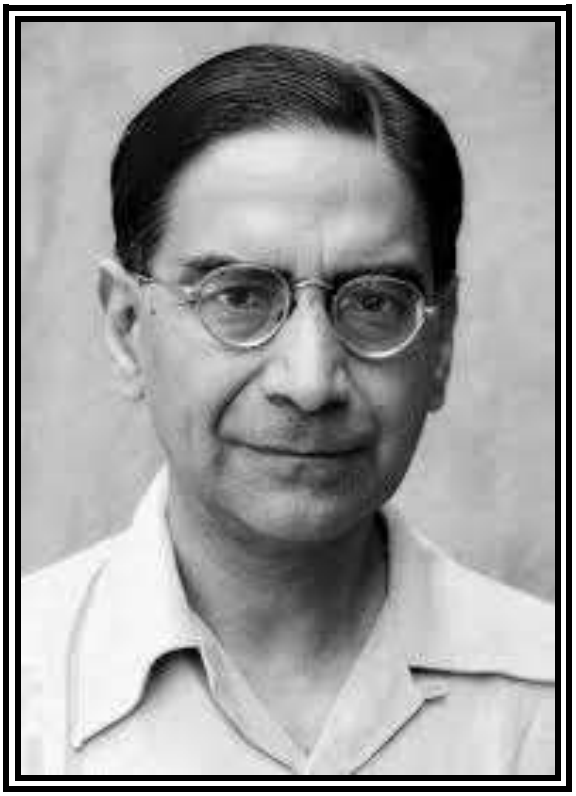
PReMI'17

7th INTERNATIONAL CONFERENCE ON
PATTERN RECOGNITION AND MACHINE INTELLIGENCE
December 5-8, 2017

Programme Brochure



Celebrating 123rd Birth Anniversary of Professor P. C. Mahalanobis

Organized by:

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PReMI: Aims and Achievements

The primary goal of the conference is to present state-of-the-art scientific results, encourage academic and industrial interaction, and promote collaborative research and developmental activities in Pattern Recognition, Machine Intelligence and related fields, involving scientists, engineers, professionals, researchers and students from India and abroad. The conference is held every two years making it an ideal platform for researchers to share their views and experiences in the said areas. PReMI'05 was the first in this series that was held in Indian Statistical Institute (ISI), Kolkata with participants from Japan, Australia, USA, Canada, China, Germany, Poland, Italy, Israel and Turkey. The successive editions were held in ISI, Kolkata, India (2007); IIT, Delhi, India (2009); Higher School of Economics (HSE), Moscow, Russia (2011); ISI, Kolkata, India (2013); and Warsaw University of Technology, Warsaw, Poland (2015).

This time PReMI is back to Kolkata. Particular emphasis of PReMI'17 is placed on data mining, soft computing, bioinformatics, biometrics, video and image analysis, big data analytics, as well as various upcoming pattern recognition/image processing problems. There is a pre-conference tutorial, keynote talks and invited talks, delivered by speakers of international repute from both academia and industry.

Machine Intelligence Unit (MIU): Research Activities

The objective of the Machine Intelligence Unit (MIU) is to carry out basic research concerning certain aspects of machine intelligence and soft computing. This signifies the work associated with attempting to make a machine behave like a human being. In other words, it integrates the core concept of pattern recognition and machine learning with advanced technologies like fuzzy logic, artificial neural networks, evolutionary computation, particle swarm optimization, and rough sets, collectively called the soft computing paradigm. They provide techniques for flexible information processing, to deal with real life ambiguous situations in an efficient manner using ideas from cognitive sciences and theories of perception thus forming the basis of future generation computing systems. The investigation that is currently being done in MIU comprises both developing these technologies individually and in an integrated manner, and demonstrating their effectiveness in solving various problems of pattern recognition, machine learning, image and video processing, biometrics, data mining, bioinformatics, etc. related to the design of intelligent systems.

Indian Statistical Institute (ISI): Tradition and objectives

Founded by the late Prof. P. C. Mahalanobis in December 1931, the Indian Statistical Institute (ISI) has all along been playing a pioneering role in theoretical and applied research, promoting teaching and training in the fields of Statistics, Mathematics, Computer & Communication Science, Quantitative Economics, Statistical Quality, Reliability & Operations Research, Physics and Earth Sciences and other related disciplines that include Human Genetics, Agriculture and Ecology, Biological Anthropology, Population Studies, Sociology, Linguistics and Psychology. It has made significant contributions to social and economic planning of the Government of India, research and development in theoretical and applied Computer Science and in disseminating scientific quality control and quantitative management techniques for the industry. By a special act of Parliament, the institute was declared an Institution of National Importance as early as in 1959. The active leadership of ISI scientists in areas of digital computing, signal processing and pattern recognition is a major force in the development of Computer and Communication Sciences in India. The Institute offers graduate level courses in Computer Science that includes specialized areas like Pattern Recognition, Image Processing, Computer Vision, Data mining, Remote Sensing, Bioinformatics, Computational Biology, Soft Computing and Artificial Intelligence, among others.

ISI Kolkata Centre

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Venue of the Conference

The Kolkata campus of the Indian Statistical Institute is located in a sprawling 30-acre estate on the Barrackpore Trunk Road (B T Road) in the Baranagore suburb of Greater Kolkata at its extreme north. It consists of two approximately equal parts – the office complex (conference venue) and the residential complex (comprising the Guest House and Hostels), separated by a public road. This road (Girish Chandra Ghosh Street) connects B T Road with Gopal Lal Tagore Road. The last mentioned road runs along the western boundary of the main campus. The office complex bears gate numbers 202, 203 and 204, and the residential complex 205 and 206. There is a subway connecting the two parts of the campus – residential and office complexes to easily move between these two complexes.

The principal buildings in the office complex are the R A Fisher Bhavan (RAFB), the Pamela Robinson Bhavan (PRB), the A N Kolmogorov Bhavan (ANKB), the Platinum Jubilee Academic Bhavan (PJAB), the Satyendra Nath Bose Bhavan (SNBB), the C D Desmukh Bhavan, the P N Haksar Bhavan (PNHB), the Rani Kuthi (Canteen) and the Amrapali (P C Mahalanobis Museum). The residential campus at 205, and 206, B. T. Road premises includes, apart from several staff quarters, the Guest House, the Medical Welfare Unit, the Boys' Hostel, the M. Tech Hostel, the Research Scholars' and ISEC Hostel, and the Ladies Hostel.

Registration Desk:
Platinum Jubilee Academic Building, Ground Floor

Inauguration, Keynote Talk and Valedictory Session:
PJAB Auditorium: Platinum Jubilee Academic Building (PJAB 1st Floor)

Tutorial:
NAB-I Seminar Hall: A N Kolmogorov Bhavan (ANKB Ground Floor)

Invited Talks and Conference Sessions:
NAB-I Seminar Hall: A N Kolmogorov Bhavan (ANKB Ground Floor)
NAB-II Seminar Hall: A N Kolmogorov Bhavan (ANKB Ground Floor)
PJAB Auditorium: Platinum Jubilee Academic Building (PJAB 1st Floor)

Conference Lunch:
ISI Guest House, 205, B. T. Road, Kolkata – 108

Internet and Email facility:
WiFi Facilities will be available throughout the conference venue.

Accommodation:
ISI Guest House and NSSO Guest House

Paper Presentation Details

Audio-visual equipment available includes PC/Laptop (with USB port, CD-ROM) equipped with Windows O/S MS PowerPoint, PDF Viewer and LCD and Overhead Projector.

Instructions for Speakers:

Time allotted for each **keynote** talk is 60 minutes, including questions.
Time allotted for each **invited** talk is 30-60 minutes including questions.
Time allotted for each **contributed** talk is 15 minutes, including questions.

Instructions for Chairpersons:

- Please request the speakers to finish their presentation 3 minutes before the allotted time.
- Please note that there is no specific time slot for pre and post session moderation. Please apply your judgment to adjust/monitor this so that overall time limit for the session could be maintained.
- Representative of the organizing committee will try to inform you about any change of schedule/non-availability of speakers for any particular session.
- Please note that the paper presented in sessions has to be marked with a score ranging from 0 to 10 (with 0 as poor and 10 as best). These score are necessary for selecting the papers for special issue.

In case of any difficulty, the chairperson should communicate with the volunteers present in the room. The chairperson may seek assistance of the registration desk for contacting organizing committee members.

Overview

The 7th International Conference on Pattern Recognition and Machine Intelligence **(PReMI'17)** is organized at the **Indian Statistical Institute (ISI),** Kolkata, India, during ***December 5-8, 2017*** by its ***Machine Intelligence Unit (MIU)***. The objective of the conference is to introduce to the community the most recent advancements in research in the domain of ***Pattern Recognition and Machine Intelligence***. The goal is to encourage academic and industrial collaborations in all fields related to machine intelligence involving scientists, engineers, professionals, researchers, and students from India and abroad. PReMI, which is held biennially, provides an ideal platform for researchers all over the world to come and share their views and experiences. The seventh edition in the series, is being held in this year marking the 125^{th} birth anniversary of ***late Prof. Prasanta Chandra Mahalanobis.***

Professor Mahalanobis is the founder of the Indian Statistical Institute and the father of modern statistics in India and has presented **Mahalanobis D^2** distance to machine learning fraternity. As researchers in pattern recognition and machine learning we are immensely indebted to him. He was instrumental in inspiring the design of the first analog computer in India in 1953. He brought to ISI, the first digital computer of India in the year 1955. As a mark of our respect to this monumental personality, we are organizing a Special Session on ***"Celebration of 125^{th} Birth Anniversary of Professor P.C. Mahalanobis"*** at PReMI'17.

PReMI'17 comprises a keynote lecture and several invited lectures delivered by eminent and distinguished researchers from academia and industry around the world. Both the invited and technical sessions feature interesting lectures in classic and contemporary aspects of machine intelligence. The topics range from deep learning and Internet of Things (IoT) to computer vision and big data analytics. There are two exclusive special sessions on "Deep Learning" and "Spatial Data Science and Engineering". Like previous editions, PReMI'17 has a very good response in terms of paper submissions. All together there were 293 submissions from about 15 countries spanning three continents. All the papers were first scanned for **plagiarism using iThenticate *(Plagiarism Detection Software)*** before sending for review. Each paper was critically reviewed by experts in the field, after which 85 papers (29% acceptance rate) were accepted for inclusion in the conference for presentation. All these papers will be presented in ***fourteen sessions*** over four days, which includes three special sessions.

We wish to express our appreciation to the Program Committee and Technical Review Committee members, who have worked hard to ensure the quality of the contributions of this conference. The extended versions of some of the presented papers will be considered for publication in the reputed journals like Fundamenta Informaticae and Applied Soft Computing.

We would like to take this opportunity to thank Professors Vineet Bafna, Andrzej Skowron, Farzin Deravi, Upinder S. Bhalla, Uday B. Desai, Soumen Chakraborti, Ambarish Ghosh, Partha Pratim Majumder, Probal Chaudhuri, Subhasis Chaudhuri, and Shalabh Bhatnagar for accepting our invitation to deliver the keynote, the special evening lecture and the invited lectures during the conference. We would like to express our sincere thanks to the speakers from the industry, Prateek Kapadia (Flytxt, India) and Kaushik Dey (Ericsson, India) for agreeing to present their work. They have been doing the forefront research and development in machine learning and encouraging students to do quality work and supporting PReMI'17 through sponsoring. We gratefully acknowledge Springer for sponsoring the best paper awards in two categories (students and young scientists) as well as for providing fellowships to the students. We are thankful to Alfred Hofmann of Springer for his co-operation in publishing the *PReMI'17 proceedings* in the prestigious *LNCS series*, as was done for the previous editions. We would like to thank all the organizations who either endorsed or sponsored this conference technically or financially. We are grateful to *EasyChair* for providing us with a wonderful platform for conducting the entire process of paper review. Last but not the least; we take this opportunity to thank all the contributors for their enthusiastic response, without which no conference can ever be successful.

While preparing for the conference we lost our beloved mentor Professor Lotfi A. Zadeh, the founder of fuzzy mathematics, an imperative part of contemporary machine learning. He was on the advisory board of PReMI ever since its inception in 2005, including the present edition. Our institute honoured him with a doctor honoris causa in 2006 during its annual convocation. We express our deep condolences to his family and all his friends and colleagues. It is a great loss to the pattern recognition, and soft computing & computational intelligence community. A special session is organized on Fuzzy sets dedicated to his memory.

Our best wishes to all the participants of PReMI'17 conference. The participants can take the *total-benefit* of the interaction with other

researchers and scientists to gain knowledge and find new avenues for research. In this regard a pre-conference tutorial is specially designed to have a set of lectures on Rough Sets and Knowledge Discovery to enrich machine intelligence research.

Enjoy your stay in Kolkata and visit at Indian Statistical Institute !!!

B. Uma Shankar
Program Chair PReMI'17

Pre-Conference Tutorial

Venue: NAB-I at A N Kolmogorov Bhavan

04 December 2017

10:30-12:00	Speaker: Pabitra Mitra *Chair:* Sanjoy K. Saha Title: Rough Sets and Applications
12:00-12:30	TEA BREAK
12:30-14:00	Speaker: Debashis Sen *Chair:* Pabitra Mitra Title: Rough Sets in Image Processing
14:00-15:00	LUNCH BREAK
15:00-17:00	Speaker: Andrzej Skowron *Chair*: Mihir K. Chakraborty Title: Rough Sets for Knowledge Discovery
19:00 Onwards	*Welcome Dinner*

Abstract of Invited talks for PReMI'17

Title: Interactive Granular Computing in Data Science

Speaker: Andrzej Skowron

We discuss Interactive Granular Computing (IGrC) as the basis of a Data Science computing model. IGrC binds together and brings a synchronous cooperation among the following four basic concepts of Artificial Intelligence: language, reasoning, perception, and action. This, together with information granulation, helps agents to deal with many complex tasks of perceiving or transforming compound abstract and physical objects (e.g., in the context of complex spatio-temporal space). One should consider that in Data Science agents collecting data have control over the data acquisition, i.e., they are deciding say which data, using which sources, at what time, and why should be collected.

Basic objects in IGrC are complex granules (c-granules or granules, for short). They are grounded in the physical reality and are, in particular, responsible for generation of the networks of information systems (data tables) through interactions with the configurations of physical objects. Development of a particular network of information systems is guided by the need to learn the relevant computational building blocks that are necessary for perception, using the formulation by Leslie Valiant. Among these blocks, often learned hierarchically, one can distinguish patterns, clusters or classifiers. The computational building blocks are used, e.g., by agents for approximation of conditions responsible for initiating actions or plans. Agents performing computations based on interaction with the physical environment learn new c-granules, in particular, in the form of interaction rules, representing knowledge not known a priori by agents. These new c-granules are used not only for construction of compound abstract objects but also of compound physical objects, e.g., sensors composed out of more primitive sensors. Learning of interaction rules also supports the control of agents, in particular the self-organized distributed control. Numerous tasks of agents may be classified as control tasks performed by agents aiming at achieving the high quality computational trajectories of configurations of c-granules relative to the considered quality measures over the trajectories.

Reasoning supporting agents in searching for solutions of their tasks is based on adaptive judgment, an important component of IGrC. Methods based on adaptive judgment allow agents to construct from given configurations of their c-granules new ones. These new configurations of c-granules should be constructed taking into account the needs of agents realized through interactions with the environment. Here, new challenges are

related to developing strategies for predicting and controlling behaviors of agents. We propose to investigate these challenges using the IGrC framework with adaptive judgment used for controlling of computations performed on c-granules. For example, adaptive judgment is used in adaptive learning of rough set based approximations of complex vague concepts evolving with time. It is also used in the risk management of granular computations, carried out by agents, toward achieving the agent needs.

Title: Identifying the favored allele in a selective sweep

Speaker: Vineet Bafna

Selection is a dominant force in evolution. Mutations arising at random might favor individuals in a specific environmental niche, and populations adapt by rapidly increasing the frequency of individuals carrying the favored mutations. The selection process results in distinct patterns (a signature) of allele frequencies and haplotype structures that can be exploited to identify the genes responding to selection pressure. A study of selection signals in humans has led to molecular insight into the evolution of many natural traits such as skin and eye color, as also adaptation to extreme environments.

Computational methods that scan population genomics data to identify signatures of selective sweep have been actively developed, but mostly do not identify the specific mutation favored by the selective sweep. In this talk, we describe an approach that uses population genetics and machine learning techniques to pin-point the favored mutation, even when the signature of selection extends to 5Mbp. Our method, iSAFE, was tested extensively on simulated data and 22 known sweeps in human populations using the 1000 genome project data with some evidence for the favored mutation. iSAFE ranked the candidate mutation among the top 15 (out of ~21,000 candidates) in 14 of the 22 loci, and identified previously unreported mutations as favored the 5 regions.

Title: An Incremental Fast Policy Search using a Single Sample Path

Speaker: Shalabh Bhatnagar

We consider a modified version of the control problem in a reinforcement learning setting with large state and action spaces. The control problem most commonly addressed in the contemporary literature is to find an optimal policy

which optimizes the long run gamma-discounted transition costs, where gamma lies in [0, 1). They also assume access to a generative model/simulator of the underlying MDP with the hidden premise that realization of the system dynamics of the MDP for arbitrary policies in the form of sample paths can be obtained with ease from the model. We consider a generalized version, where the cost function is the expectation of a non-convex function of the value function without access to the generative model. Rather, we assume that a single sample path generated using a priori chosen behaviour policy is made available. In this information restricted setting, we solve the generalized control problem by developing an incremental version of cross entropy method. The proposed algorithm is shown to converge to the solution which is globally optimal relative to the chosen behaviour policy. We also present a few experimental results to corroborate our claims.

Title: Biometric Counter-spoofing for Mobile Devices using Gaze Information

Speaker: Farzin Deravi

With the rise in the use of biometric authentication on mobile devices, it is important to address the security vulnerability of spoofing attacks where an attacker using an artefact representing the biometric features of a genuine user attempts to subvert the system. In this paper, techniques for presentation attack detection are presented using gaze information with a focus on their applicability for use on mobile devices. Novel features that rely on directing the gaze of the user and establishing its behaviour are explored for detecting spoofing attempts. The attack scenarios considered in this work include the use of projected photos, 2D and 3D masks. The proposed features and the systems based on them were extensively evaluated using data captured from volunteers performing genuine and spoofing attempts. The results of the evaluations indicate that gaze-based features have the potential for discriminating between genuine attempts and imposter attacks on mobile devices.

Title: Sequence Recognition as a Subcellular Computational Primitive in Neural Function

Speaker: Upinder S. Bhalla

Many sensory, motor, and cognitive processes involve sequences with complex hierarchical structures. In computational neuroscience these have

typically been modeled as arising from network computation. We have analyzed how such computations may arise instead from subcellular reaction-diffusion processes on small (~30 micron) segments of neuronal dendrites. This formulation vastly increases the potential computational capacity of neuronal networks. We consider some possible mappings of subcellular sequence computation to the structure of deep learning networks. This is interesting because it provides for very compact and efficient biological implementations of LSTM-like networks. We speculate that there may be a parallel between some of the computational principles of engineered networks and the hippocampal-entorhinal cortex loop.

Title: Attention Models for Entity Resolution and Search

Speaker: Soumen Chakrabarti

We discuss two problems: linking entity mentions in a text corpus to corresponding nodes in a knowledge graph (KG), and using this KG-corpus combination for better entity search. Coherence models for entity linking encourage all mentions in a document to resolve to entities that are related in the KB. We enhance coherence with attention, where the evidence for each candidate is based on a small set of strong supporting relations, rather than relations to all other entities in the document. The rationale is that document-wide support may simply not exist for non-salient entities, or entities not densely connected in the KB. Our system outperforms state-of-the-art systems on the CoNLL 2003, TAC KBP 2010, 2011 and 2012 tasks. Traditionally, question answering (QA) has focused on either side of the structure spectrum, using either a corpus or a KG. Corpus-only QA loses the benefit of structured KG knowledge, whereas KG-only QA ``drops off the structure cliff'' when KG coverage fails, or the query cannot be semantically parsed into a structured form. Only recently have corpus and KG combined forces to improve entity search. A major challenge is robust query interpretation, in the face of queries that range between syntax-rich, well-formed questions (In which band was Jimmy Page before Led Zeppelin?) and syntax-poor ``telegraphic'' Web queries (jimmy page band before led zeppelin). We present a system that analyzes the query using multiple convolutional networks, locates plausible candidate entities in the KG, generates a multitude of features from the convolution outputs and KG entity neighborhood, and directly ranks candidate entities rather than choose structured KG queries. Our system gets the best accuracy for both syntax-poor and syntax-rich queries. On four public query workloads amounting to over 8,000 queries in different query formats, we see 8--30% absolute improvement in mean average precision (MAP), compared to recent systems.

PReMI'17 Conference Programme

05 December 2017 (Tuesday)

9:30 – 10:15	CONFERENCE REGISTRATION (PJA Building) GROUND FLOOR
10:15–10:30	**INAUGURATION** Venue: Platinum Jubilee Building Auditorium (PJAB)
10:30–11:30	Keynote Talk Venue: PJAB Auditorium Speaker: Vineet Bafna *Chair:* Rajat K. De Title: Identifying the Favoured Allele in a Selective Sweep
11:30–12:00	HIGH TEA
12:00–13:15	 Special Technical Session on Fuzzy Sets *dedicated to late Professor Lotfi A. Zadeh* *Chair:* B. B. Bhattacharya Venue: PJAB Auditorium
13:15–13:45	Industry Session (Presentation by Ericsson) Venue: PJAB Auditorium Speaker: Kaushik Dey *Chair:* C. A. Murthy Title: On industrial applications of deep learning and reinforcement learning
13:45–15:00	LUNCH

15:00–16:00	Invited Talk **Speaker:** Shalabh Bhatnagar **Title:** An Incremental Fast Policy Search using a Single Sample Path		Venue: PJAB Auditorium *Chair:* Sushmita Mitra
16:00–16:30	TEA		
16:30–18:30	16:30–18:30	Technical Session I	Venue: NAB-I
	16:30–18:30	Technical Session II	Venue: NAB-II
	16:30–18:30	Special Session on Deep Learning	Venue: PJAB Auditorium

06 December 2017 (Wednesday)

Celebration of 125th Birth Anniversary of Professor P. C. Mahalanobis

Invited Lectures — Venue: PJAB Auditorium

10:00–12:30	10:00–10:50	**Speaker:** Partha Pratim Majumder *Chair:* C. A. Murthy **Title:** Understanding Structure and Relationships of Indian Ethnic Groups: The Legacy of Prasanta Chandra Mahalanobis.
	10:50–11:40	**Speaker:** Probal Chaudhuri *Chair:* C. A. Murthy **Title:** Mahalanobis Distance: Historical Review and Recent Developments.
	11:40–12:30	**Speaker:** Ambarish Ghosh *Chair:* B. B. Bhattacharya **Title:** Computers and Computer Science in ISI and the role of PCM
12:30–13:30	Venue: PJAB Auditorium PCM Poster Session with TEA *Presented by Sandip De and Kuntal Ghosh*	

<table>
<tr><td>13:30–15:00</td><td colspan="3">LUNCH</td></tr>
<tr><td>15:00–16:00</td><td colspan="3">Invited Talk (Over VC) Venue: NAB – I
Speaker: Farzin Deravi Chair: Sankar K. Pal

Title: Biometric Counter-spoofing for Mobile Devices using Gaze Information</td></tr>
<tr><td>16:00–16:30</td><td colspan="3">TEA</td></tr>
<tr><td>16:30–18:00</td><td>16:30–18:00</td><td>Technical Session V</td><td>Venue: NAB-I</td></tr>
<tr><td>18:00–19:00</td><td colspan="3">Special Evening Talk Venue: NAB – I
Speaker: Andrzej Skowron Chair: Malay K. Kundu

Title: Interactive Granular Computing in Data Science</td></tr>
<tr><td>19:00
Onwards</td><td colspan="3">Venue: Lawn Adjacent to the Guest House

Cultural Programme and Banquet

Nrityanjali
by
Amita Dutt & Troupe

  </td></tr>
</table>

07 December 2017

<table>
<tr><td rowspan="3">10:00-11:45</td><td>10:00-11:45</td><td>Technical Session III Venue: NAB-I</td></tr>
<tr><td>10:00-11:45</td><td>Technical Session VI Venue: NAB-II</td></tr>
<tr><td>11:00-11:45</td><td>Industry Session: (Presentation by Flytxt)
Venue: PJAB Auditorium

Speaker : Prateek Kapadia
Chair: Suman K. Mitra
Title : Machine Learning @ Flytxt: Scalable Autonomous Customer Engagement</td></tr>
<tr><td>11:45-12:15</td><td colspan="2">TEA</td></tr>
<tr><td>12:15-13:15</td><td colspan="2">Invited Talk Venue: PJAB Auditorium
Speaker: U. B. Desai Chair: Ashish Ghosh

Title: IoT and Cyber Physical System: Smarter Societies</td></tr>
<tr><td>13:30-15:00</td><td colspan="2">LUNCH</td></tr>
<tr><td rowspan="3">15:00-16:30</td><td>15:00-16:30</td><td>Technical Session IV Venue: NAB-I</td></tr>
<tr><td>15:00-16:30</td><td>Technical Session XI Venue: NAB-II</td></tr>
<tr><td>15:00-16:30</td><td>Venue: PJAB Auditorium

Special Session on Spatial Data Science and Engineering</td></tr>
<tr><td>16:30-17:00</td><td colspan="2">TEA</td></tr>
<tr><td>17:00-18:00</td><td colspan="2">Invited Talk (Over VC) Venue: NAB - I
Speaker: Soumen Chakrabarti Chair: C. A. Murthy

Title: Attention Models for Entity Resolution and Search</td></tr>
</table>

08 December 2017

<table>
<tr><td rowspan="2">10:15-11:45</td><td>10:15-11:45</td><td>Technical Session VII</td><td>Venue: NAB-I</td></tr>
<tr><td>10:15-11:45</td><td>Technical Session IX</td><td>Venue: NAB-II</td></tr>
<tr><td>11:45-12:15</td><td colspan="3">TEA</td></tr>
<tr><td>12:15-13:15</td><td colspan="3">Invited Talk Venue: PJAB Auditorium
Speaker: Upinder Bhalla
Chair: Sanghamitra Bandyopadhyay

Title: Sequence Recognition as a Subcellular Computational Primitive in Neural Function</td></tr>
<tr><td>13:30-15:00</td><td colspan="3">LUNCH</td></tr>
<tr><td rowspan="2"></td><td>15:00-16:30</td><td>Technical Session VIII</td><td>Venue: NAB-I</td></tr>
<tr><td>15:00-16:30</td><td>Technical Session X</td><td>Venue: NAB-II</td></tr>
<tr><td>16:30-17:00</td><td colspan="3">TEA</td></tr>
<tr><td>17:00-18:00</td><td colspan="3">Chair: C. A. Murthy Venue : NAB - I

Open House & Valedictory</td></tr>
</table>

Conference Technical Sessions

5th December 2017 (Tuesday)

Special Technical Session on Fuzzy Sets dedicated to late Professor Lotfi A. Zadeh		
05 December 2017	Venue: PJAB AUDITORIUM	12:15-13:30
Session Chair: B. B. Bhattacharya		
	Introduction by Sankar K. Pal	
1	Feature selection and fuzzy rule mining for epileptic patients from clinical EEG data *Abhijit Dasgupta, Losiana Nayak, Ritankar Das, Debasis Basu, Preetam Chandra and Rajat De*	
2	Improving the Performance of Deep Learning based Speech Enhancement System Using Fuzzy Restricted Boltzmann Machine *Suman Samui, Indrajit Chakrabarti and Soumya K Ghosh*	
3	LEXER: LEXicon based Emotion analyzeR *Shikhar Sharma, Piyush Kumar and Krishan Kumar*	
4	A Fuzzy-LP Approach in Time Series Forecasting *Pritpal Singh and Gaurav Dhiman*	
5	Third Order Backward Elimination Approach for Fuzzy-Rough Set based Feature Selection *Soumen Ghosh, Sai Prasad P.S.V.S. and Raghavendra Rao C*	

Special Technical Session on Deep Learning		
05 December 2017	Venue: PJAB AUDITORIUM	16:30-18:30
Session Chair: Bhabatosh Chanda		
1	Learning Deep Representations for Place Recognition in SLAM *Aritra Mukherjee, Satyaki Chakraborty and Sanjoy Kumar Saha*	
2	Performance of Deep Learning Algorithms vs. Shallow models, in extreme conditions - some empirical studies *Samik Banerjee, Prateep Bhattacharjee and Sukhendu Das*	

3	Space-Time Super-Resolution using Deep Learning based Framework *Manoj Sharma, Santanu Chaudhury and Brejesh Lall*
4	Stacked Features Based CNN For Rotation Invariant Digit Classification *Ayushi Jain, Gorthi R.K. Sai Subrahmanyam and Deepak Mishra*
5	A Study on Deep Convolutional Neural Network Based Approaches for Person Re-Identification *Harendra Chahar and Neeta Nain*
6	Two-Stream Convolutional Network with Multi-level Feature Fusion for Categorization of Human Action from Videos *Prateep Bhattacharjee and Sukhendu Das*
7	A spatio-temporal feature learning approach for Dynamic Scene Recognition *Ihsan Ullah and Alfredo Petrosino*

Session I: Pattern Recognition and Machine Learning		
05 December 2017	Venue: NAB -I	16:30-18:30
Session Chair: Smarajit Bose		
1	kNN Classication with an Outlier Informative Distance Measure *Gautam Bhattacharya, Koushik Ghosh and Ananda S. Chowdhury*
2	Tree-based Structural Twin Support Tensor Clustering with square loss function *Reshma Rastogi N'ee Khemchandani and Sweta Sharma*
3	Kernel Entropy Discriminant Analysis for Dimension Reduction *Aditya Mehta and Chandra Sekhar C*
4	Machine Learning Approach for Identification of miRNA-mRNA Regulatory Modules in Ovarian Cancer *Sushmita Paul and Shubham Talbar*
5	Label Correlation Propagation for Semi-Supervised Multi-Label Learning *Aritra Ghosh and Chandra Sekhar C*
6	Formulation of Two Stage Multiple Kernel Learning using Regression Framework *Shiju S S, Asif Salim and Sumitra S*
7	A Two-Stage Conditional Random Field Model based Framework for Multi-Label Classification *Abhiram Kumar Singh and Chandra Sekhar C*
8	A Matrix Factorization & Clustering based Approach for Transfer Learning *V. Sowmini Devi, Vineet Padmanabhan and Arun K. Pujari*

Session II: Computer Vision and Video Processing -1		
05 December 2017	Venue: NAB-II	16:30-18:30
Session Chair: Hemant Patil		
1	Unlocking the Mechanism of Devanagari Letter Identification using Eye Tracking *Chetan Ralekar, Tapan Gandhi and Santanu Chaudhury*	
2	Unsupervised Feature Descriptors based Facial Tracking over Distributed Geospatial Subspaces *Shubham Dokania, Ayush Chopra, Feroz Ahmad, Sreedevi Indu and Santanu Chaudhury*	
3	Adaptive TerraSAR-X Image Registration (AIR) using Spatial Fisher Kernel Framework *Sirisha B, Chandrasekhar P, Chandrasekhara Sastry A S and Sandhya B*	
4	A Robust Color Video Watermarking Technique Using DWT, SVD and frame differences *Sai Sharma, Sanik Thapa and K. Chaitanya Pavan Tanay*	
5	Object Tracking with Classification Score Weighted Histogram of Sparse Codes *Mathew Francis and Prithwijit Guha*	
6	A Machine Learning Inspired Approach for Detection, Recognition and Tracking of Moving Objects from Real-time Video *Anit Chakraborty and Sayandip Dutta*	
7	Face detection based on frequency domain features *Rajesh D S and Shekar B H*	

6th December 2017 (Wednesday)

Session V: Soft and Natural Computing		
06 December 2017	Venue: NAB-I	16:30 – 18:00
Session Chair: Susmita Ghosh		
1	A Novel OCR System based on Rough Set Semi-Reduct *Ushasi Chaudhuri, Partha Bhowmick and Jayanta Mukherjee*	
2	Rough set rules determine disease progressions in different groups of Parkinson's patients *Andrzej Przybyszewski, Stanislaw Szluk, Piotr Habela and Dariusz Koziorowski*	
3	Detection of Atypical Elements by Transforming Task to Supervised Form *Piotr Kulczycki and Damian Kruszewski*	
4	Adversarial Optimization of Indoor Positioning System using Differential Evolution *Feroz Ahmad and Sreedevi Indu*	
5	Fast Convergence to Near Optimal Solution for Job Shop Scheduling using Cat Swam Optimization *Vivek Dani, Aparna Sarswat, Vishnu Swaroop, Shridhar Domanal and G.Ram Mohana Reddy*	
6	Music-Induced Emotion Classification from the Prefrontal Hemodynamics *Pallabi Samanta, Diptendu Bhattacharya, Amiyangshu De, Lidia Ghosh and Amit Konar*	

7th December 2017 (Thursday)

Session III: Computer Vision and Video Processing -2		
07 December 2017	Venue: NAB-I	10:00-11:45
Session Chair: B. B. Chaudhuri		
1	A Study on the Properties of 3D Digital Straight Line Segments *Mousumi Dutt, Somrita Saha and Arindam Biswas*	
2	Does Rotation Influence the Estimated Contour Length of a Digital Object? *Sabyasachi Mukherjee, Oishila Bandyopadhyay, Arindam Biswas and Bhargab B. Bhattacharya*	
3	Aggregated Channel Features With Optimum Parameters for Pedestrian Detection *Blossom Bastian and Jiji Victor*	
4	Variants of Locality Preserving Projection for Modular Face and Facial Expression Recognition *Gitam Shikkenawis and Suman K Mitra*	
5	Video Stabilization using Sliding Frame Window *Keerthan S Shagrithaya, Eeshwar Gurushankar, Deepak Srikanth, Pravin Bhaskar Ramteke and Shashidhar G. Koolagudi*	
6	Abnormal Crowd Behavior Detection Based on Combined Approach of Energy Model and Threshold *Madhura Halbe, Vibha Vyas and Yogita Vaidya*	
7	Deep Learning in the Domain of Multi-Document Text Summarization *Rajendra Kumar Roul, Jajati Keshari Sahoo and Rohan Goel*	

Session VI: Bioinformatics and Computational Biology		
07 December 2017	Venue: NAB-II	10:00-11:45
Session Chair: Susmita Sur-Kolay		
1	A New Method to Address Singularity Problem in Multimodal Data Analysis *Ankita Mandal and Pradipta Maji*	
2	Efficient and Effective Multiple Protein Sequence Alignment Model Using Dynamic Progressive Approach with Novel Look Back Ahead Scoring System *Sanjay Bankapur and Nagamma Patil*	
3	Classification of Vector-borne Virus through Totally Ordered Set of Dinucleotide Interval Patterns *Uddalak Mitra and Balaram Bhattacharyya*	

4	A quasi-clique mining algorithm for analysis of the human protein-protein interaction network *Brijesh Sriwastava, Subhadip Basu and Ujjwal Maulik*
5	Prediction of Thyroid Cancer genes using an ensemble of Post Translational Modification, Semantic and Structural similarity based clustering results *Anup Kumar Halder, Pritha Dutta, Mahantapas Kundu, Mita Nasipuri and Subhadip Basu*
6	mRMR+ : An Effective Feature Selection Algorithm for Classification *Hussain Chowdhury and Dhruba Bhattacharyya*
7	Topological Inquisition into the PPI Networks Associated with Human Diseases through Graphlet Frequency Distribution *Debjani Bhattacharjee, Sk Md Mosaddek Hossain, Raziya Sultana and Sumanta Ray*

Special Session on Spatial Data Science and Engineering		
07 December 2017	Venue: PJAB AUDITORIUM	15:00-16:30
Session Chair: Dipti Prasad Mukherjee		
	Introduction by Soumya K. Ghosh	
1	Spatial Distribution based Provisional Disease Diagnosis in Remote Healthcare *Indrani Bhattacharya and Jaya Sil*	
2	Extraction of Phenotypic Traits for Drought Stress Study using Hyperspectral Images *Swati Bhugra, Nitish Agarwal, Shubham Yadav, Soham Banerjee, Santanu Chaudhury and Brejesh Lall*	
3	Spatio-temporal Prediction of Meteorological Time Series Data: An Approach based on Spatial Bayesian Network (SpaBN) *Monidipa Das and Soumya Ghosh*	

Session IV: Signal and Image Processing		
07 December 2017	Venue: NAB-I	15:00-16:30
Session Chair: Sanjoy Kumar Saha		
1	Selection of Relevant Electrodes based on Temporal Similarity for Classification of Motor Imagery Tasks *Jyoti Singh Kirar, Ayesha Choudhary and R.K. Agrawal*	

2	Automated Measurement of Translational Margins and Rotational Shifts in Pelvic Structures using CBCT Images of Rectal Cancer patients *Sai Phani Kumar Malladi, Bijju Kranthi Veduruparthi, Jayanta Mukherjee, Partha Pratim Das, Saswat Chakrabarti and Indranil Mallick*
3	Exploring the scope of HSV color channels towards simple shadow contour detection *Jayeeta Saha and Arpitam Chatterjee*
4	Linear Curve Fitting-based Headline Estimation in Handwritten Words for Indian Scripts *Rahul Pramanik and Soumen Bag*
5	Object Segmentation in Texture Images using Texture Gradient based Active Contours *Priyambada Subudhi and Susanta Mukhopadhyay*
6	A Variance Based Image Binarization Scheme and Its Application in Text Segmentation *Ranjit Ghoshal, Aditya Saha and Sayan Das*

Session XI: Applications of Pattern Recognition and Machine Intelligence		
07 December 2017	Venue: NAB-II	15:00-16:30
Session Chair: Piotr Kulczycki		
1	Hierarchical Ranking of Cricket Teams Incorporating Player Composition *Abhinav Agarwalla, Madhav Mantri and Vishal Singh*	
2	Smart Water Management: An Ontology-drivenContext-aware IoT application *Deepti Goel, Santanu Chaudhury and Hiranmay Ghosh*	
3	Structured Prediction of Music Mood with Twin Gaussian Processes *Santosh Chapaneri and Deepak J Jayaswal*	
4	Differentiating Pen Inks in Handwritten Bank Cheques using Multi-layer Perceptron *Prabhat Dansena, Soumen Bag and Rajarshi Pal*	
6	Analysis of Causal Interactions and Predictive Modelling of Financial Markets Using Econometric Methods, Maximal Overlap Discrete Wavelet Transformation and Machine Learning: A Study in Asian Context *Indranil Ghosh, Manas K. Sanyal and R. K. Jana*	
7	Concept-Based Approach for Research Paper Recommendation *Ritu Sharma, Dinesh Gopalani and Yogesh Meena*	

8th December 2017 (Friday)

Session VII: Speech and Natural Language Processing – 1		
08 December 2017	Venue: NAB-I	10:15-11:45
Session Chair: Utpal Garai		
1	Analysis of Features and Metrics for Alignment in Text-Dependent Voice Conversion *Nirmesh Shah and Hemant Patil*	
2	Effectiveness of Mel Scale-Based ESA-IFCC Features for Classication of Natural vs. Spoofed Speech *Madhu Kamble and Hemant Patil*	
3	Novel Phase Encoded Mel filterbank Energies for Environmental Sound Classification *Rishabh Tak, Dharmesh Agrawal and Hemant Patil*	
4	An Adaptive i-vector Extraction for Speaker Verication with Short Utterance *Arnab Poddar, Md Sahidullah and Goutam Saha*	
5	Spoken Keyword Retrieval using Source and System Features *Maulik Madhavi, Hemant Patil and Nikhil Bhendawade*	
6	Novel Gammatone Filterbank Based Spectro-Temporal Features for Robust Phoneme Recognition *Ankit Nagpal and Hemant Patil*	

Session IX: Data Mining and Big Data Analytics – 1		
08 December 2017	Venue: NAB-II	10:15-11:45
Session Chair: Nikhil R. Pal		
1	K-Means Algorithm to Identify k1-Most Demanding Products *Ritesh Kumar, Partha Sarathi Bishnu and Vandana Bhattacherjee*	
2	Mining Rare Patterns using Hyper-Linked Data Structure *Anindita Borah and Bhabesh Nath*	
3	Random Binary Search Trees for Approximate Nearest Neighbour Search in Binary Space *Michal Komorowski and Tomasz Trzcinski*	
4	Opinion Mining using Support Vector Machine with Web based Diverse Data *Mir Shahriar Sabuj, Zakia Afrin and K. M. Azharul Hasan*	

5	Harnessing Online News for Sarcasm Detection in Hindi Tweets *Santosh Kumar Bharti, Sathya Babu Korra and Sanjay Kumar Jena*
6	Incremental learning of Non Stationary Temporal Causal Networks for Telecommunication Domain *Ram Mohan, Santanu Chaudhury and Brejesh Lall*

Session VIII: Speech and Natural Language Processing – 2		
08 December 2017	Venue: NAB-I	15:00-16:30
Session Chair: Swapan Kumar Parui		
1	Neural Networks Compression for Language Modeling *Artem Grachev, Dmitry Ignatov and Andrey Savchenko*	
2	A Metaphor Detection Approach using Cosine Similarity *Malay Pramanick and Pabitra Mitra*	
3	Named Entity Identication Based Translation Disambiguation Model *Vijay Sharma and Namita Mittal*	
4	Lexical TF-IDF: An n-gram Feature Space for Cross-Domain Classification of Sentiment Reviews *Atanu Dey, Mamata Jenamani and Jitesh J Thakkhar*	
5	A Method for Semantic Relatedness based Query Focused Text Summarization *Nazreena Rahman and Bhogeswar Borah*	

Session X: Data Mining and Big Data Analytics – 2		
08 December 2017	Venue: NAB – II	15:00-16:30
Session Chair: Ujjwal Maulik		
1	A Graphical Model for Football Story Snippet Synthesis from Large Scale Commentary *Anirudh Vyas, Sangram Gaikwad and Chiranjoy Chattopadhyay*	
2	Palmprint and Finger Knuckle based Person Authentication with Random Forest via Kernel-2DPCA *Gaurav Jaswal, Amit Kaul and Ravinder Nath*	
3	An efficient approach for mining frequent subgraphs *Tahira Alam, Sabit Anwar Zahin, Md. Samiullah and Chowdhury Farhan Ahmed*	

4	An Efficient Encoding Scheme for Dynamic Multidimensional Datasets *Mehnuma Tabassum Omar and K.M. Azharul Hasan*
5	Image Annotation using Latent Components and Transmedia Association *Anurag Tripathi, Abhinav Gupta, Santanu Chaudhury and Brejesh Lall*
6	Effectiveness of representation and length variation of shortest paths in graph classification *Asif Salim, Shiju S S and Sumitra S*

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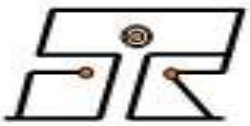

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KOLKATA

In the fall of 1687 Job Charnock, an agent of the East India company, secured permission from the Mughals to establish a base at Sutanati. In 1696, Old Fort William was established and this was the origin of the city of Kolkata. One of the sayings goes, the name Kolkata is derived from Kalikata, one of three villages whose lands became a part of the new settlement. In the three centuries, Kolkata has grown from a mere fishing village into one of the largest cities in India with a population of 10.5 million, and indeed, one of the largest cities in the world. Kolkata served as the capital of British India until 1912 and it is not surprising that one sees predominantly Western architectural styles in its many buildings and monuments. Two of the finest examples are Writers Building and the Victoria Memorial, where the architecture is a medley of the best of Occidental and Oriental styles. It is proud to have one of the best libraries and museums in Asia. Kolkata is a city with strong cultural, literary and scientific flavour. This is reflected in the ever increasing flow of activities in diverse fields such as science, fine arts, writing, music, dance and theatre. The first Noble laureate in literature from Asia was from Kolkata and it was the main place of work of several other Nobel laureates.


KOLKATA
TOURIST MAP
N
Belanagar RS
Dakshineshwar
Barahanagar RS
Uttarpara
Bali RS
Belghariya
Durganagar RS
Dum Dum Airport
Bali
Alambazar
Ban Hugli
Belur RS
Barahanagar
Subhashnagar
Gorabazar
Bhattanagar RS
Belur Math
Eksara
Belur
Sinthi
Motijhil
Lilua
Dum Dum RS
Salap
Lilua RS
Kashipur
Kona RS
Chitpur
Tala RS
Baguiati
Bamangachhi
Lake Town
Bankra
Tikiapara RS
Belgachhiya
Bagbazar
Santragachhi
Jagachha
Dasnagar RS
Ultadanga
Bidhannagar
Ramrajtala RS
Baruipara
Ashoka
Jorasanko
Central Park
Bantra
Howrah Bridge
Maniktala
Salt Lake City
St.Thomas's Church
Howrah RS
Marble Palace
Marwari
ITC Sonar
Baksara
Hyatt Regency
Writers Building
Mourigram
Shibpur
BBD Bagh
Nicco Park
Lal Dighi
Calcutta High Court
Baleghata
Eden Garden
Shaheed Minar
Salt Lake Stadium
Hugli River
Mirzapur
Fort William
Subhas Sarovar
Shalimar RS
Race Course
The Golden Park
Tangra
M.P. Birla Planetarium
Victoria Memorial
St. Mary's
Beniapukur Park
Taj Bengal
SSKM
Hindustan International
Dhapa
Garden Beach
Khidirpur
Bhawanipur
Gurudwara
Baliganja
Tiljala
Santoshpur RS
Alipur
Kasba
Chetla
Kalighat
Akra RS
New Alipur
Southern Market
Dhakura RS
Taratala
Rabindra Sarovar
Charu Market
Santoshpur
Behala Airport
Taliganja
Jadabpur RS
Behala
Golf Course
Jadabpur
Bagha Jatin RS
Sodpur
Gariya
Thakurpukur
Garia RS
Sonarpur
Legend
Highway
Other Road
Rail Line
Hotel
Hospital
Religious Place
Education
Imp. Landmark
Vegetation
Water Body
Tourist Places
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PLACES TO VISIT

Belur Math

Founded by Swami Vivekananda, the world famous socio-religious reformer and disciple of Sri Ramakrishna Paramhansa, it is the Headquarters of Ramakrishna Mission. This International tourist attraction is located on the bank of the river Hooghly near Belur, close to Indian Statistical Institute. Its sprawling prayer hall with a statue of Ramakrishna is remarkable. It is well connected by train the bus.

Birla Industrial & Technological Museum

Established in 1959, it is located at 19A Gurusaday Road. it features permanent exhibition on scientific and technological progress. has workshop which designs and produces much of its exhibits. Entry by ticket. Monday is closed.

Birla Planetarium

One of the largest in Asia, it is located at 96, Jawaharlal Nehru road, near the Victoria Memorial. Daily programmes in English, Bengali, Hindi from 12 noon to 7pm . It can accommodated 500 persons. Entry is by ticket, and is closed on Monday.

Botanical Garden

The largest and oldest of its kind in India, it was laid out in 1787. It covers an area of 109.27 Ha and is famous for the over 250 years old Great Banyan tree which covers 382 m in its circumference, with over 600 aerial roots. There are more than 30,000 varieties of trees and plants. Situated about 9 km from Kolkata, across the Hooghly river, it is a lovely picnic spot, well-connected by bus and ferry service. It is open from 7:00am to 5:00 pm. entry by ticket

Dakshineswar

Built by Rani Rasmoni in the 19th century on the bank of the river Hooghly in the northern suberb of Kolkata and very close to the Indian Statistical Institute. It is here that Sri Ramakrishna Paramhansa, the renowed spiritual personality and the guru of Swami Vivekananda had worshipped the goddess Kali. It is a world famous place of pilgrimage.

A sprawling garden set up by the Brtitish in the early 20th century with a band stand and a beautiful pagoda. It is an attractive picnic spot on Strand Road. A stadium has been built adjacent to it for cricket test matches which can accommodate as many as 100,000 people.

Eden Gardens

A National Museum housing rare antiques, armaments, armour, fossils, stones, paintings of Mughal India, regal dresses/uniforms, rare animal skeletons, mummies, etc. Entry is by ticket. It is situated on J L Nehru Road, near the Birla Planetarium.

Indian Museum

Legend goes that the name of Kolkata, is derived from the famous Kali deity of this temple located at Kalighat in South Kolkata. It is a great attraction for Hindu pilgimage and is easily accessible by Metro railway from Shyambazar in the north.

Kalighat Temple

Previously vice-Regal House, it is one of the largest libraries in Asia with a collection of rare books and manuscripts. It is located opposite the Zoological Gardens, Alipore.

National Library

Previously known as Octerloney Monument, it resembles the Qutab Minar of Delhi. It is located near Esplanade on the Maidan, a green stretch at the heart of Kolkata comprising many football, cricket, hockey and athletic clubs. The Saheed Minar is the seat of many memorable political meetings.

Saheed Minar

St. Paul's Cathedral

The Anglican Cathedral of Kolkata built in 1847, is adjacent to the Birla Planetarium. Its tower is 65 m high and is famous for the serene service rendered on Christmas Eve.

Science City

One of the few such facilities in the World, the Science City on the Eastern Metropolitan Bypass has a Convention Center and Science Theme Park. Here modern technology combines with impressive visuals to bring science closer to people. Entry is by ticket.

Victoria Memorial

Built in memory of Queen Victoria, between 1906 and 1921 imitating the Taj Mahal, topped with an angel, this memorial faces the Kolkata maidan. It houses paintings, manuscripts, and other objects of historic value in its Museum and Art Gallery. Two regular sound and light shows are held in the evening. Its entry by ticket, and Monday is closed.

Zoological Garden

One of the biggest zoological gardens in India, it has a vast collection of animals, birds, snakes and reptiles. it also has a section for children. It remains a favourite picnic spot during winter and attracts a large number of emigrant birds. Directly across the main zoo is an aquarium, with a variety of aquatic life from around the world. Its entry by ticket and is closed on Thursday.

Tipu Sultan Mosque

A famous mosque in Kolkata, India. Located at 185 Dhartamtalla Street near Saheed Minar, the mosque is a relic of architectural and cultural heritage. People from all sections of society and religions are allowed to visit and take pictures of this historical premise. This building was built in 1832 by Prince Ghulam Mohammed, the youngest son of Tipu Sultan, the great warrior of Mysore

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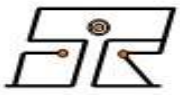	Center for Soft Computing Research
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