



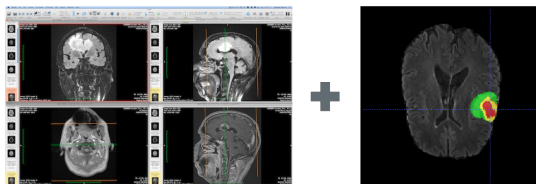
Medical Images Research Framework

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Motivation



Project goal:

- ▶ to create an extensible platform for development of medical instruments
- ▶ to integrate this instruments into a convenient environment in which many other essential instruments for physicians may be seamlessly used

Related work



FreeSurfer



icomatrix



Ginkgo
CADx



3DSlicer



MITK vs MIRF

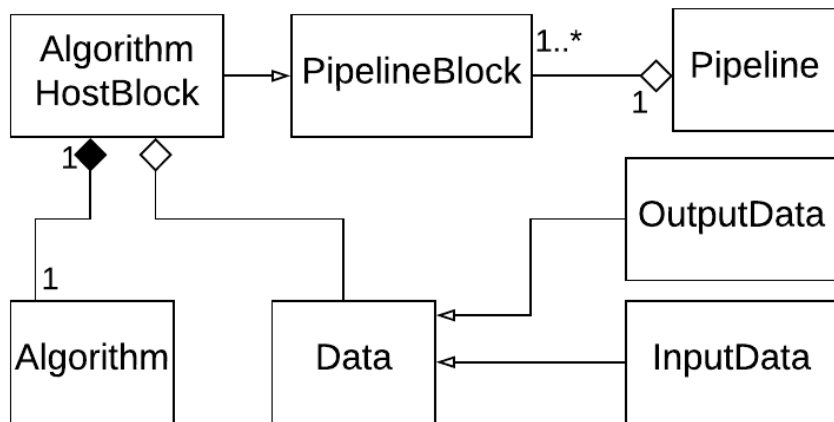


- ▶ C++
- ▶ Requires integration into its own infrastructure
- ▶ Many good plugins for medical images



- ▶ Kotlin
- ▶ Can be integrated into existing applications
- ▶ Cross-platform and supports mobile apps

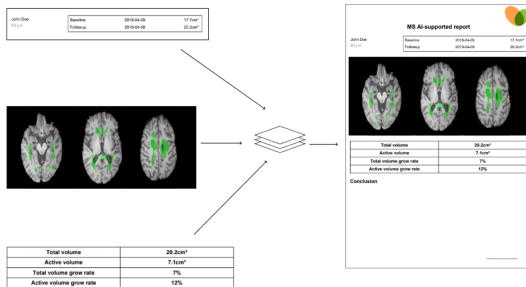
MIRF Core architecture



Supported image formats

- ▶ Common intermediate representation
- ▶ Supported formats:
 - ▶ DICOM
 - ▶ NIfTI
 - ▶ MHD (from ITK)

Report generation



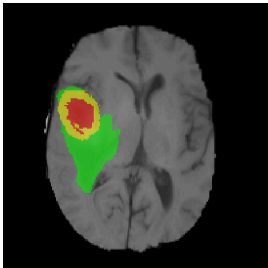
name	value
Total volume	46.172 cm ³
Active volume	12.0 cm ³
Total volume grow rate	144.2875%
Active volume grow rate	120.0%

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Tensorflow integration

- ▶ Java API for Tensorflow
- ▶ Wrapper blocks for pre-learned models

Example: brain tumor analysis



Various tumor tissues:
necrotic core (red), tumor
site (yellow), edema (green)

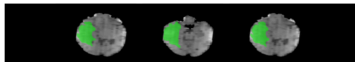
Brain Tumor Segmentation Report



John Doe
54 y.o.

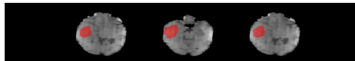
Total brain volume	1194.177999999978 cm ³
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Edema:



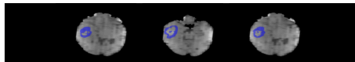
Whole tumor volume	102.3119999999984 cm ³
Tumor percentage compared to brain volume	8,57%

Necrotic/cystic core:



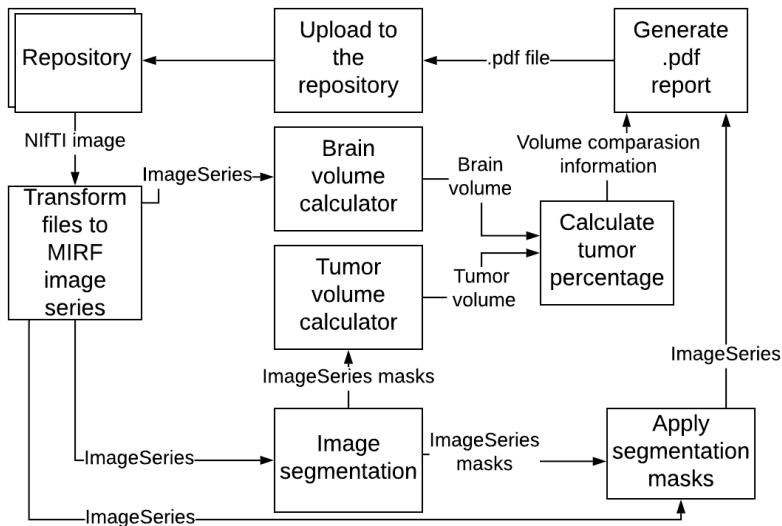
Necrotic/cystic core tumor volume	33.39699999999984 cm ³
Percentage compared to brain volume	2,80%

Enhancing core:

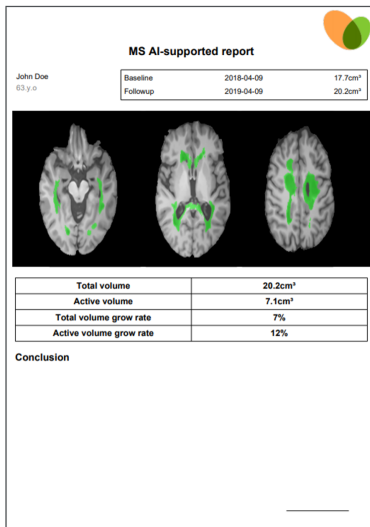


Enhancing core tumor volume	20.496 cm ³
Percentage compared to brain volume	1,72%

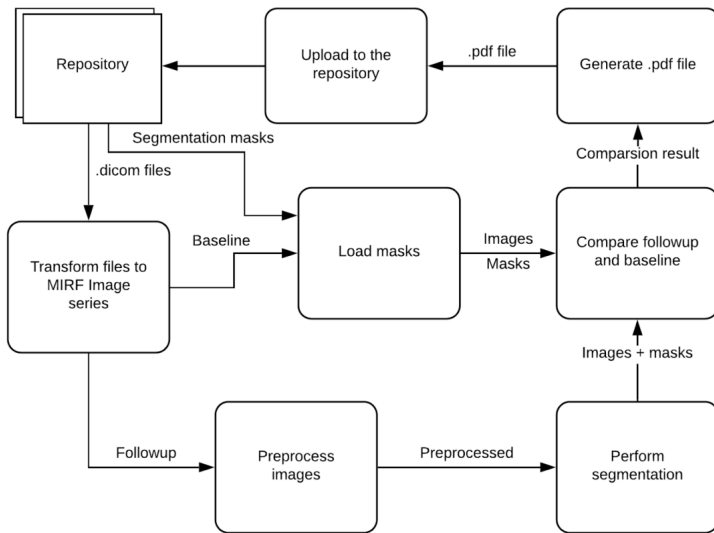
Example: brain tumor analysis



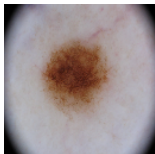
Example: multiple sclerosis



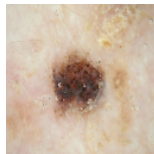
Example: multiple sclerosis



- ▶ Example: skin cancer diagnosis using phone camera



Benign mole



Malignant mole

- ▶ Separate MIRF build for Android

- ▶ <http://mathandmedlab.com/mirf.html>
- ▶ <https://github.com/MathAndMedLab/Medical-images-research-framework>
- ▶ contact@mathandmedlab.com