

## Improvement to Gradient Pattern Analysis and applications

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The description of complex patterns, especially spatial patterns, is a challenge. Some features, such as classification features (in static cases) and regime (in dynamical systems), are difficult to detect. In this work we present the Gradient Pattern Analysis (GPA), an operator that describes spatially extended system by means of vectorial alignment and vectorial symmetry. This operator showed interesting results dynamical systems [1] and astronomical problems [2, 3]. We briefly review this operator and propose some improvements, with respect to the measured feature and the computation cost. To improve the feature extraction, we introduce an operator which analyses the second order gradient moment. To reduce the computation time, a version of this code is presented using OpenCL. In this work we also briefly showcase two applications to this operator: Coupled Map Lattices (CML) and galaxy morphological classification. As result we observed better results with the improved operator and a lower computational cost in the parallel version.

Sistemas Dinâmicos. Morfologia de galáxias. GPU