

Welcome to the rave

System Requirements:

Rave requires MATLAB 2007b or a newer version (not tested on 2010b). I have only tested 32-bit versions. It has only been tested on Windows (xp, vista and 7). Rave requires java to be enabled in MATLAB (it is by default). I have not tested RAVE on “student versions” of MATLAB.

You must have a vertical screen resolution of at least 900 pixels. So it won't run on a netbook (but this could be accommodated in the future by simply hiding the Navigator)

How to contact me:

Whenever something says “contact me” it means email mdaskilewicz@asdl.gatech.edu

What's included in the RAVE Install package:

1. This file
2. Another file that contains a user manual
3. The main install file, named “rave install <ver>.zip”. This contains the rave toolbox folder structure.
4. A sample data folder that contains some data sets and functions you can use in RAVE.

How to install RAVE:

RAVE can be installed as a toolbox, or just as a folder within your normal MATLAB working directory. These instructions show how to install it as a toolbox, which may provide slightly improved overall MATLAB performance, and keeps the files from cluttering your normal directory, but requires you to use “rehash toolboxcache” when you add new files, and prevents RAVE from carrying over to new MATLAB version installs.

1. Locate your MATLAB toolbox folder. It should have a path like C:\MATLAB\r2010a\toolbox\ or your MATLAB directory may be in your Program Files folder. If you can't find it, open MATLAB and enter the command “matlabroot”, then append \toolbox\ on to the end of it.
2. Unzip the rave folder (found in rave install <ver>.zip) into your matlab toolbox directory. (Note, copy the whole folder, don't open the folder and just copy the files)
3. Start matlab if you haven't already. Go to Files>>Set Path. Pick add with subfolders, and add C:\MATLAB\r2009b\toolbox\rave (or wherever you put it.) Make sure you pick add with subfolders! A bunch of folders should get added to the path. Pick “Save” and “Close”. **Note:** If you don't have permission to modify the path file, you'll have to save

the path in a startup.m file. MATLAB should alert you of this when you try to save the path.

4. Enter the command `rehash toolboxcache` at the MATLAB command prompt. MATLAB will be “busy” for a minute.
5. Enter “rave” at the MATLAB prompt. The rave installer will start, which will help you set up additional options. **Note:** The rave installer also modifies your path, so if you don’t have the proper permissions it might not work. Please let me know if this happens. (I haven’t tested it.)
6. When the installer finishes, rave will open. In the future, start rave by simply entering “rave” at the MATLAB prompt. The installer will not re-run unless you delete your raveprefs.mat file (or you stored it in a location that isn’t on your MATLAB path).

Note: To install RAVE to a different directory, just follow the above steps, but in step 2 unzip rave to the desired directory.

Setting Preferences:

In addition to the two preferences set by the rave installer, you can customize RAVE in other ways by changing the other preferences. These are described in the user manual, but you probably shouldn’t worry about them just yet.

Installing additional components:

RAVE currently uses some controls that must be installed on your system for certain features to work. You may already have these installed, if not, follow the directions below. If you’re not sure, install them again; it won’t hurt. (These provide minor functionalities... if you can’t install them, let me know, but you won’t be missing much.) I plan on removing the need for these in the future.

OCW11 (optional)

Office Web Components 11 is used to view your data set in a table. Download from <http://www.microsoft.com/downloads/details.aspx?FamilyId=7287252C-402E-4F72-97A5-E0FD290D4B76&displaylang=en>

If you don’t have it, you’ll see this error when you try to view your data in a table:

??? Error using ==> actxcontrol at 216

Control creation failed. Invalid ProgID 'OWC11.Spreadsheet.11'

To install, just download the file and run it and follow the steps. **Note:** If you also have Excel (pre2007) installed, the table view window should also have an “Excel toolbar,” otherwise it will appear as a generic table.

Setting up PDF export:

(Note, I've only done this once, so I might be missing a step in this process. If it spits out a blank pdf file instead of your graph, let me know and I'll see what I can do.)

To export files as PDFs, you must have ghostscript installed. Also you must have the ghostscript path on your system path. To do this in Windows:

1. Install ghostscript from the internet.
2. From the desktop right-click My Computer and click properties.
3. In the System Properties window, click on the Advanced tab.
4. In the Advanced section, click the Environment Variables button.
5. Finally, in the Environment Variables window, highlight the PATH variable in the Systems Variable section and click edit. It will contain a list of paths, separated by semicolons. Make sure your GS bin folder is listed. If not, add it to the path (put a semicolon after the last item and just append it). It should look something like: "C:\Program Files\gs\gs8.64\bin" Try not to screw anything else up while you're in there.

(If you know how to set this up for a different operating system, please send me the steps.)

Setting up rave File Types in Windows

This is optional, but if you'd like, you can register the rave file types, which will allow you to open saved rave projects and metadata files by double clicking them, and will also give them the rave icons instead of the default "unknown file type" icon. If MATLAB is not already running, double clicking a .rve file will start MATLAB.

To set up file types, click the appropriate button in the rave installer. Or, to set them up manually...

Find the rve.reg.txt file in the main rave directory. **You must edit this file before adding it to the registry, so keep reading.** Open this file in a text editor and make sure the paths are correct. Check that the MATLAB version in the path is correct and if you need the Program Files folder in the path. There are 3 places the path appears in the file, so make sure you check all 3. Also, if you make any changes, make sure you use the double backslash \\ to separate directories.

Once it's all correct, delete the comment in the first line of the file, then save it, make a copy of the file and remove the txt extension so it is a .reg file. Then double click it and you should get a prompt asking to add the info to the registry. Say yes. You might need to restart for the changes to take effect.

If you update your MATLAB version in the future, you will need to re-edit this file to reflect the new version, and then re-add it to the registry.

How to use RAVE:

Some instructions are in the User Manual file and some very basic instructions are included here:

To start RAVE, simply type “rave” at the MATLAB command line.

Loading Data Sets

The first thing you should do when you start RAVE is load a data set. **Most functions (including changing tabs) will be disabled until you load a data set and create a graph.** To load a data set, click the “manage data sets” button on the manage tab, then click the browse button in the window that pops up. Select the file you want to use and hit “Create this Data Set.”

Supported file types are tab-delimited text, csv, and xls files. Data files must be “flat file” formatted (google it). If you use other formats for data, let me know and I’ll see what I can do (or you can modify the data loading function on `managedatagui.m`)

After a couple seconds, the data set name should appear in the lower half of the window under the words “Manage Data Sets”. You can hit “Done” or use the buttons on the right to modify the data set if necessary. For example, you can use the Define Data Types button to make some variables discrete.

When you close the Manage Data Sets window (by hitting “Done”), you are ready to create a graph.

Creating Graphs

After you have loaded a data set, you must create a graph. Click on the “Create New” button under “Graph” on the Manage tab. Select the type of graph you would like to create by clicking its button. The pop up window will disappear, and you must place the graph on the workspace by clicking and dragging the mouse to size the graph. When you release the mouse button, the graph will appear.

You can resize the currently selected graph (the one with the orange border) by clicking and dragging the small squares at each corner (note, sometimes the lower right square cannot be clicked because it is too close to the axes label. If that happens, resize the graph using the other three corners)

You can move a graph without resizing it by holding CTRL and clicking in the empty space between the graph and the orange border, then dragging the graph to the desired position.

You can select a graph by clicking the empty space between the graph itself and solid colored rectangle that surrounds the graph and its axis labels. This gives it the (usually orange) resizing border) and makes the tabs update to show the information related to this graph.

Sample Data sets:

RAVE comes with some sample data sets in the “sample data” folder inside the rave .zip file you downloaded.

Turbofan Demo.txt is a DOE of inputs for a turbofan design. By itself it isn’t much to look at (a two-level full factorial). But there is also a folder “Turbofan Functions” that contains several response surface equations saved as text files. These are the “outputs” and you can load them on the model tab by selecting “load folder of functions” and then you can do function-dependent things like optimizers, prediction profilers, surface profilers, and the many scatterplot explore methods. Alternatively, the RSEs are also contained in the tfrses4rave.m function, which can be loaded as a matlab function from the model tab. (same equations, just in a different format – so don’t load them twice!) This data set can be used to demonstrate almost any of RAVE’s capabilities.

Combustion.txt is a 1-D data set. It is a calculation of (mostly) mole fractions of different molecules across a flame sheet. The independent variable is “distance” and all the other variables are responses. This is useful for playing around with line graphs and histograms.

Tnk.txt and tnk.m are the “TNK test problem” for multiobjective optimization described in “A fast and elitist multiobjective genetic algorithm: NSGA-II” by Deb et al. (2002). Note that tnk.m contains the text of the two constraints in comments... make sure you apply these on the constrain tab!

A note about updating RAVE:

For the most part, if any rave m-file changes, you can replace it while you’re working and changes will take place immediately. The exception is if you add a new FOLDER, it won’t be recognized until you restart rave (and you have added it to your MATLAB path).

To update **everything**, just delete all files in the rave folder and replace them with the new ones. Even if you delete them all first, you might be asked to overwrite a couple hidden files. It doesn’t matter if you pick yes or no for these. If a new file is added that did not previously exist, you will need to enter the command “rehash toolboxcache” before it can be used. If you aren’t creating new files (and often even when you are), **you don’t need to restart rave** unless changes are made to the rave.m file itself. If a new folder is added, you need to add it to the path using the set path dialog, and then enter “rehash toolboxcache”

A note about updating MATLAB:

If you update to a new version of MATLAB and you want to use RAVE with that version, you will need to reinstall it as described above, but you only need to redo steps 1-4 of the installation instructions... your preferences should carry over.

You will also have to manually update the rve.reg.txt file so rave projects will open in your new version of MATLAB. (Though as long as you keep the old version installed, you might not really care which version of MATLAB rave uses.)

Also, as long as you keep your preferences file in your default MATLAB directory, all preferences should carry over to the new version.

A warning about file names:

Rave contains lots of files. On the off chance you have another file with the same name, things will break. I've tried to make the names rather obscure, but some (particularly optimizers) might have a conflict. RAVE also uses a lot of MATLAB functions that you may not have even known about. If you have created a function with the same name as a builtin matlab function, things might not work.

Release Notes

Bugs:

There will be bugs. Most of them can just be ignored though. (Think of these as features yet to be implemented.) The only real killer is if there is an error while changing tabs, which may require a restart. If your monitor is big enough that the word “rave” appears below the tabs, click that word and it would reset the tabs and you can keep working. If the word “rave” is not there, you’re out of luck and will have to restart RAVE. (Lame, I know, but these errors should be VERY rare.)

I recommend you have your sound turned on so you can hear errors happen, as that is often the only immediate notification you’ll get. (RAVE does not display error messages; they’ll appear in your main MATLAB window.)

If you find a bug, please let me know and describe what you were doing as best you can. Almost all bugs are really simple and take <5 minutes to fix, so don’t be shy, I might be able to send you a fix right away.

Known major shortcomings in this release:

- Tables do not work. Don’t try to make one, it might break your session
- Metamodeling capabilities have been temporarily removed while I fix some things
- There is no support for the Optimization Toolbox optimizers, but the Global Optimization Toolbox optimizers (Genetic algorithm, etc) should all work.
- Explore Tab methods only work for scatter plot (but may be easily modified to work with other plots... let me know if any of them interest you and I’ll give them priority)

If you try to load a regression/function that takes a string as an input, it will convert the string to an integer value ($j=1$ to n where n is the number of possible strings and j is the index of this string when all n of them are listed alphabetically) and send that value as the input to your function. This will be “fixed” in the future.

Optimizers (except for NSGA-II) do not currently support discrete variables! (Note: many of the explore tab methods use optimizers behind the scenes). Other than that, any tab-delimited text file should work. Comma separated text might also work. Note that you must always work from a data table, even if you’re just running an optimizer.

Every data set must at least contain at least two variables (columns) and two non-identical rows. (If you’re just running an optimizer or profilers, use a 2-row data table that just contains the high and low limits of each input variable.)

I have not tested for bugs when two variables have the same name, but I’m almost sure something will break. Don’t do that. If your variable name contains a common function name, like “sin” or “exp” it might also break if it is used with a JMP function. Also if you try to read in

a text function whose variable names start with a number or contain symbols other than `_`, it won't work.

If you save a session that involved JMP functions of any kind, it will only work again on your own computer unless you find and copy any m files RAVE created along with it. In the future I'll add a utility to find/zip these for you.

Speaking of which, every time you load a txt function, an m file gets created for it in your defaultdir folder (described below.) These never get deleted, so over time you might build up a massive number of them. (Eventually I'll come up with a more elegant solution for this.) Assuming you don't save your rave sessions, these can always be deleted any time RAVE isn't running, but really they're small and you can just not worry about them. In the future RAVE will be smarter on cleaning out old functions.

There is no undo button. This shouldn't surprise you because making an undo button is one of the hardest jobs in all of coding. Luckily though there isn't much you can screw up. But be aware that all changes are final.

Several buttons exist but don't yet do anything. If you click and nothing happens, don't feel bad. Notable among these:

- The explore tab is currently under construction and probably only works for scatter plots.

Data set size limit

RAVE (well, matlab really) can only really graph about 10,000 pts at a time. If you have a giant data set, it's gonna be very slow. RAVE will still work, it'll just be slow. If you're just making static graphs to export, this might be fine for you. Related to this: making scatterplot matrices that are colored according to an additional variable is VERY slow and I recommend you avoid it if your data set has more than 1000 pts.

Acknowledgements:

RAVE includes the following files from the Mathworks file exchange. Some have been renamed because I have edited them (so they won't conflict with existing copies of these files).

Aslib.m and ashape.m by Urs (us) Schwarz
Findjob.m by Yair Altman
Ipd.m by John D'Errico
Linewrap.m by The MathWorks
Movie2gif.m by Nicolae Cindea
Paretofront.m/paretofront.mexw32 by Yi Cao
Myaa.m by Anders Brun
Print_pdf.m by Oliver Woodford

Want to know how something works?

If there is a particular feature you want to know about so you can modify it or incorporate it in your own code, ask me about it and I can at least refer you to the file/line number that contains the code you're looking for.

Please! Contact me with your feedback:

While I may not be able to respond to every email, I ALWAYS read them. I am VERY interested to hear about:

- How you use RAVE. What functions do you use most often?
- Why you do or do not like RAVE
- What other programs you use for visualization, optimization, etc... and why you like them
- Anything that gives an error or does not work the way you expected it to (even if it is working correctly)
- What other data formats you use that you would like to see supported in RAVE
- What other visualizations, optimizers, metamodels, exploremethods, etc. you use that you would like to see supported in RAVE
- Ideas for how to improve user interfaces
- Ideas for how to make user-supplied function interfaces less restrictive (e.g. allowing the function to take individual variables as inputs instead of taking in the whole data set)
- Additional capabilities you'd like to see implemented, regardless of how simple (ability to change axis label fonts) or how complex (ability to control call RAVE from Excel).

RAVE is still a very new program, and up until now has been coded based on my personal view of the world. I am VERY interested in hearing about what your data "looks like" (file formats, nature of data, etc...), how you interact with it, and how RAVE can be improved to better support your needs.

Licensing

This copy of rave has been provided to you under the GNU General Public License v2. If you are interested in obtaining a copy of RAVE that you can develop and distribute under other terms, contact the Georgia Tech Research Corporation. If you are interested in collaborating with me, or having me/Georgia Tech develop particular capabilities for you under a contract, contact me (mdaskilewicz@asdl.gatech.edu) or brian.german@aerospace.gatech.edu.

Future Plans

Here is a list of the major capabilities I plan on implementing in the very near future. Consequently, this is also the list of things that don't yet work in this release:

- Allow multiple functional models to exist for the same variable.
- Fix metamodeling
- Better support for different formats for user-supplied function input/outputs.
- Improve workspace management: allow duplicating graphs, put away/restore graphs, resizing workspace, multiple workspace "sheets" (like a spreadsheet)
- Improve the New Data Set dialog box to let you do things like choose which rows of a data file to import.
- More options for selecting data interactively and using conditional statements.
- Expand "explore tab" methods to more graph types, and greatly expand the number of options available
- Implement support for Optimization Toolbox optimizers
- Fix Tables