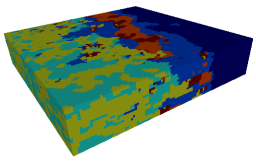
MULTIPLE-POINT GEOSTATISTICS: MODELING WITH TRAINING IMAGE-BASED ALGORITHM



Instructor: Dr. Alexandre Boucher

Friday August 28th, Stanford University

Training image-based geostatistics is changing the way in which spatial modeling is performed. The traditional analytical nature of models, e.g. through variograms, is replaced with a more visual approach in the form of training images. The training image explicitly contains the patterns, or essentially, the multiple-point statistics (mps), that are deemed relevant for the spatial phenomena under study.

Furthermore, multiple-point geostatistics is becoming routine for some companies in the energy sector with growing applications in environmental and mining problems.

The algorithms are freely available (e.g. through the SGeMS software) but there is little supporting material to help users getting started. This short course introduces the attendees to the theory, concept and practice of multiple-point geostatistics. This short course is a rare opportunity to get familiar with these state-of-the-art algorithms by an instructor who is at the forefront of development and application of multiple-point geostatistics.

PARTICIPANTS

Anyone who is interested in the frontier technology development of spatial modeling is encouraged to attend.

GENERAL OBJECTIVES

The goal of the class is to teach attendees to use mps-algorithms on realistic 2D and 3D modeling problems. The treatment of theory will be limited, only an intuitive understanding will be provided. Instead, there is a strong emphasis on understanding and using the algorithms in a real-world setting such that their capabilities and limitation are well understood.

SPECIFIC OBJECTIVES

Concept and theory: The attendees will be introduced to the notion of training image and how a training image should be constructed. The differences between the training image-based and the variogram-based algorithms will be highlighted to give the attendees the critical insights what approach to select.

Algorithms and hands-on exercise: two mps algorithms, snesim and filtersim will be demonstrated, with the former targeted to categorical spatial phenomena, while the latter focused on continuous variables. Through hands-on exercises with the open-source SGeMS software, the attendees will learn how each algorithm works and the importance/sensitivity of its input parameters. The attendees will also learn how to integrate geological knowledge through the regions and probability field concept.

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METHODOLOGY

This is a hand-on workshop with the SGeMS software. The class will alternate between lectures and exercises. At least half the time will be spent working on exercises.

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8:30-9:00AM	Welcome and general perspective
9:00-10:00AM	SNESIM (Algorithm, parameters, Training images)
10:00-10:20AM	Coffee break
10:20-11:15AM	SNESIM exercises (Intro to SGeMS, unconditioanl simulations)
11:15-11:45AM	Conditioniong with SNESIM (hard and soft data)
11:45AM-12:30PM	SNESIM exercises
12:30-1:30PM	Lunch
1:30-2:15PM	Advanced SNESIM concepts (trends, regions, partitions)
2:15-3:00PM	SNESIM exercises
3:00-3:20PM	Coffee break
3:20-4:15PM	FILTERSIM (Algorithm, parameters, Training images)
4:15-5:00PM	FILTERSIM exercises
5:00-5:15PM	Discussion

PRICING:

Non-IAMG member : 350$ IAMG member : 150$ Student : 75$

Alexandre Boucher (geostat.stanford.edu) received a BEng in Geological Engineering from EcolePolytechnique of Montreal, Canada, a MPhil from University of Queensland, Australia and a PhD in Geostatistics from Stanford University. His research interests include training image based geostatistics, remote sensing, machine learning and probabilistic modeling of spatio-temporal phenomena. He is currently an Acting Assistant Professor in the department of Environmental Earth System Science at Stanford University where he teaches geostatistics. He is a contributor to SGeMS (Stanford Geostatistical Modeling Software), is actively publishing in scientific journal and is a co-author of the book: Applied Geostatistics with SGeMS: A user's guide. He has given traditional and multiple-point geostatistics short courses in California, Texas, Japan and Chile.