

MATLAB



python

Automating OpenSim Processing

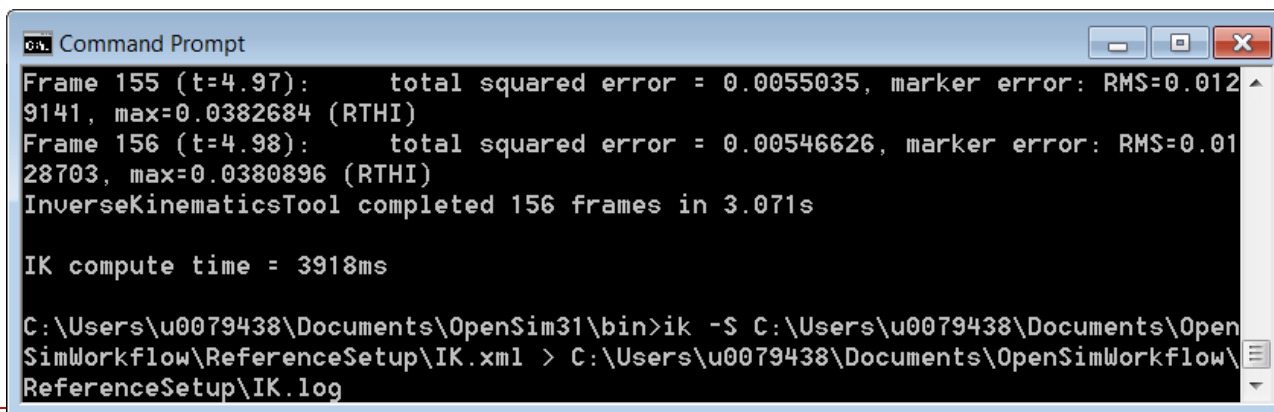
OpenSim Workshop

Automated processing

- Command line
- API

Command line

- Execute OpenSim tools from command line
 - All executables that are available in `<OpenSim_Install_Dir>/bin`
 - ik, id, rra, cmc, analyze...
 - Open command window
 - Go to `<OpenSim_Install_Dir>/bin`
 - Run setup file
 - executable `-S setup.xml`
 - e.g. **ik -S** setup_ik.xml
 - Output in command window
 - Add log file
 - » e.g. ik -S setup_ik.xml > setup_ik.log
 - Use full paths in setup .xml file



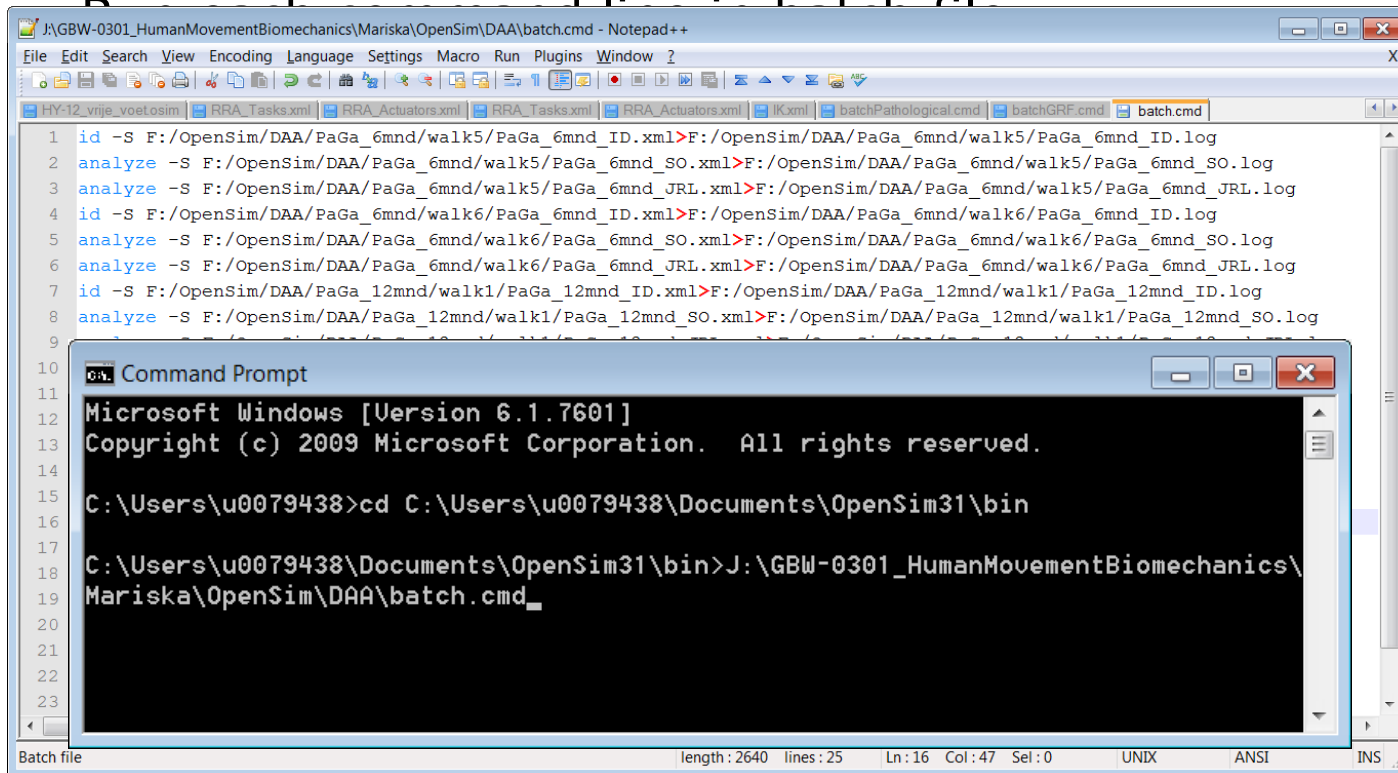
```
Command Prompt
Frame 155 (t=4.97):      total squared error = 0.0055035, marker error: RMS=0.012
9141, max=0.0382684 (RTHI)
Frame 156 (t=4.98):      total squared error = 0.00546626, marker error: RMS=0.01
28703, max=0.0380896 (RTHI)
InverseKinematicsTool completed 156 frames in 3.071s

IK compute time = 3918ms

C:\Users\u0079438\Documents\OpenSim31\bin>ik -S C:\Users\u0079438\Documents\Open
SimWorkflow\ReferenceSetup\IK.xml > C:\Users\u0079438\Documents\OpenSimWorkflow\
ReferenceSetup\IK.log
```

Batch processing

- Command lines in .cmd file
 - e.g. `ik -S setup_ik.xml > setup_ik.log`
 - Write output to log file
 - Combine different analysis
- Run .cmd file from command line



The image shows a Notepad++ window with a batch file named 'batch.cmd' open. The batch file contains the following commands:

```
1 id -S F:/OpenSim/DAA/PaGa_6mnd/walk5/PaGa_6mnd_ID.xml>F:/OpenSim/DAA/PaGa_6mnd/walk5/PaGa_6mnd_ID.log
2 analyze -S F:/OpenSim/DAA/PaGa_6mnd/walk5/PaGa_6mnd_SO.xml>F:/OpenSim/DAA/PaGa_6mnd/walk5/PaGa_6mnd_SO.log
3 analyze -S F:/OpenSim/DAA/PaGa_6mnd/walk5/PaGa_6mnd_JRL.xml>F:/OpenSim/DAA/PaGa_6mnd/walk5/PaGa_6mnd_JRL.log
4 id -S F:/OpenSim/DAA/PaGa_6mnd/walk6/PaGa_6mnd_ID.xml>F:/OpenSim/DAA/PaGa_6mnd/walk6/PaGa_6mnd_ID.log
5 analyze -S F:/OpenSim/DAA/PaGa_6mnd/walk6/PaGa_6mnd_SO.xml>F:/OpenSim/DAA/PaGa_6mnd/walk6/PaGa_6mnd_SO.log
6 analyze -S F:/OpenSim/DAA/PaGa_6mnd/walk6/PaGa_6mnd_JRL.xml>F:/OpenSim/DAA/PaGa_6mnd/walk6/PaGa_6mnd_JRL.log
7 id -S F:/OpenSim/DAA/PaGa_12mnd/walk1/PaGa_12mnd_ID.xml>F:/OpenSim/DAA/PaGa_12mnd/walk1/PaGa_12mnd_ID.log
8 analyze -S F:/OpenSim/DAA/PaGa_12mnd/walk1/PaGa_12mnd_SO.xml>F:/OpenSim/DAA/PaGa_12mnd/walk1/PaGa_12mnd_SO.log
```

Below the Notepad++ window, a Command Prompt window is open, showing the execution of the batch file:

```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\u0079438>cd C:\Users\u0079438\Documents\OpenSim31\bin
C:\Users\u0079438\Documents\OpenSim31\bin>J:\GBW-0301_HumanMovementBiomechanics\
Mariska\OpenSim\DAA\batch.cmd_
```

The Command Prompt window also shows the status bar at the bottom: length: 2640 lines: 25 Ln: 16 Col: 47 Sel: 0 UNIX ANSI INS

OpenSim API

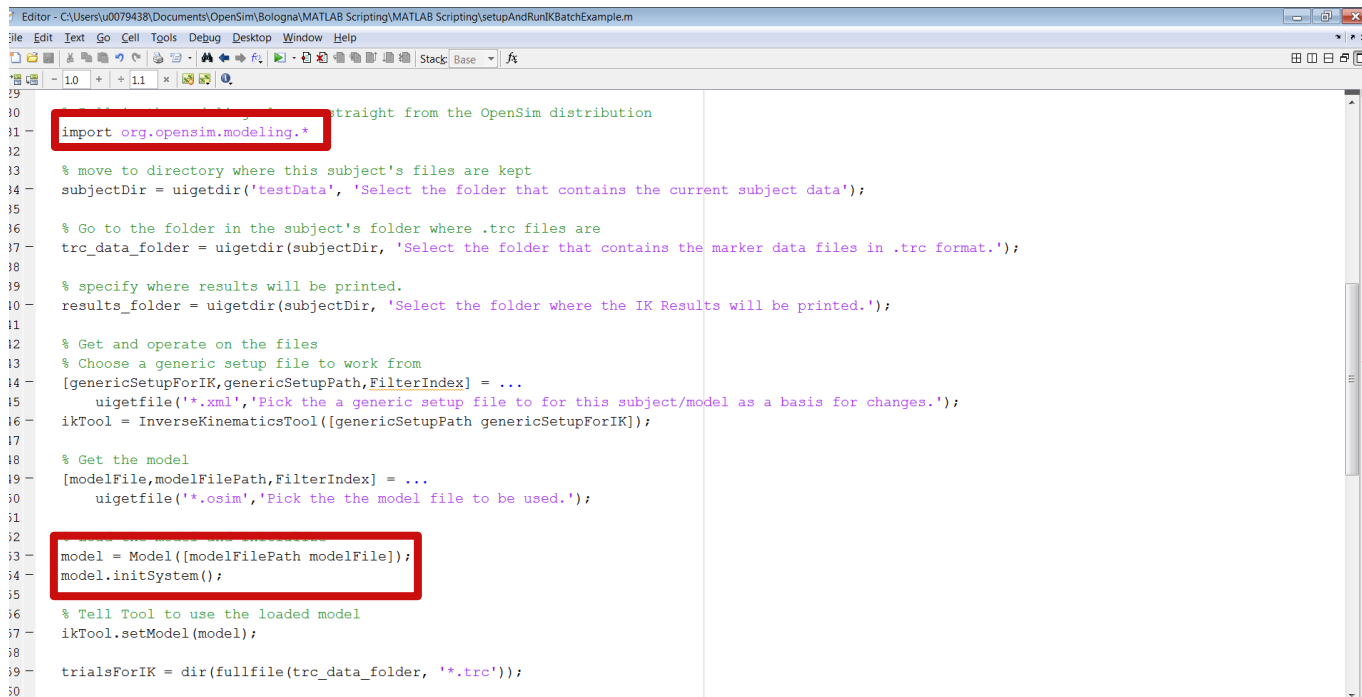
- Application programming interface
 - Interface between software programs
 - Matlab
 - Python
- Build/adapt models
- Create setup files
- Run analyses
- ...

Scripting

- OpenSim GUI scripting shell
- Matlab
- Python

Scripting

- Matlab
 - Setup Matlab Scripting environment
 - Automated setup from OpenSim 3.2 onward
 - Load OpenSim libraries
 - Import model



```
Editor - C:\Users\u0079438\Documents\OpenSim\Bologna\MATLAB Scripting\MATLAB Scripting\setupAndRunIKBatchExample.m
File Edit Text Go Cell Tools Debug Desktop Window Help
Stack: Base
19
20 % Get the model straight from the OpenSim distribution
21 import org.opensim.modeling.*
22
23 % move to directory where this subject's files are kept
24 subjectDir = uigetdir('testData', 'Select the folder that contains the current subject data');
25
26 % Go to the folder in the subject's folder where .trc files are
27 trc_data_folder = uigetdir(subjectDir, 'Select the folder that contains the marker data files in .trc format.');
```

```
28
29 % specify where results will be printed.
30 results_folder = uigetdir(subjectDir, 'Select the folder where the IK Results will be printed.');
```

```
31
32 % Get and operate on the files
33 % Choose a generic setup file to work from
34 [genericSetupForIK, genericSetupPath, FilterIndex] = ...
35     uigetfile('*.xml', 'Pick the a generic setup file for this subject/model as a basis for changes.');
```

```
36 ikTool = InverseKinematicsTool([genericSetupPath genericSetupForIK]);
37
38 % Get the model
39 [modelFile, modelFilePath, FilterIndex] = ...
40     uigetfile('*.osim', 'Pick the the model file to be used.');
```

```
41
42 % Load the model and initialize
43 model = Model([modelFilePath modelFile]);
44 model.initSystem();
45
46 % Tell Tool to use the loaded model
47 ikTool.setModel(model);
48
49 trialsForIK = dir(fullfile(trc_data_folder, '*.trc'));
50
```

Useful recourses

- Command line
 - <http://simtk-confluence.stanford.edu:8080/display/OpenSim/Command+Line+Utilities>
- API
 - <http://simtk-confluence.stanford.edu:8080/display/OpenSim/Introduction+to+the+OpenSim+API>
- Scripting
 - <http://simtk-confluence.stanford.edu:8080/display/OpenSim/Scripting>
 - <http://simtk-confluence.stanford.edu:8080/display/OpenSim/Common+Scripting+Commands>
- Doxygen (documentation of classes and methods)
 - https://simtk.org/api_docs/opensim/api_docs32/
- Example scripts
 - Installed with OpenSim
 - <OpenSim_Install_Dir>/Scripts