Three ways to use the NA-MIC kit

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The NA-MIC Kit

3D Slicer  VTK  ITK  Nrrd  KWidgets

CMake  CTest  Dart  Batch Make  XNAT
3D Slicer

- Open-source application available for Windows, Linux and Mac
- More than 2.8 million lines of code
- Neuroscience and Image-Guided Therapy

Image courtesy of Marianna Jakab, SPL
3D Slicer History

- Started in 1997 between the Surgical Planning Lab (Harvard) and the CSAIL (MIT)

Image Courtesy of the CSAIL, MIT
3D Slicer History

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- 2010: Multi-institution effort to share the latest advances in image analysis with clinicians and scientists
3D Slicer Geography

- **Open-source** platform developed on a national scale
- Supported by the **National Institutes of Health** consortia which include
  - National Alliance for Medical Image Computing
  - Neuroimage Analysis Center
  P.I. Prof. Ron Kikinis, MD,
  Director of the Surgical Planning Lab
Three ways to use the NA-MIC kit
The NA-MIC kit from three user perspectives

- Clinical researchers
- Biomedical engineers
- Algorithm developers
Clinical researchers

Interact in 3D to enhance data interpretation
Visualize

• User-driven views of anatomical structures
• Overlay between 2D grey-levels images and 3D anatomical structures
• Intuitive interaction with the 3D models
Biomedical Engineers

Extract relevant information from complex data
Analyze

- Advanced analysis of complex data
- Multimodal data fusion
- Clinical parameters extraction

Image courtesy of Mahnaz Maddah, MIT
Analyze

Statistical Analysis of Anatomy from Medical Images

Courtesy of Tom Fletcher, University of Utah.
Algorithm Developers

\[
\ln p(X | \pi, \mu, \Sigma) = \sum_{n=1}^{N} \ln \left( \sum_{k=1}^{K} \pi_k N(x_n | \mu_k, \Sigma_k) \right)
\]

Develop plug-ins to extend image analysis capabilities

#include "itkDiscreteGaussianImageFilter.h"

int main( int argc, char * argv[] )
{
    PARSE_ARGS;
    typedef itk::Image< short, 3 >   ImageType;
    typedef itk::ImageFileReader< ImageType >  ReaderType;
    typedef itk::ImageFileWriter< ImageType >  WriterType;
    ReaderType::Pointer reader = ReaderType::New();
    WriterType::Pointer writer = WriterType::New();
    reader->SetFileName( FilterInputVolume.c_str() );
    writer->SetFileName(FilterOutputVolume.c_str());
    typedef itk::DiscreteGaussianImageFilter< ImageType,  ImageType > FilterType;
    FilterType::Pointer filter = FilterType::New();
}
Create

• Integrate external executables with the Slicer3 platform
• Develop plug-ins in C++, Tcl or Python
• Build upon the NA-MIC kit to meet your scientific goals
Clinical researchers
Biomedical engineers
Algorithm developers

Translate techniques into skills
Slicer3: A Technology Delivery Platform

- Integrated solution for delivering technological breakthroughs to the clinical research community

- Practical aspects: Open-source and available on all major computer platforms
Conclusion

- An end-user application for image analysis
- An open-source environment for software development
- A technology delivery platform for community breakthroughs