

# Assignment 1

*Name Surname*

*Matriculation number*

## Superresolution

1. **Problem.** Briefly describe the problem.
2. **Motivations.** Describe the reasons and motivations behind this problem.
3. **Derivation of gradient.** In this section you should:
  - Write the finite difference approximation of the objective function  $E$ .
  - Compute the gradient of the objective function  $\nabla_u E$ .
4. **Implement gradient descent for superresolution.** In this section you should:
  - Show some images, as the the gradient method progresses iteration by iteration. Display the initial and the final image and 3 more images in between.
5. **Show images obtained by very high, very low and optimal  $\lambda$ .** In this section you should:
  - Display 3 images with different  $\lambda$  (very low, very high and optimal).
  - Describe the effect of  $\lambda$  on the solution.
6. **Find optimal  $\lambda$ .** In this section you should:
  - Display the  $SSD$  vs.  $\lambda$  graph.
  - Describe the effect of  $\lambda$  with respect to the  $SSD$  between the ground truth and the solution image.