University of Salzburg — Lecturer: Roland Kwitt

Imaging Beyond Consumer Cameras – Proseminar (911.422)

Exercise sheet **A**

Exercise 1. 4 P.

Download the ZIP file linked below. It contains a (brain) MRI image (`a01.nii.gz`) with a (manual) segmentation (`a01-seg.nii.gz`). The segmentation image only contains integers specifying to which anatomical structure each voxel belongs to.

Download by clicking

Use either `Convert3D` or `ITKSnap`, see , to compute, for the image (`a01.nii.gz`),

1. the image size (in voxel),
2. the physical voxel size (in mm),
3. the image orientation (e.g., RAS, etc.),
4. the image origin, and
5. the range of the intensity values in the MRI image.

Exercise 2. 2 P.

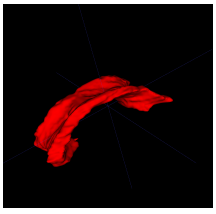
Use the MRI image from **Exercise 1** and convert the image orientation to *RPI* using `Convert3D`. Provide the `Convert3D` command.

Exercise 3. 4 P.

Use `Convert3D` to extract the middle transversal slice from the MRI image in **Exercise 1** and save it (1) as a PNG (visualize this) and (2) as a `.nii` file. What could be the problem with the PNG image here? Provide the `Convert3D` command!

Exercise 4. 5 P.

The ZIP file also contains a XML file `Hammers_mith_atlases_n30r95_label_indices_SPM12_20170315.xml` that lists the IDs of all anatomical brain structures present in `a01-seg.nii.gz`; Identify the ID of the *corpus callosum* and extract a binary volume (i.e., values in $\{0, 1\}$ with 1 for voxel belonging to the *corpus callosum* and 0 else). *Hint*: use the `-thresh` command line parameter of `Convert3D`). Visualize the corpus callosum in 3D (e.g., load the extracted corpus callosum as a *segmentation* in `ITKSnap` and update the 3D view) - this should look something like the image below.



Finally, use Convert3D to compute the volume of this structure (in mm^3). Provide all Convert3D commands!

Total #points: 15 P.