Registration of 3D rotational angiography to CT (or MR) angiography

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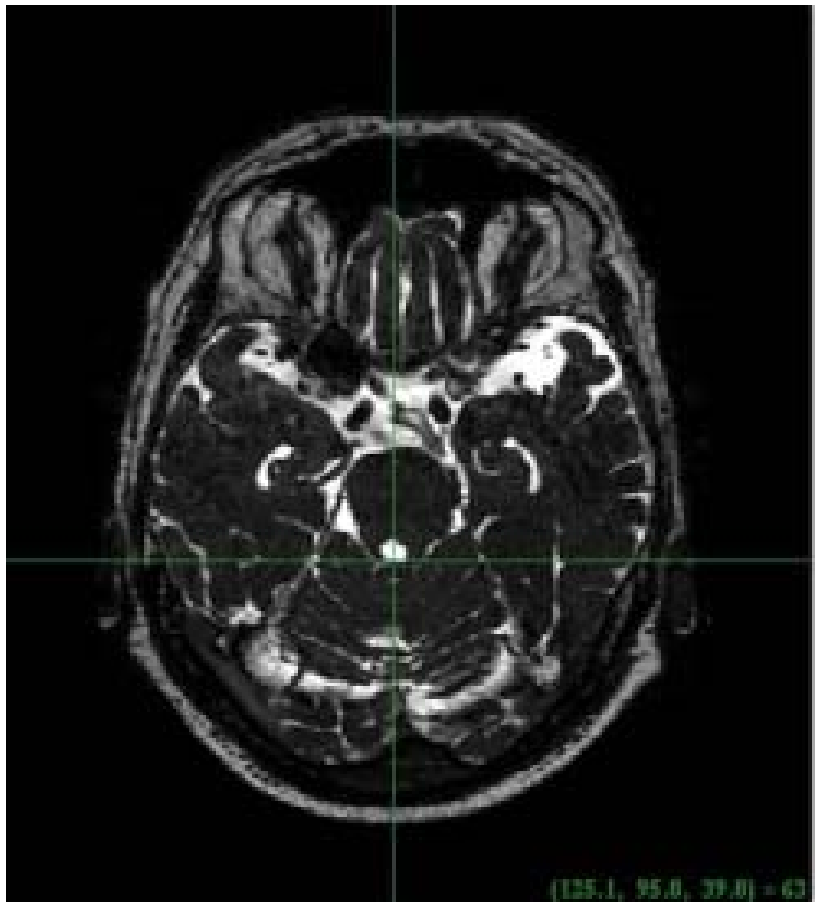
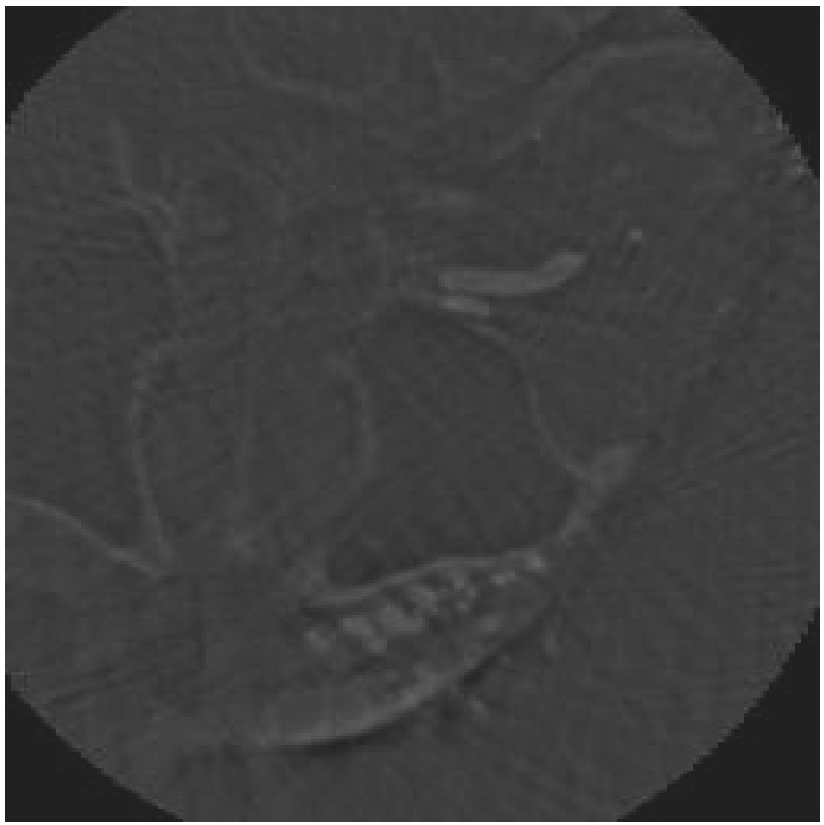
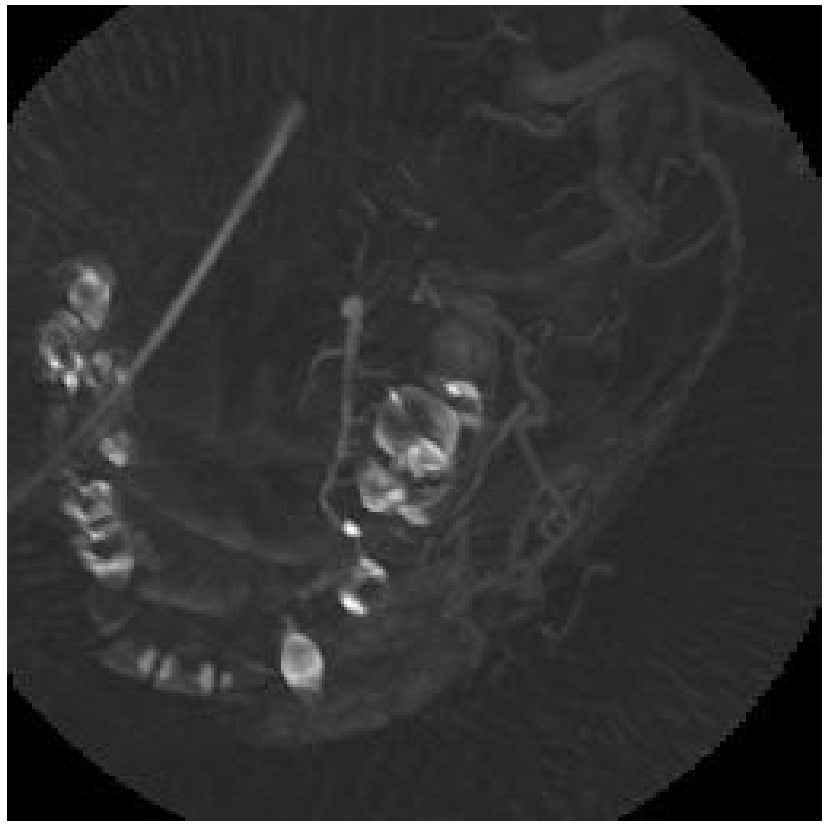
CT/MR Angiography

CT angiography (CTA) or magnetic resonance angiography (MRA) data conventionally used in vascular surgical procedures.



3D Rotational Angiography (3DRA)





Motivation

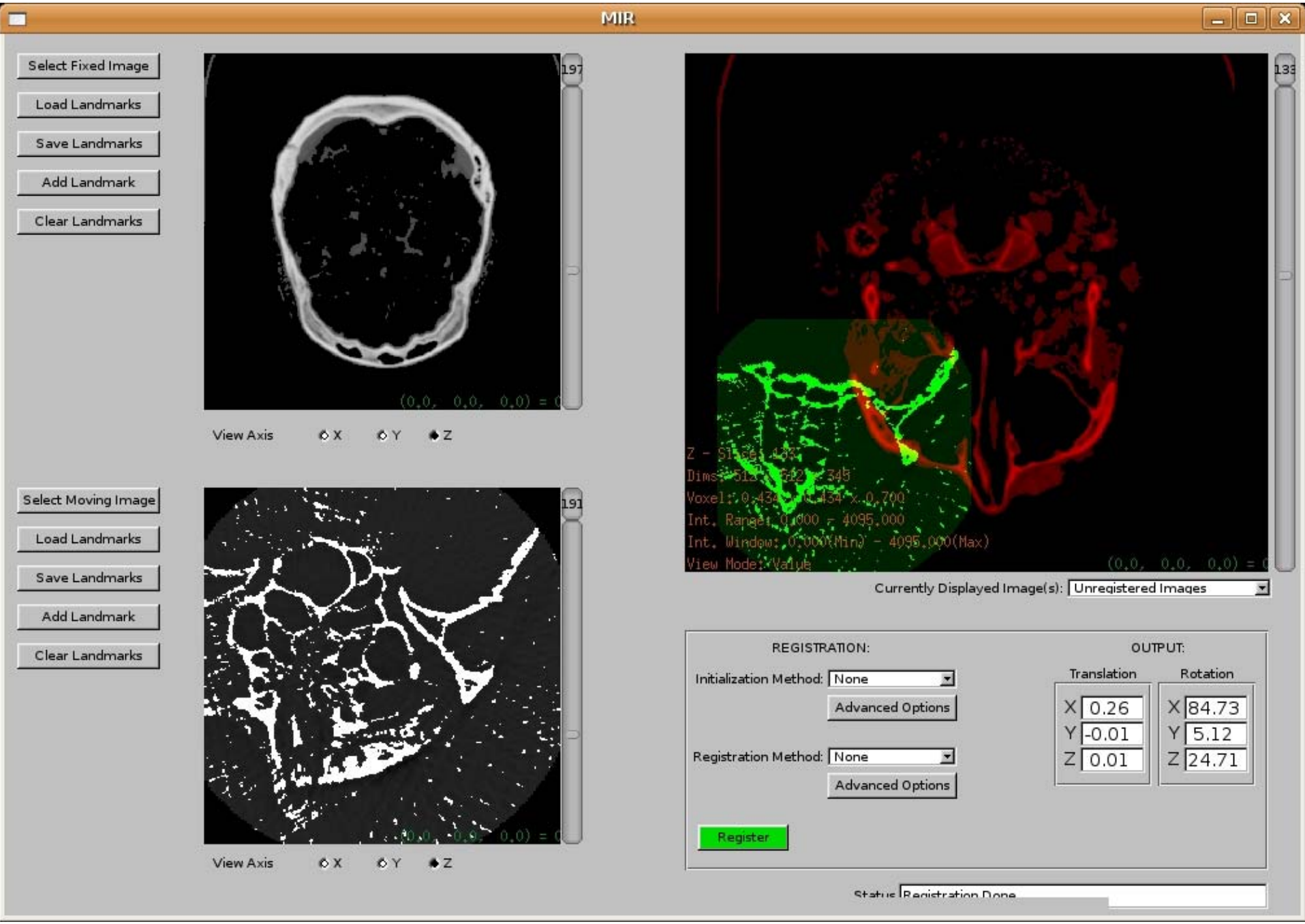
- CTA and MRA provide a context anatomy (bones and tissue).

- 3DRA provide a clear high resolution understanding of vasculature.

► *Registering 3DRA to CTA/MRA allows for high resolution vessel information to be put into the context anatomy.*

MIR Tool

- ITK Segmentation and Registration Toolkit
- FLTK GUI Toolkit
- Mutual Information (MI) based image registration algorithm
- Optional Moments (automatic)/Landmark (user-driven) initialization step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Unregistered Images
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Initialization Method:
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Y -0.01
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Rotation
X 84.73
Y 5.12
Z 24.71
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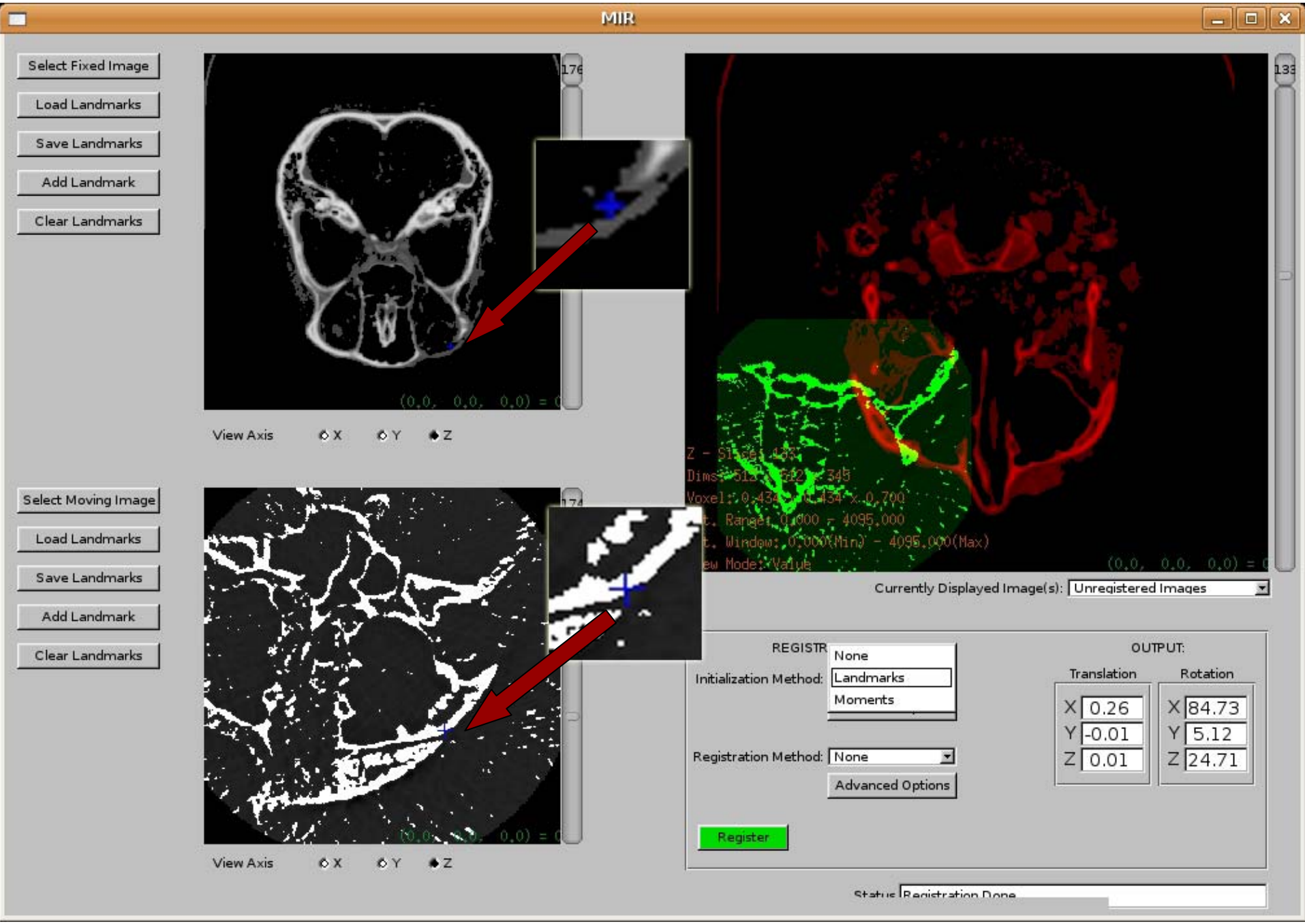
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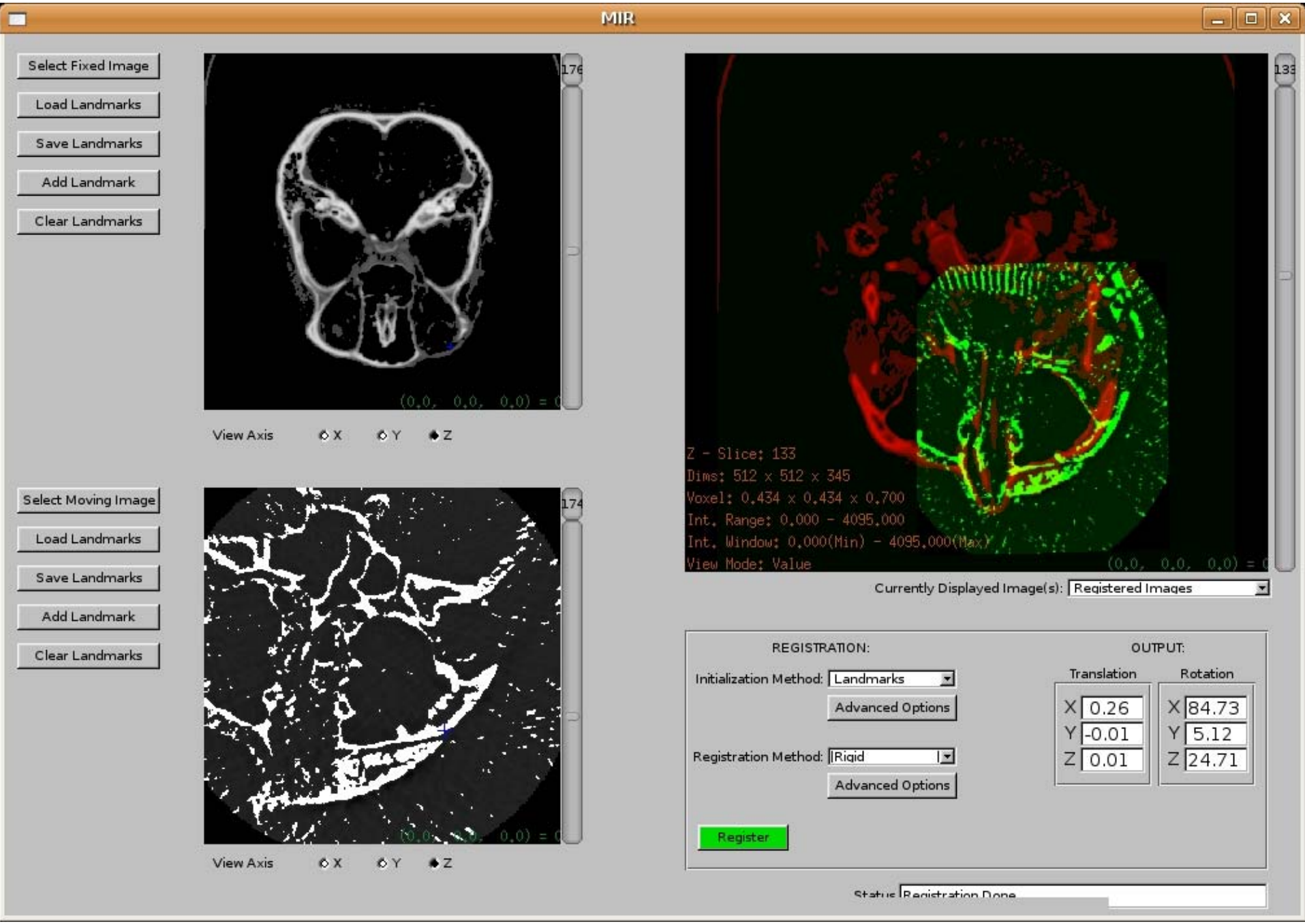
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Voxel: 0.434 x 0.434 x 0.700
Int. Range: 0.000 - 4095.000
Int. Window: 0.000(Min) - 4095.000(Max)
View Mode: Value
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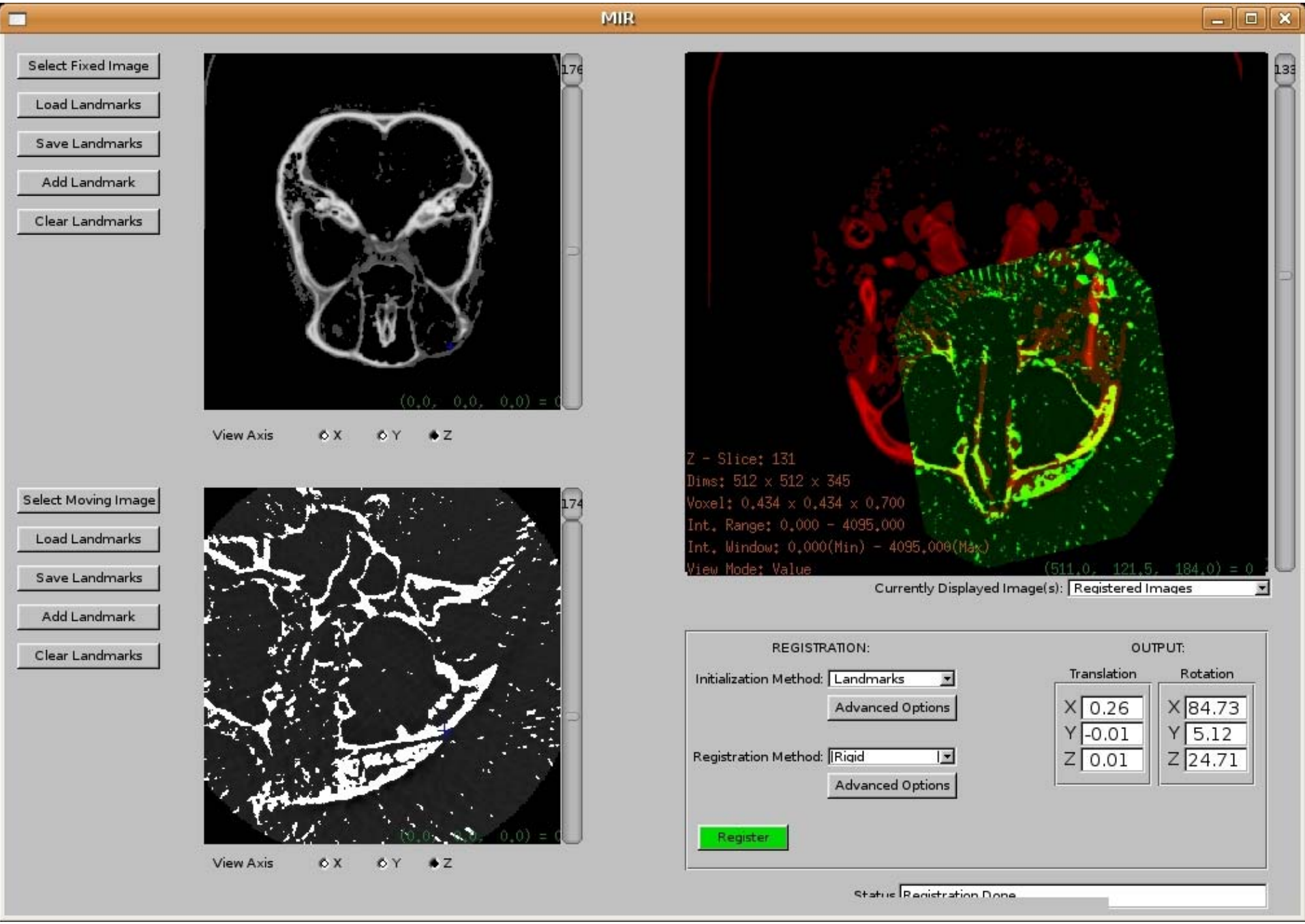
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Results

- Due to relatively high noise level in 3DRA images landmark initialized registration works best.

- For registration of other modalities (i.e. CT to MRI) automatic rigid registration with no initialization step is sufficient.

Conclusions

- Developed a successful multi-modal medical image registration framework for the registration of angiography images.
- 3DRA to CT-/MR-A combines detailed information of the vascular system with content information about bone and tissue.
- Protocol at the hospital adjusted so suitable dataset combinations are more often acquired (typically CTA *and* 3DRA).

The End

Questions?

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