ANR Défis DIAMOND

Déconvolution d'**I**mages **A**ugmentée en **M**icroscopie **O**ptique **N** **D**imensions

UPE contributions

UPE ANR DIAMOND TASKS

UPE: coordinator of Task 5 - Deconvolution in MACROscopy

- Task 5.1: Noise shape analysis
- Task 5.2: Combination of convex optimization and discrete geometry
- Task 5.3: New restoration methods (multiple regularizations, hyperparameters estimation) and its comparisons with existing ones
- Task 5.4: Parallel implementation

Noise shape analysis

Poisson + Gauss well established in literature and fits the data so far.

Associated problems:

- Noise parameter estimation;
- Denoising
- Joint deblurring + denoising

Many more details in talks of Ania and Saima

UPE ANR DIAMOND MILESTONES

Non-blind deblurring:

- PSF should have been obtained from task 1 (measured or analytic PSF). So far data is incomplete – various reasons
- Noise shape analysis: good progress
- Hybrid optimization combining convex and discrete optimization: joint quantization and denoising
- New restoration methods still to be proposed subject to PSF availability.

PERFORMED WORK

- PSFs: Discussion is still open between Praveen, Gilbert and UPE in order to determine a MACROscope PSF model
- Noise: A suitable identification method was proposed; G. Engler generated data for noise estimation and considered model validation. Recent results to be shown today
- Hybrid optimization: Solution combining Graph cut and PPXA+ has been proposed for optimal joint quantization and denoising.

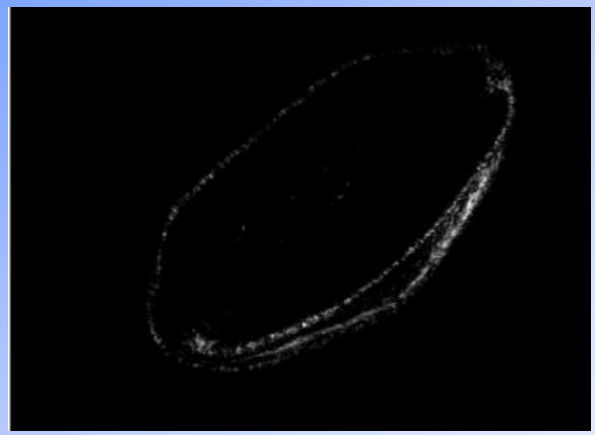
NOISE INDENTIFICATION

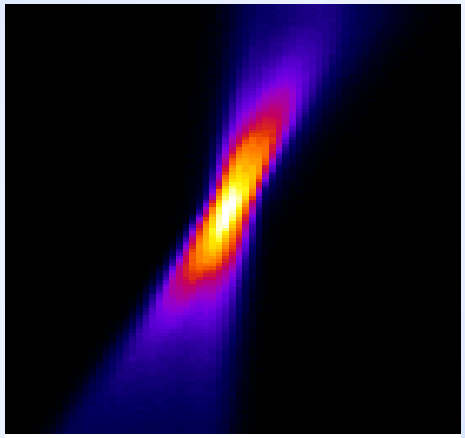
- General model of noise arising in fluorescence based measurements: Poisson - Gaussian
- State of the art methods
- New cumulant-based method
- New EM-based method, which was parallelized
- Validation of our model and proposed method on MACROconfocal data
- Photobleaching phenomenon taken into account.

WORK IN PROGRESS

- General noise model: to be taken into account in restoration methods
- PSF modelization: variations ?

- Future
  - Image restoration under spatially variant PSF assumptions





Thank you for your attention