and how clustering is achieved in GA and ABC algorithms. These two methods were discussed for single objective optimization and thereafter he discussed the algorithms for multiobjective optimization.

VALEDICTORY SESSION- June 22, 2018 at 4:30pm



The session started with concluding remarks on FDP and thanking eminent speakers since day of the FDP. The honorable personalities present in this occasion were Dr. G. N. Pillai, Professor in Department of Electrical Engineering, IIT Roorkee, Dr. Pramod kumar singh, Associate Professor, IIITM, Gwalior, Prof.(Dr.) V.K Singh, Director(Engg.), BBDNIIT, .



Continuing the session, some of the most informative and learning algorithms for search and optimization, which specially caught the eye of audience, were briefed. Thereafter, mementos and certificates were distributed to the participants.

The program was ended with vote of thanks by Prof. Sanjay Sharma, Associate Professor and Convener, COIN-2018.

LEARNING OUTCOMES FROM FDP

The sessions of the five day faculty development programme were highly informative as the resource persons from across the country discussed the recent trends in computational intelligence and their applications in real world. The discussed algorithms and different techniques for optimization were of great benefit to the participants in their research. Participants were enlightened with the most widely used advance technologies in this domain.

