Fast pattern simulation using multi-scale search and image quilting

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June 2015

Pattern-based algorithms for generating reservoir models from training images are fast and versatile alternatives to pixel-based algorithms. Our research focuses on implementing new algorithms that make use of the latest computer science research in the area of texture modeling and synthesis yet steer it towards geostatistical application involving conditioning. In this context we employ a multi-scale representation of the training image along a pattern projection strategy in cross-correlation based simulation (the CCSIM algorithm). In this multi-scale representation, we transform the high-resolution training image into a pyramid of consecutively up-gridded views of the same training image. This pyramid allows for rapid search of patterns to interlock with the previously simulated patterns. Additionally we rely on image quilting techniques to simulate very large multi-million cell models in a matter of seconds. This research is in collaboration with Gregoire Mariethoz of the University of Lausanne.

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