Two-Week DST Summer School on "Mathematical Morphology in Geosciences"
24th March – 08th April 2015
Homepage: www.isibang.ac.in/~dst-ss-mmg

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24th March 2015, Tuesday:

Time	Title of the Topics	Speaker
10:00-10:45	**Registration**	
	Inaugural Session	
10:45 -11:00	Welcome Address and a few words about Indian Statistical Institute	NSN Sastry Head, ISI-BC
11:00-11:15	A few words about Systems Science and Informatics Unit (SSIU)	B. S. Daya Sagar SSIU, ISI-BC
11:15-11:20	Introducing S. Sinha-Roy	Saroj K. Meher SSIU, ISI-BC
11:25-11:30	Felicitation to S. Sinha-Roy	N. S. N. Sastry
11:30-12:00	**Coffee Break**	
12:00-13:00	**Quantitative Geomorphology in Earth Surface Processes and Tectonic Analyses**	**Inaugural Talk by Prof. S. Sinha-Roy**
13:00-13:30	Interaction	Audience
13:30- 14:30	**Lunch Break**	
14:30-15:30	Overview on the Summer School	BS Daya Sagar
15:30-16:00	**Tea Break**	
16:00 -17:15	Potential Applications of Mathematical Morphology-Part-I	P. Bhanu Prasad

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LECTURE TITLES WITH TIME SCHEDULES

Time	Date	Lecture By	Lecture Title
12.00-13.30	**24-03-15**	**S. Sinha-Roy (Inaugural)**	**Quantitative Geomorphology in Earth Surface Processes and Tectonic Analyses**
14.30-16.00	24-03-15	B. S. Daya Sagar	Overview on DST Summer School on "Mathematical Morphology in Geosciences"
16.30-17.30	**24-03-15**	**P. Bhanu Prasad**	**Potential Applications of Mathematical Morphology-Part-I**
10.00-11.30	25-03-15	B. S. Daya Sagar	Minkowski Operations and Mathematical Morphology
12.00-13.30	**25-03-15**	**P. Bhanu Prasad**	**Potential Applications of Mathematical Morphology-Part-II**
14.30-16.00	25-03-15	B. S. Daya Sagar	Fundamental binary mathematical morphology transformations, and Structuring elements (flat and non-flat), symmetric and asymmetric, and their decompositions
16.30-17.30	25-03-15	B. S. Daya Sagar	Multiscale binary mathematical morphological operations, and Geodesic binary morphology
10.00-11.30	26-03-15	B. S. Daya Sagar	Greyscale morphological operations and their multiscale versions
12.00-13.30	26-03-15	B. S. Daya Sagar	Binary granulometries and grayscale granulometries
14.30-16.00	**26-03-15**	**Bhabatosh Chanda**	**Watershed Transformation: Morphological Segmentation Algorithm-Part-1**
16.30-17.30	26-03-15	B. S. Daya Sagar	Alternate sequential Filters (ASF) and ASF-Based granulometries
10.00-11.30	27-03-15	B. S. Daya Sagar	Detection of orientations and directional granulometries, and certain power-laws
12.00-13.30	**27-03-15**	**Bhabatosh Chanda**	**Watershed Transformation: Morphological Segmentation Algorithm-Part-2**
14.30-16.00	27-03-15	B. S. Daya Sagar	Skeletonization and extraction of valley and ridge connectivity networks
16.30-17.30	27-03-15	B. S. Daya Sagar	Grayscale skeletonization and extraction of valley and ridge connectivity networks

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		28-03-15 (SATURDAY-HOLIDAY)	
		29-03-15 (SUNDAY-HOLIDAY)	
10.00-11.30	30-03-15	Pratap Vardhan	Implementation of morphological operations through Python and/or MatLab-Part-1
12.00-13.30	30-03-15	Pratap Vardhan	Implementation of morphological operations through Python and/or MatLab-Part-2
14.30-16.00	30-03-15	B. S. Daya Sagar	Fractal-skeletal based Channel Network (F-SCN) models, generation of Fractal Landscapes, allometric Power-law relationships in Hortonian Fractal DEMs
16.30-17.30	30-03-15	B. S. Daya Sagar	Skeletonization by Influence Zones (SKIZ) and Weighted Skeletonization by Influence Zones (WSKIZ). Point-Polygonal conversion, cartograms-Part-1
10.00-11.30	31-03-15	B. S. Daya Sagar	Skeletonization by Influence Zones (SKIZ) and Weighted Skeletonization by Influence Zones (WSKIZ). Point-Polygonal conversion, cartograms-Part-2
12.00-13.30	31-03-15	B. S. Daya Sagar	Morphological shape decomposition and scale invariant but shape-dependent power-laws. Morphometry of networks and non-network spaces via morphological shape decomposition. Hierarchical morphological pruning, travel-time channel networks, convex hulls, convexity measures. Morphological hulls and convexity measures, half-plane closings
14.30-16.00	31-03-15	B. S. Daya Sagar	Morphological Distances and Logical relationships Vs. Quantitative spatial relationships
16.30-17.30	31-03-15	B. S. Daya Sagar	Binary and greyscale morphological interpolations and morphological extrapolations-Part-1
10.00-11.30	**01-04-15**	**Chakravarthy Bhagvati**	**Road Distress Assessment: Application of Mathematical Morphology**
12.00-13.30	01-04-15	B. S. Daya Sagar	Binary and greyscale morphological interpolations and morphological extrapolations-Part-1
14.30-16.00	01-04-15	B. S. Daya Sagar	Binary and greyscale morphological interpolations and morphological extrapolations-Part-2
16.30-17.30	01-04-15	Raghvendra Sharma	Demonstration of spatial interpolations and extrapolations through MatLab- Part-1
10.00-11.30	**02-04-15**	**Saroj K. Meher**	**Granular computations Part-1**

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12.00-13.30	02-04-15	**Saroj K. Meher**	**Granular computations Part-1**
14.30-16.00	02-04-15	Raghvendra Sharma	Demonstration of spatial interpolations and extrapolations through MatLab- Part-2
16.30-17.30	02-04-15	B. S. Daya Sagar	Width-function and geodesic spectrum
		03-04-15 (GOOD FRIDAY-HOLIDAY)	
		04-04-15 (SATURDAY-HOLIDAY)	
		05-04-15 (SUNDAY-HOLIDAY)	
10.00-11.30	**06-04-15**	**B. L. Deekshatulu**	**Intelligent Processing and Applications**
12.00-13.30	06-04-15	Sravan Danda and Aditya Challa	Basics Of Graph Morphology
14.30-16.00	06-04-15	B. S. Daya Sagar	Modelling, description and characterization of porous structures via mathematical morphology
16.30-17.30	06-04-15	B. S. Daya Sagar	f-alpha spectra--Opening-Based bisections
10.00-11.30	07-04-15	B. S. Daya Sagar	Logistic Maps and Bifurcation Theory
12.00-13.30	07-04-15	B. S. Daya Sagar	Spatial significance index and Modified Gravity Models for variable-specific classification of zones, pairs of zones, clusters of a spatial system
14.30-16.00	07-04-15	B. S. Daya Sagar	Ranks for pairs of images via grayscale morphological distances
16.30-17.30	07-04-15	B. S. Daya Sagar	Discrete simulations of spatiotemporal dynamics of small water bodies under varied streamflow discharges
10.00-11.30	**08-04-15**	**Manoranjan Mohanty**	**Research Initiatives in Earth Sciences by Department of Science and Technology**
12.00-13.30	08-04-15	B. S. Daya Sagar	Summary of the Sumer School and Seeking Feedback
14.30-15.00	**08-04-15 (CONCLUDING SESSION: CERTIFICATE DISTRIBUTION BY DR. MANORANJAN MOHANTY, MEMBER-SECRETARY, PROGRAMME ASSESSMENT COMMITTEE, SERB-ES, DST)**		

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B. S. Daya Sagar

Lecture: Overview on DST Summer School on "Mathematical Morphology in Geosciences"

PART-I: Binary and Greyscale Mathematical Morphology

B. S. Daya Sagar

Lecture: Minkowski Operations and Mathematical Morphology
Lecture: Fundamental binary mathematical morphology transformations, and Structuring elements (flat and non-flat), symmetric and asymmetric, and their decompositions
Lecture: Multiscale binary mathematical morphological operations, and Geodesic binary morphology
Lecture: Greyscale morphological operations and their multiscale versions

PART-II: Binary and Greyscale Granulometries and Skeletonization

B. S. Daya Sagar

Lecture: Binary granulometries and grayscale granulometries
Lecture: Alternate sequential Filters (ASF) and ASF-Based granulometries
Lecture: Detection of orientations and directional granulometries, and certain power-laws
Lecture: Skeletonization and extraction of valley and ridge connectivity networks
Lecture: Grayscale skeletonization and extraction of valley and ridge connectivity networks
Lecture: Skeletonization by Influence Zones (SKIZ) and Weighted Skeletonization by Influence Zones (WSKIZ)
Lecture: Fractal-skeletal based Channel Network (F-SCN) models, generation of Fractal Landscapes, allometric Power-law relationships in Hortonian Fractal DEMs

PART-III: Morphological Decompositions, Morphometric Analysis and Quantitative Characterization

B. S. Daya Sagar

Lecture: Morphological shape decomposition and scale invariant but shape-dependent power-laws
Lecture: Morphometry of networks and non-network spaces via morphological shape decomposition
Lecture: Morphological hulls and convexity measures, half-plane closings
Lecture: Hierarchical morphological pruning, travel-time channel networks, convex hulls, convexity measures
Lecture: Width-function and geodesic spectrum
Lecture: Modelling, description and characterization of porous structures via mathematical morphology
Lecture: f-alpha spectra--Opening-Based bisections

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PART-IV: Morphological distances, Interpolation and Extrapolation, and Quantitative Spatial Reasoning

B. S. Daya Sagar

Lecture: Morphological Distances and Logical relationships Vs. Quantitative spatial relationships
Lecture: Binary and greyscale morphological interpolations and morphological extrapolations
Lecture: Spatial significance index and Modified Gravity Models for variable-specific classification of zones, pairs of zones, clusters of a spatial system
Lecture: Ranks for pairs of images via grayscale morphological distances
Lecture: Discrete simulations of spatio-temporal dynamics of small water bodies under varied streamflow discharges
Lecture: Point-Polygonal conversion, cartograms

PART-V: Case Studies and Demonstrations with Hands-On Activity

Pratap Vardhan: Demonstrations: Implementation of morphological operations through Python and/or MatLab
Raghvendra Sharma: Demonstrations: Demonstration of spatial interpolations and extrapolations through MatLab

PART-VI: Graph Morphology

Sravan Danda and Aditya Challa: Lecture: Basics Of Graph Morphology

PART-VII: Expert Lectures

Professor S. Sinha-Roy: Quantitative Geomorphology in Earth Surface Processes and Tectonic Analyses
Professor B. L. Deekshatulu: Intelligent Processing and Applications
Professor Bhabatosh Chanda: Watershed Transformation: Morphological Segmentation Algorithm-Parts 1 & 2.
Professor Chakravarthy Bhagvati: Road Distress Assessment: Application of Mathematical Morphology
Dr. Bhanu Prasad: Potential Applications of Mathematical Morphology-Parts 1 & 2
Dr. Saroj K. Meher: Granular Computations-Parts 1 & 2
Dr. Manoranjan Mohanty: Research Initiatives in Earth Sciences by Department of Science and Technology

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No.	Name of Participant	Designation	Affiliation
1	K. Saranya	PhD Scholar	Central University of Karnataka
2	N. V. Lakshmi	PhD Scholar	Jawaharlal Technological University-K
3	Ananya Divyadarshini	PhD Scholar	Delhi University
4	Swapna Mahanand	PhD Scholar	Indian Institute of Technology-Kharagpur
5	K. N. Kusuma	Assistant Professor	Pondycherry University
6	Balasaraswathi P	PhD Scholar	Anna University
7	Shubhra Sharma	PhD Scholar	Wadia Institute of Himalayan Geology
8	Sugandha Panwar	PhD Scholar	Indian Institute of Technology-Roorkee
9	Vijayalakshmi Naik	PhD Scholar	Mangalore University
10	Vinaya Kumari P	PhD Scholar	Mangalore University
11	V. Gopi Krishna Kasyap	PhD Scholar	Jawaharlal Technological University-K
12	Kushal A Chavare	PhD Scholar	Maharaja Sayajirao University of Baroda
13	Ramendra Sahoo	PhD Scholar	Indian Institute of Technology-Gandhinagar
14	Suman K. Choudhury	PhD Scholar	National Institute of Technology-Rourkela
15	Rahul Raman	PhD Scholar	National Institute of Technology-Rourkela
16	L. Vinoth Kumar	PhD Scholar	Anna University
17	V. Kumaran	PhD Scholar	Anna University
18	Amit K Singh	PhD Scholar	Jawaharlal Nehru University-Delhi
19	Sukumar Parida	PhD Scholar	Delhi University
20	Mohd Yawar Ali Khan	PhD Scholar	Indian Institute of Technology-Roorkee
21	S. Anbarasu	PhD Scholar	Anna University
22	Rajendra Mohan Panda	PhD Scholar	Indian Institute of Technology-Kharagpur
23	H. M. Rajashekara	PhD Scholar	Indian Statistical Institute-Bangalore,
24	Akkisetty Bhargav	Student	Indian Statistical Institute-Bangalore,
25	Charakanam Chakradhar	Student	Indian Statistical Institute-Bangalore.