

CU_CSE_2017_18_WS_MathematicalMorphologyinSpatialDataScience_Mar-8_v1

FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Mathematical Morphology in Spatial Data Sciences
WORKSHOP

Date: 8th March 2018

Time: 9:00 A.M to 4 PM

Venue: Block II, 3rd Floor, Seminar Hall, CHRIST(Deemed to be University), Faculty of Engineering

Speaker/s:

Name: Dr B.S. Daya Sagar and Dr Saroj Meher

Organization and Place: Indian Statistical Institute, Bangalore

Target Audience (Students): CSI Membership Students

Faculty Members:

1. Dr Balachandran K
2. Dr Samiksha Shukla
3. Mr Michael Moses
4. Mr Bijesh TV
5. Mr Manjunath C
6. Ms Sumitha VS

Total Present: 69

OBJECTIVE: To give a glimpse of various scenarios related to applications of Mathematical Morphology and Fractal Geometry—in the context of DEM processing and analyses

POSSIBLE LEARNING OUTCOMES: Faculty members pursuing PhD will be able to get an insight and be able to implement the same with respect to their research work. Students can carry out projects, taking this learning forward and implementing it.

Session 1

Timing: 10 AM to 11:30 AM

Dr Dayasagar addresses the audience, in the first session. Georges Matheron and Jean Serra of the Centre of Mathematical Morphology, Fontainebleau founded Mathematical Morphology (MM) [1-3]. Since the birth of MM in the mid-1960s, its applications in a wide ranging disciplines have illustrated that intuitive researchers can find varied application-domains to extend the applications of MM. The motivation for this talk stems from the fact that Mathematical Morphology is one of the better choices to deal with highly intertwined topics—which are the main components of spatial data science—such as retrieval, analysis, reasoning, and simulation and modelling of spatial (e.g. terrestrial) phenomena and processes [4]. Digital Elevation Models (DEMs) that are main by-products of remotely sensed data acquired via various sensing mechanisms offer rich clues to better understand the terrestrial phenomena and processes. This talk provides an illustrative review of application of Mathematical Morphology in DEM processing and analyses. This talk provides a glimpse of various case-studies carried out by the speaker over a period of 25 years—related to applications of Mathematical Morphology and Fractal Geometry—in the context of DEM processing and analyses [5-6]. In the first one hour a few fundamental morphological transformations would be covered. The applications of those transformations in DEM processing and analyses involving aforementioned intertwined topics would be covered during the rest of the period. He spoke about the concept of basic Morphology from Minkowski Operation. It included subtraction (Shrink) and Sum (Expand) operations. The morphological term for subtraction is 'Erosion' and addition is 'dilation'. Opening is the process which includes eroding the component with its sub-component and then dilating it with the same component. This is used to remove the unwanted objects in the given component. E.g. - Spikes, Lines, etc. Similarly, Closing is the process which includes dilating the component with its sub-component first and then eroding it with the same sub-component. Closing is usually used to fill up the holes in the components. Thus, opening can be used to remove grains from a plate which is called Granulometry Analysis or Granulometry Patternspectromenas. The session was followed by a tea-break for 10 minutes.

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Session 2

Timing: 11.45 AM to 1:45 PM

Dr B.S. Dayasagar gave a brief explanation on skeleton structure of any object and how it is used in encryption and decryption process. The definition of Antigranulometry, Coding of Binary Images using Skeletinization, Mathematical Morphology & Spatial Science, Grey Scale Morphological Operation, and more about usage of these concepts in deformation of tumor cells & blood cells during chemotherapy was explained. Dr BS.DayaSagarexplained the same with slides relating to the above concepts and some animations on it , for fine-tuning the session. Dr BS DayaSagar winded up the session by asking questions from the participants.

The HOD Dr Balachandran K presented a memento to the honourable professor.



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Session 3

Timing: 2:30 PM to 4 PM

After an hour of lunch break, the afternoon session began with DrSaroj K Meher explaining the agenda about Granular Neural Networks. He then briefed the students about Pattern Recognition (PR) with respect to the domain of Machine Learning, Machine Intelligence which includes pattern recognition system (PRS), Granular Computing, Technical Writing which is multiple level of Granularity, Granulation of a variable, main driving force of GrC which is fuzzy set & rough set, Fuzzy Information Granulation (FIG), Granular Properties which are shape and size, and mainly Neural Network and Knowledge encoded GNN. This edifying session was concluded with the presenting of memento to DrSaroj K Meher. This training workshop ended by 4 PM.

Head of the Department