

Grand Challenge Framework

**Powered By
Kitware's Midas Platform**

<http://www.midasplatform.org>

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What is the Midas Platform?

- System for heterogeneous data hosting
 - Images, videos, presentations, DICOM, ...
- Server-side processing
 - ParaViewWeb, Condor Grid, ...
- Report generation
 - Grand challenge scoring, image-based measures, ...
- Integration into existing workflows
 - Web interface
 - RESTful interface
 - API for access from C++ and Python
- Multiple levels of data and user security
- Highly customizable
- Proven installations throughout the world

Midas Platform Installations

- <http://midasplatform.org/MIDAS/project/midasuse.html>

- Brigham and Women's Hospital & the National Alliance for Medical Image Computing

- Thousands of papers and datasets and users

- <http://www.spl.harvard.edu/publications>

- Optical Society of America, National Library of Medicine, NCI intramural research, Insight Journal, Department of Psychiatry at UNC, ...

- [Retrospective Image Registration Evaluation](#)

- Grandfather of all Grand Challenges
- Michael Fitzpatrick from Vanderbuildt

Title	Authors	Date	Collection	Reference	Export
Predictorial Evaluation of an MRI-compatible Prostateic Robot [New]	Tokuda J, Song B-E, Fischer G, Yoshimura H, Saitoh R, Cho N-B, Tuncal K, Fichtinger G, Terranova C-M, Hata N	Nov-2012	SNR, NCI/OT, SPL	Int J Comput Assist Radiol Surg. 2012 Nov;7(5):948-57.	□
Head and Neck Atlas [New]	Jakob M, Kikinis R	Nov-2012	SPL, OpenLab Data, NAC, SLICER	SPL Head and Neck Atlas 2012 November.	□
3D Biter as an Image Computing Platform for the Quantitative Imaging Network [New]	Fedorov A, Beichel R, Kalbally-Cramer J, Fiore J, Pien-Hoang A, C, Pujol O, Bower C, Jennings D, Furehey F, Sousa A, Baid J, Alford S R, Miller J V, Payer D, Kikinis R	Nov-2012	SPL, NA-MIC, NAC, Prostate Group, SLICER	Magn Reson Imaging. 2012 Nov;30(9):1323-41.	□
Differences in Simple Morphological Variables in Prostate and Unprostate Metastatic Cancer After Androgen Deprivation [New]	Lin N, He A, Gross B A, Payer D, Proctor K L, Day A L, Du H, Mattfeld H, Tokuda J, Shi R, Pader R, Lantieri R, Sigurdsson D, Baker J, Hata N	Nov-2012	SPL, NA-MIC, SLICER	J Neurosurg. 2012 Nov;117(5):913-9.	□
Clinical Application of Pharmacokinetic Analysis as a Biomarker of Solitary Pulmonary Nodules: Dynamic Contrast-enhanced MR Imaging [New]	Ling M, Freymann J B, Kitty J S, Fedorov A, Farnsey F M, Eisenberg S A, Berglund E E, Farnsworth D A, Yin Y, Goh K, Chapman T L, Brown D J, Blatt T A, Datta S, Resnik S, Mountz J M, Bates C, Layton C, Olson M, Hata N	Nov-2012	Prostate Group, SLICER, SPL	Magn Reson Imaging. 2012 Nov;30(9):1249-56.	□
Reduced Fractional Anisotropy and Axial Diffusivity in White Matter in 22q11.2 Deletion Syndrome: A Pilot Study	Khan Z, Assari T, Bouix S, Finn C T, Sabharwal T, Tammigala D R, Kucharskaia R, Kikinis R, Sheline Y E, Kikinis M	Oct-2012	PNL, SPL	Schizophr Res. 2012 Oct;141(1):35-9.	□
Image Registration for Targeted MRI-guided Transperineal Prostate Biopsy	Fedorov A, Tuncel R, Farnsey F M, Tokuda J, Hata N, Hata N, W M, Kikinis R, Terranova C M	Oct-2012	Prostate Group, NA-MIC, NCI/OT, SLICER, SNR, SPL	J Magn Reson Imaging. 2012 Oct;36(4):987-92.	□

Midas for Grand Challenges

Key features of a system to support grand challenges:

- Broad distribution of training data
- Control user access to testing data
- Easy-to-use for challenge organizers and participants
- Automated scoring of results uploaded by participants
- Report performance of participants

Simple creation & management of Grand Challenges

The screenshot displays the MIDAS web application interface. At the top, there is a navigation bar with the MIDAS logo, a search bar, and buttons for 'Upload' and 'Score Submissions'. The left sidebar contains navigation links: Feed, Explore, Communities, Users, My space, and Troubleshooting. Below these are 'RECENTLY VIEWED' items.

The main content area is titled 'Manage Community' and shows details for the 'BRATS 2012' community. It includes a 'Back' button and tabs for 'Info', 'Members & Groups', 'Files', and 'Edit Challenge'. The 'Info' tab is active, showing the community name 'BRATS 2012' and a description field containing 'BRATS 2012'. Below this, there are sections for 'Training Status' and 'Testing Status', each with radio button options for 'Open' and 'Closed'. A 'Save' button is located at the bottom of the form.

On the right side, there are sections for 'ACTIONS' (Create a top level Folder, Delete Community), 'MEMBERS' (a list of 13 members), and 'STATS' (13 members).

MIDAS 3.2.8 by Kitware © 2012 - Generated in 0.155 s - Report bug

Intuitive framework for result submission for participants

The screenshot shows the MIDAS Submission Scoring interface. The top navigation bar includes the MIDAS logo, a search bar, and buttons for 'Upload' and 'Score Submissions'. A left sidebar contains navigation links: Feed, Explore, Communities, Users, My space, and Troubleshooting. The main content area is titled 'Submission Scoring' and includes dropdown menus for 'Challenge: BRATS 2012' and 'Dataset: Testing'. A 'Submission Folder' section shows a 'Browse' button and the path 'BRATS-2 submissions'. A 'Submit Results' button is located on the right. A 'Results Folder Validation' message states: 'Some results are mis-matched or missing.' Below this, a table lists 'Mismatched items' with two columns: 'What is required by the challenge' and 'What is in your results folder'. The table shows 27 rows, each with a file name in the first column and a red 'X' icon in the second column, indicating that no files were found for these items.

Submission Scoring

Challenge: BRATS 2012 ▾

Dataset: Testing ▾

Submission Folder: BRATS-2 submissions

Results Folder Validation: Some results are mis-matched or missing.

Mismatched items:

What is required by the challenge	What is in your results folder
BRATS_HG0131_result.mha	✘
BRATS_HG0133_result.mha	✘
BRATS_HG0134_result.mha	✘
BRATS_HG0135_result.mha	✘
BRATS_HG0136_result.mha	✘
BRATS_HG0137_result.mha	✘
BRATS_LG0103_result.mha	✘
BRATS_LG0105_result.mha	✘
BRATS_LG0109_result.mha	✘
BRATS_LG0116_result.mha	✘
SimBRATS_HG0156_result.mha	✘
SimBRATS_HG0157_result.mha	✘
SimBRATS_HG0158_result.mha	✘
SimBRATS_HG0159_result.mha	✘
SimBRATS_HG0160_result.mha	✘
SimBRATS_HG0166_result.mha	✘
SimBRATS_HG0167_result.mha	✘
SimBRATS_HG0168_result.mha	✘
SimBRATS_HG0169_result.mha	✘
SimBRATS_HG0170_result.mha	✘
SimBRATS_LG0151_result.mha	✘
SimBRATS_LG0152_result.mha	✘
SimBRATS_LG0153_result.mha	✘
SimBRATS_LG0154_result.mha	✘

Results are automatically scored. Scoring metrics and rank aggregation can be customized.

The screenshot shows the MIDAS web interface. At the top, there is a search bar and two buttons: 'Upload' and 'Score Submissions'. On the left, a navigation menu includes 'Feed', 'Explore', 'Communities', 'Users', 'My space', and 'Troubleshooting'. The main content area displays 'Results from BRATS 2012, Training run on 2012-10-25 10:54:31' with a 'Back' button. Below this is a table with 12 columns: Subject, Average Dist 1, Average Dist 2, Dice 1, Dice 2, Hausdorff Dist 1, Hausdorff Dist 2, Cohen's Kappa, Sensitivity 1, Sensitivity 2, Specificity 1, and Specificity 2. The table contains 13 rows of data, including an 'averages' row and 12 individual subject rows.

Subject	Average Dist 1	Average Dist 2	Dice 1	Dice 2	Hausdorff Dist 1	Hausdorff Dist 2	Cohen's Kappa	Sensitivity 1	Sensitivity 2	Specificity 1	Specificity 2
averages	1.24	1.021	0.592	0.736	4.799	5.071	0.468	0.828	0.809	0.995	0.998
BRATS_LG0013	1.155	1.097	0.495	0.784	4.123	4.123	0.558	0.788	0.884	0.997	0.997
BRATS_LG0012	1.022	1.001	0.465	0.753	4.123	4.123	0.284	0.716	0.816	0.998	0.999
BRATS_LG0011	0.991	0.946	0.33	0.797	4.123	4.123	0.262	0.615	0.829	0.997	0.999
BRATS_LG0004	1.478	0.925	0.746	0.586	9.434	4.123	0.6	0.946	0.655	0.996	1
BRATS_LG0002	1.274	0.917	0.739	0.769	4.123	4.123	0.647	0.888	0.79	0.991	0.998
BRATS_LG0001	1.139	0.964	0.428	0.743	4.123	4.123	0.249	0.75	0.822	0.997	0.999
BRATS_HG0027	1.294	1.329	0.668	0.767	4.69	13.602	0.566	0.885	0.863	0.991	0.996
BRATS_HG0026	1.397	1.041	0.706	0.689	4.123	4.123	0.506	0.922	0.808	0.993	0.998
BRATS_HG0025	1.259	1.037	0.683	0.683	4.123	4.123	0.473	0.871	0.795	0.995	0.997
BRATS_HG0024	1.386	0.951	0.659	0.785	5	4.123	0.537	0.905	0.827	0.995	0.999

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Kitware can host your data and/or automated your scoring process for your grand challenge.

Requirements to create a grand challenge at Kitware

1. Scoring metrics
 - either selected from existing or provide executables
2. Training and testing datasets
 - images and ground truth for each
3. Sample participant results to use in testing the system

We provide the following

1. Data hosting
2. Server-side processing for scoring
3. Ranking & aggregation algorithms for participant scoring

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