

1 A neurogeometrical model for image completion and visual illusion

Our purpose is to study non-linear sub-Riemannian PDEs in the rototranslation group $SE(2)$ which arise in the model introduced by G.Citti e A.Sarti for the functional architecture of the primary visual cortex, in which perceptual phenomena such as the formation of subjective surfaces are described in terms of sub-Riemannian mean curvature flow and minimal surfaces in $SE(2)$. The existence of viscosity solutions for the mean curvature flow in the Euclidean space was deeply studied through level-sets method (Osher and Sethian) and its theoretical justification was proved by Evans and Spruck, while it was still open in $SE(2)$. Here we start filling the gap providing existence for the solution and estimates for the derivatives.

Finally we extend the proposed model to interpret the behaviour of the primary visual cortex in presence of geometric optical illusions for which infinitesimal strain theory plays an important role.