**Summary of the 1st week activities**

**Overview of the co-registration method & lab activities**

* Refer to the 1st week slides in the Dropbox folder
  + “FIRST-WEEK-MATERIAL/PRESENTATIONS”

**Lab Session**

* **From 2D images to 2D triangle meshes**
  + - Load a 2D image & (eventually) make the input image a square image
    - Extract the boundary components (black-white adjacent pixels) or representative level-sets
    - Considering pixels as 2D points (with integer coordinates), generate a Delaunay triangulation of the input point set
    - Visualise the triangulation
  + **From 3D (MRI) images to tetrahedral meshes**
    - Load a 3D MR image, single slices, read metadata, and convert MRI slices to JPG images (for co-registration)
    - For each slice, extract representative level-sets and generate a tetrahedral mesh by applying the Delaunay triangulation
    - Visualise the tetrahedralization
  + **Triangle meshes**
    - Load triangle meshes in PLY format
    - Visualize triangle meshes (e.g., segmented 3D districts from MR images)
    - Mesh data structures for mesh representation and visualisation
      * Discussion on different mesh representations (OFF & related data structure, GMSH tool)
    - Change the sampling density of the Delaunay triangulation through subdivision (simple implementation) or simplification (main ideas). Some hints on tools for mesh processing and the generation of tetrahedral meshes (e.g., Meshlab, TET-GEN)
    - Compute and plot the main properties of the triangle mesh
    - Edge length (*isometry-preserving*)
    - Triangle area (*area-preserving*)
    - Triangle angle (*conformal*)
  + **Transformation**
    - Classes of transformations: affine, “algebraic”, etc (*see slides*)
    - Classes of transformation in Matlab (affine transformation) and in “our code” (deforma.m)
    - Evaluation of the transformation distortion in terms of edge length, angles, and triangle areas
    - Overview on the co-registration code and on the structure of deforma.m
    - Selection of preliminary test cased on the code and preliminary results
    - Identification of
  + Interesting test cases (see FIRST-WEEK-MATERIAL/ CO-REGISTRATION-TESTS)
  + possible improvements (e.g., include the class of affine transformation (?) for the co-regitration)
  + **Contact**: for questions, I’ll be available by
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**Summary of results during the first week**