XXVI SIBGRAPI – CONFERENCE ON GRAPHICS, PATTERNS AND IMAGES

SIBGRAPI 2013

August 5-8, Arequipa – Peru

CAPES CNPq Conselho Nacional de Desenvolvimento Científico e Tecnológico FAPERJ Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro

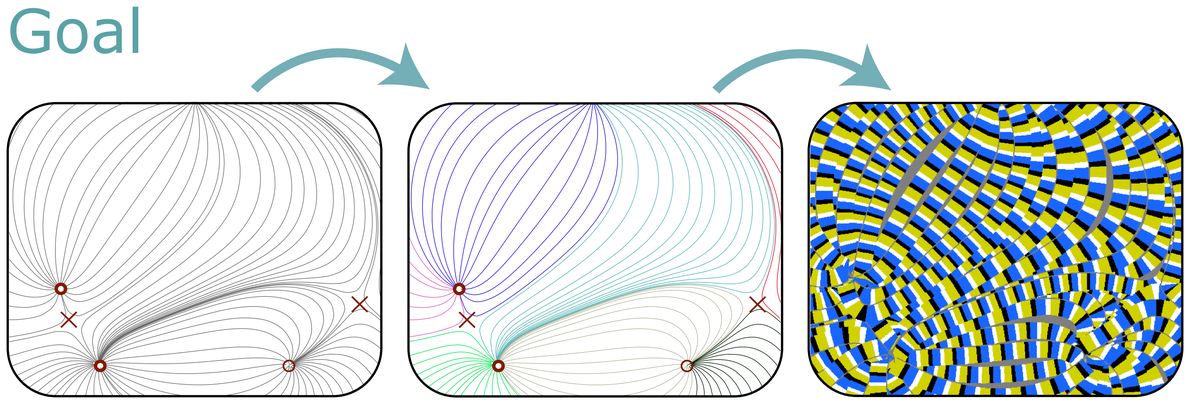
Streamline-based topological graph construction with application to self-animated images

Renata Nascimento, Thomas Lewiner
Department of Mathematics - PUC-Rio

Introduction

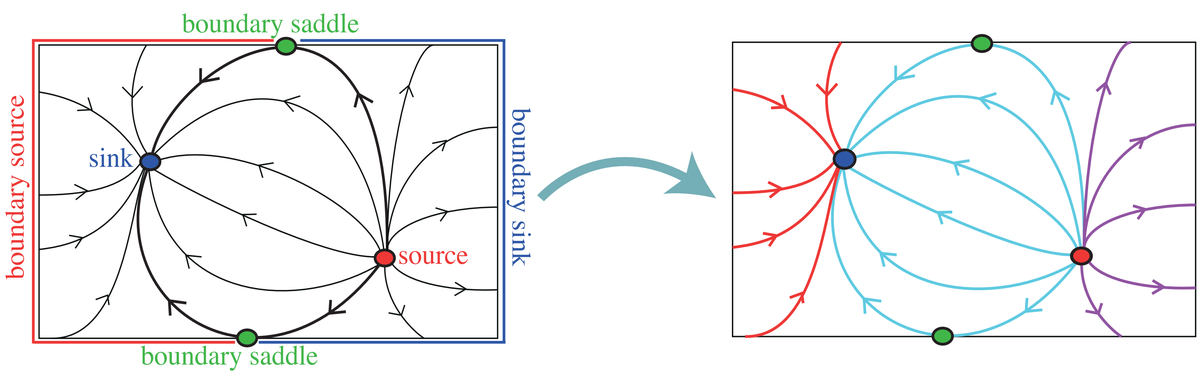
This work introduces a topological graph construction based on streamlines clustering. It is guaranteed to produce a coherent result even when some singularities are not detected. This work also details an application of topological graphs to improve the generation of self-animated images.

Goal

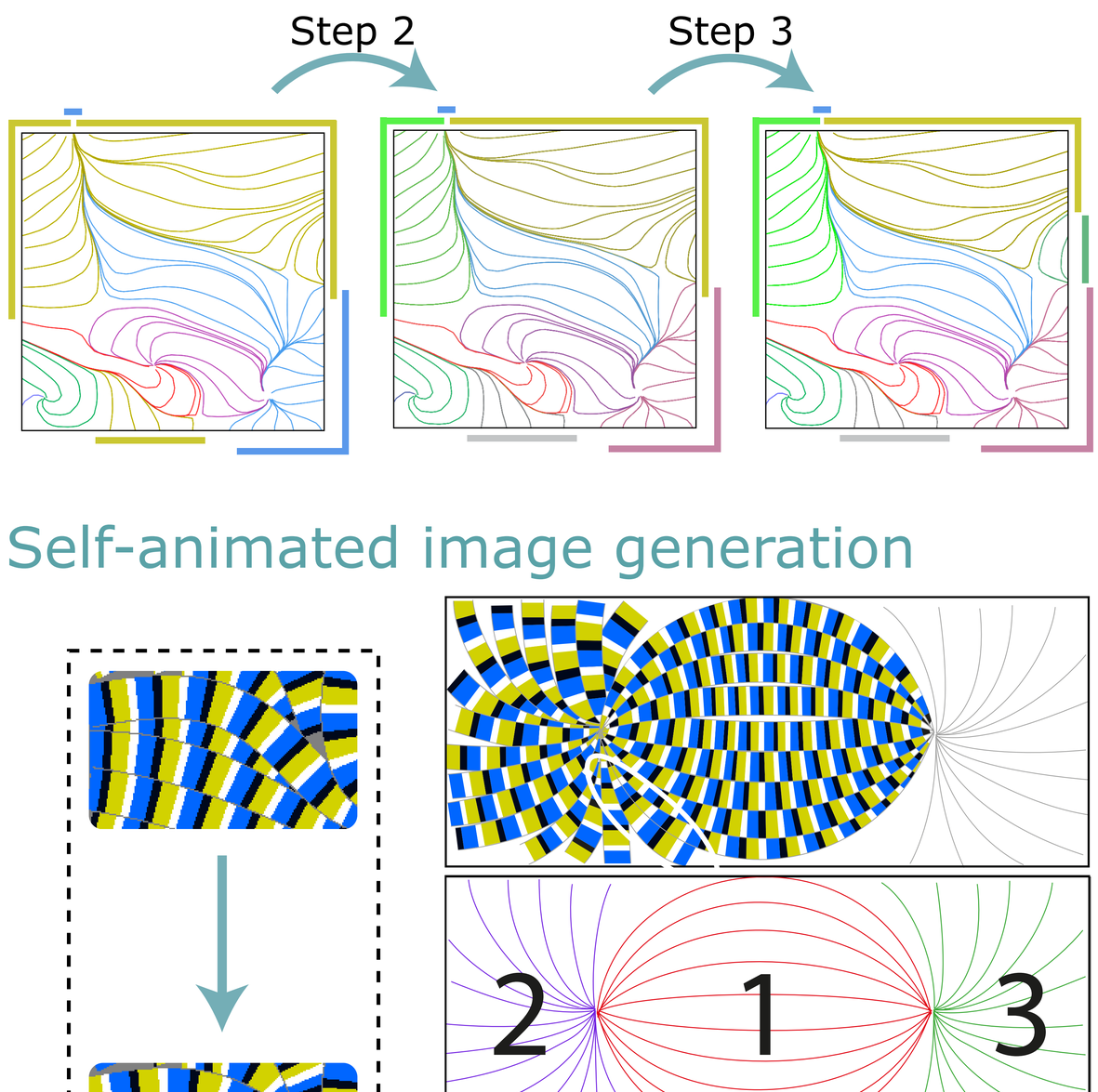


Topological graph: Vector field representation

Def.: The topological graph of a vector field ***v*** is a graph whose nodes are the singular points of ***v*** and whose arcs are its separatrices.

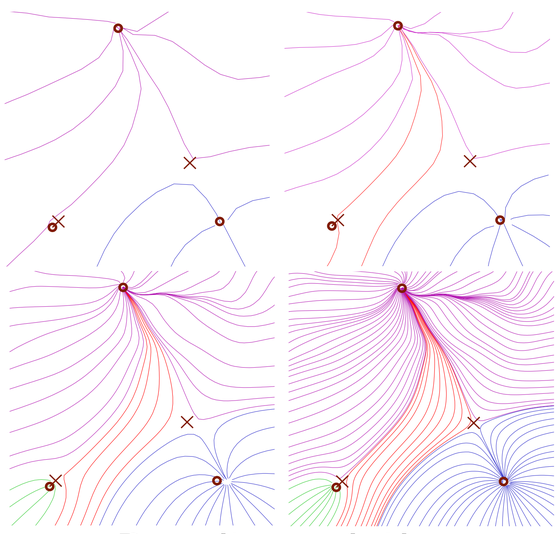


Topological graph construction from streamlines clustering

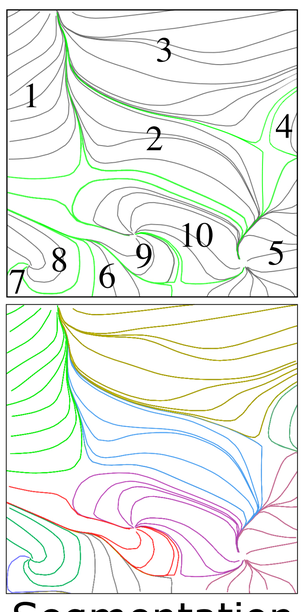


Self-animated image generation

Results

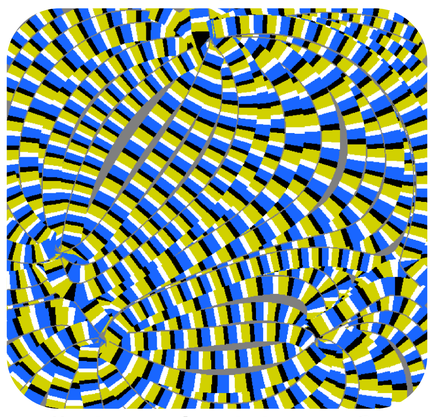


Density variation
(0.15, 0.2, 0.4, 0.9)



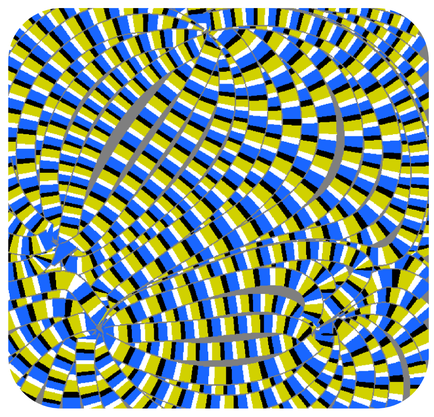
Segmentation comparison

Time: 1.54 secs



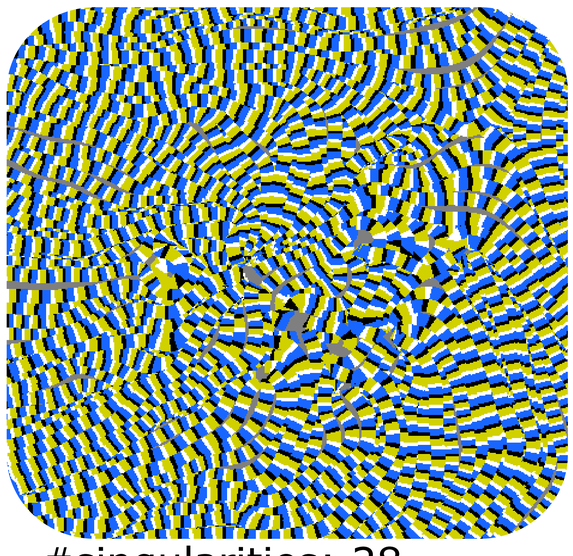
#singularities: 6
#regions: 9

Time: 3.77 secs



Gain 2.4x

Real data - Gain 5.6x



#singularities: 28
#regions: 15