

## LM in Artificial Intelligence Image Processing and Computer Vision 17/07/2024

- 1) (A) Describe the key idea behind the Non-Local Means (NLM) image smoothing filter, also highlighting the main difference with respect to other linear and non-linear filters. (B) Describe the mathematical formulation of the NLM filter, describe its components and provide a list of the hyperparameters of the algorithm. (C) Provide the algorithm computational complexity and discuss how it can be reduced.
- 2) (A) Explain where lens distortion takes place in the image formation process and how radial lens distortion is modelled. (B) Then, discuss how an initial guess for radial distorsion parameters is obtained in the Zhang's algorithm, explaining what kind of linear system is solved, how it is solved and what are the shapes of the vectors and matrices involved. (C) Finally, briefly describe how and why images are undistorted after calibration.

