Stephen Marsland - Registration Notes

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The following outlines the issues raised in brevity.

1 Primary Notes

- Code for two-dimensional warps was explained in some detail.
- The most appropriate warp to be used in 2-D is bi-harmonic CPS.
- Formulation for 3-D warps is identified and highlighted in paper (the original paper is written in Italian, but the mathematical notions contribute more than prose to the understanding in this case).
- Unlike the implementation path previously followed, only knot-points are required to apply Greens functions. More on this will be explored shortly.
- **Green.m** is the main function to be used for warping. An up-to-date version must always be retrieved using CVS before use.
- **Pick_disk_points.m** uses the discrepancy image in brain registration (see MICCAI 2003). **Pick_skull_points.m** is designated solely to select the knot-points around the skull. It can provide useful insight into selection of points.

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- 3-D registration is unrealistic. Complexity makes implementation insufficiently fast if a reasonably high resolution is expected, e.g. 100^3 voxels. Under such a registration task, even something as fundamental as knot-points identification becomes highly cumbersome.
- C++ implementation for registration purposes should be avoided.
- *Compiled* MATLAB code will speed up execution by up to 1 order of magnitude. It can be considered as a valuable option.

2 Secondary Notes

- Extensive registration notes from December 2002 were received. This was a paper copy, but an electronic version will possibly be requested from Carole later on.
- Stephen is leaving the Division in the end of January, yet Carole will be able to assist with registration technicalities too.

3 Ways to Proceed

The 2-D synthetic data currently generated should be registered using Greens function. Model-based group-wise registration is expected to be the next stage. Since 3-D extensions seem impractical, it might be better to improve the existing approach and speed it up in various ways. All these issues will require deeper discussions.