
 Matlab toolbox, User's Guide*
version 0.0.30

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Abstract

The  Matlab toolbox contains some basic tools used in my other toolboxes.

* \LaTeX manual, revision 0.0.30, compiled with Matlab 2019a, and toolbox `fc-tools`[0.0.30].

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1 graphics module

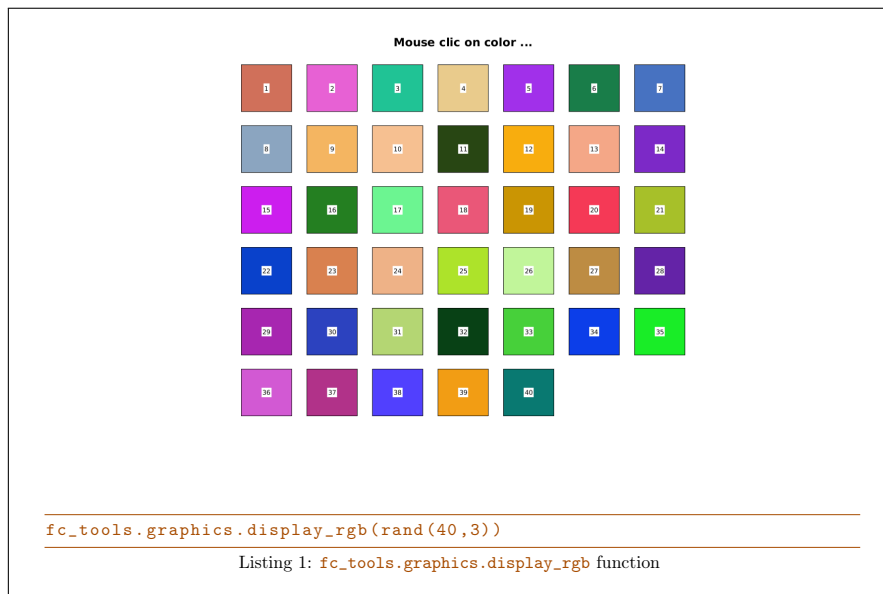
1.1 main functions

1.1.1 `fc_tools.graphics.display_rgb` function

The `fc_tools.graphics.display_rgb` displays colors of a n -by-3 RGB colors array with their names if available.

Syntaxe

```
fc_tools.graphics.display_rgb(rgb)
fc_tools.graphics.display_rgb(rgb, names)
```



1.1.2 `fc_tools.graphics.selectColors` function

The `fc_tools.graphics.selectColors` function returns colors that are maximally perceptually distinct without using the Image Processing Toolbox.

This function is inspired by the function `select_colors` (or `distinguishable_colors`) of *Timothy E. Holy* which uses the Image Processing Toolbox of Matlab.

Syntaxe

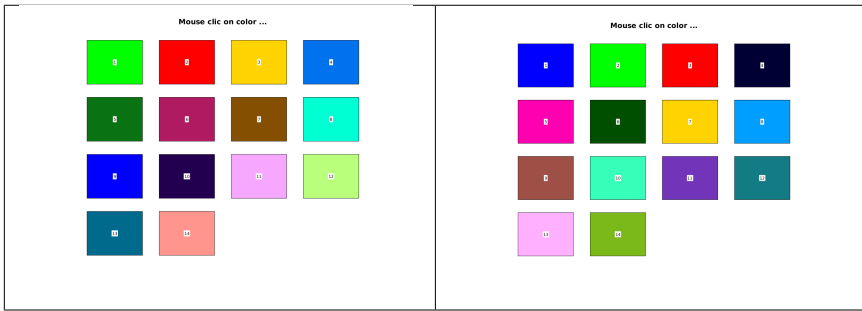
```
colors=fc_tools.graphics.selectColors(N)
colors=fc_tools.graphics.selectColors(N, ...
    key, value)
```

Description

`colors=fc_tools.graphics.selectColors(N)` Returns N colors that are maximally perceptually distinct as a N -by-3 RGB colors array.

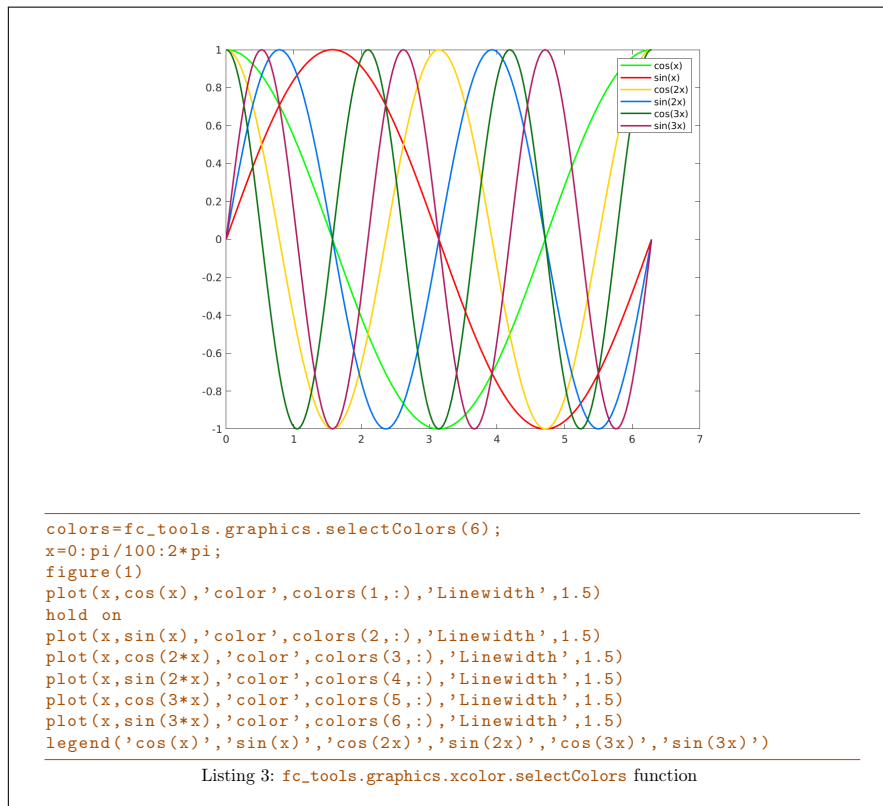
`colors=fc_tools.graphics.selectColors(N, Name, Value)` specifies function options using one or more `Name,Value` pair arguments. Options are

- `'background'` : the N colors selected will be as far as possible from the colors specified by this options as a n -by-3 RGB colors array. Default is `[1 1 1; 0 0 0; 0.8 0.8 0.8;1,0,1]`
- `'func'` : To specify an other function for converting RGB colors to LAB colors. Default is local `RGB2LAB` function.



```
colors1=fc_tools.graphics.selectColors(14);
figure(1)
fc_tools.graphics.display_rgb(colors1)
colors2=fc_tools.graphics.selectColors(14,'background',[1 1 1]);
figure(2)
fc_tools.graphics.display_rgb(colors2)
```

Listing 2: `fc_tools.graphics.xcolor.selectColors` function



1.1.3 `fc_tools.graphics.DisplayFigures` function

The `fc_tools.graphics.DisplayFigures` function regularly distributes the figures on the screen.

Syntaxe

```

fc_tools.graphics.DisplayFigures()
fc_tools.graphics.DisplayFigures(n)
fc_tools.graphics.DisplayFigures('nfig',n)

```

Without argument, all figures are regularly distributed on the screen. Otherwise, empty figures with numbers 1 to n are created and regularly distributed on the screen.

1.1.4 `fc_tools.graphics.SaveAllFigsAsFiles` function

The `fc_tools.graphics.SaveAllFigsAsFiles` saves all figures as files.

Syntaxe

```

fc_tools.graphics.SaveAllFigsAsFiles(basename)

```

```
fc_tools.graphics.SaveAllFigsAsFiles(file, ...
    key, value, ...)
```

Description

`fc_tools.graphics.SaveAllFigsAsFiles(basename)` save each figure in the file

```
[basename,'_fig',fignumber]
```

of the current directory where `fignumber` is the number of the figure to be saved.

`fc_tools.graphics.SaveAllFigsAsFiles(file, key, value, ...)` specifies function options using one or more `Name,Value` pair arguments. Options are

- `'format'` : to specify the file format. `Value` could be `'eps'` (default), `'pdf'`, `'png'` or `'pdflatex'`.
- `'dir'` : to specify the directory (default `'.'`). the directory is created if it does not exist.
- `'verbose'` : if `true`, prints file names. Default is `false`.
- `'tag'` : if `true` each figure is saved in the file:

```
[basename,'_fig',fignumber,'_',software,version]
```

where `software` is Matlab and `version` is its release. Default is `false`.

- `'size'` : to specify size of the image. Default is `[800,600]`.

1.2 xcolor submodule

1.2.1 `fc_tools.graphics.xcolor.svg` function

The `fc_tools.graphics.xcolor.svg` function returns names and RGB values of the 149 SVG colors.

Syntaxe

```
[name,rgb]=fc_tools.graphics.xcolor.svg()
```

`name` is cell array of string (color names) and `rgb` is 149-by-3 array (rgb values) such that the color `name{i}` has `rgb(i,:)` for rgb values.

1.2.2 `fc_tools.graphics.xcolor.X11` function

The `fc_tools.graphics.xcolor.X11` function returns names and RGB values of the 317 X11 colors.

Syntaxe

```
[name,rgb]=fc_tools.graphics.xcolor.X11()
```

`name` is cell array of string (color names) and `rgb` is 317-by-3 array (rgb values) such that the color `name{i}` has `rgb(i,:)` for rgb values.

1.2.3 `fc_tools.graphics.xcolor.fullX11` function

The `fc_tools.graphics.xcolor.fullX11` function returns names and RGB values of the 738 X11 colors.

Syntaxe

```
[name,rgb]=fc_tools.graphics.xcolor.fullX11()
```

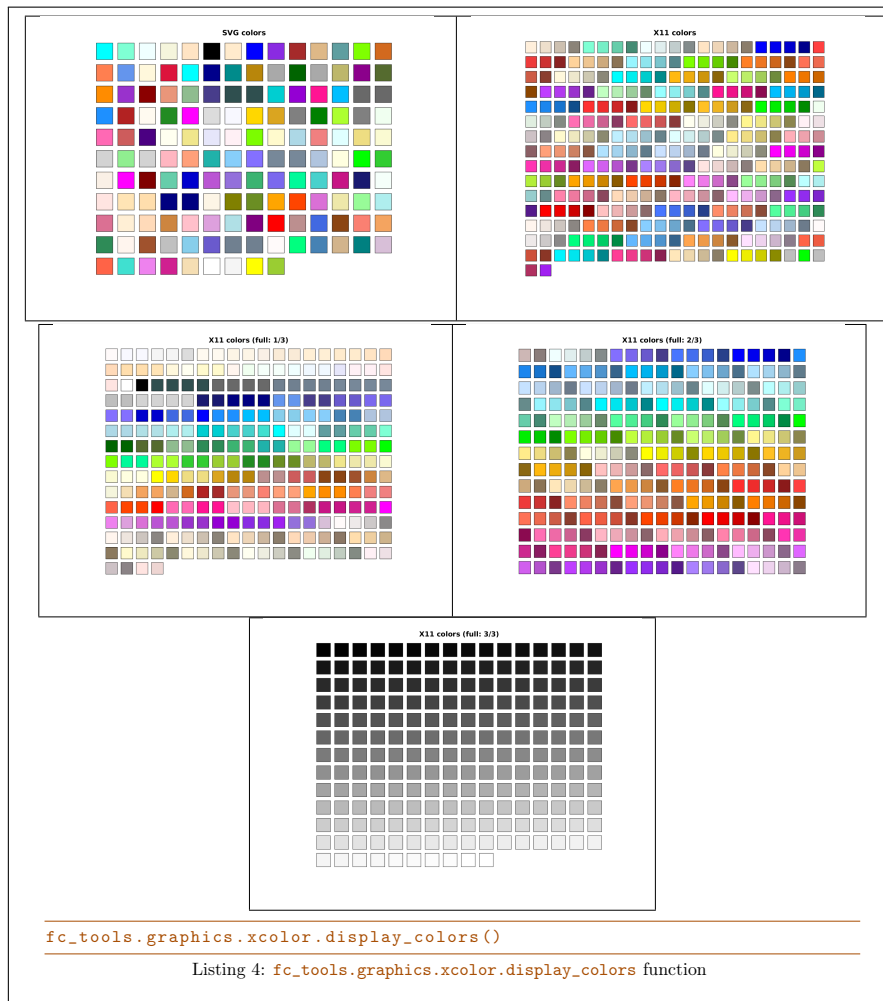
`name` is cell array of string (color names) and `rgb` is 738-by-3 array (rgb values) such that the color `name{i}` has `rgb(i,:)` for rgb values.

1.2.4 `fc_tools.graphics.xcolor.display_colors` function

The `fc_tools.graphics.xcolor.display_colors` function displays SVG colors, X11 colors and (full)X11 colors.

Syntaxe

```
fc_tools.graphics.xcolor.display_colors()
```



1.3 monitors submodule

1.3.1 `fc_tools.graphics.monitors.onGrid` function

The `fc_tools.graphics.monitors.onGrid` displays figures on a virtual m -by- n grid (as `subplot` command with axes) positioned on a selected monitor.

Syntaxe

```
fc_tools.graphics.monitors.onGrid(n,m)
fc_tools.graphics.monitors.onGrid(n,m, ...
    key,value, ...)
```

Description

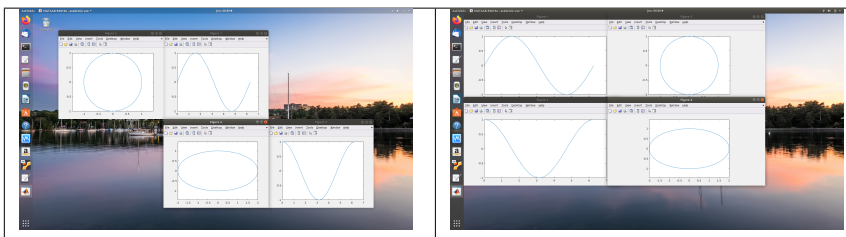
```
fc_tools.graphics.monitors.onGrid(n,m)
```

A virtual m -by- n grid is created on the first monitor and the figures num-

bered from 1 to $m*n$ are moved or created (if it doesn't exist) respectively to the position given by an index (default is the figure number). This index runs row-wise; all columns of the first row are numbered from left to right and so on with rows 2 to m .

`fc_tools.graphics.monitors.onGrid(n,m, key,value)` specifies function options using one or more `key,value` pair arguments. Options are

- `'figures'` : specifies the numbers of the figures to be used. Default is `1:m*n`.
- `'positions'` : specifies the index on the grid corresponding to the `'figures'` option. Default is `1:m*n`.



```

1  x=0:pi/100:2*pi;
2  close all
3  fc_tools.graphics.monitors.onGrid(2,3,'figures',[1,3], ...
   'positions',[2,6],'covers',4/5)
4  figure(1)
5  plot(x,sin(x))
6  figure(3)
7  plot(x,cos(x))
8  fc_tools.graphics.monitors.onGrid(2,3,'figures',[2,4], ...
   'positions',[1,5],'covers',4/5)
9  figure(2)
10 plot(sin(x),cos(x))
11 axis equal
12 figure(4)
13 plot(2*sin(x),cos(x))
14 axis equal
15 fprintf('waiting 2s...\n');pause(2)
16 fc_tools.graphics.monitors.onGrid(2,2,'figures',1:4,'covers',4/5, ...
   'location','NorthWest')

```

Listing 5: Using `fc_tools.graphics.monitors.onGrid` function, part of `fc_tools.graphics.monitors.demos.demo02` function. Figures are screenshot taken at line 15 (left) and after last line (right).

1.3.2 `fc_tools.graphics.monitors.show` function

The `fc_tools.graphics.monitors.show` displays monitors with their resolution, position and number on a figure. When arguments are provided, they are those of the `fc_tools.graphics.monitors.onGrid` function and then the grid is also drawn with the indices of the positions of the grid elements.

Syntaxe

```

fc_tools.graphics.monitors.show()
fc_tools.graphics.monitors.show(n,m)
fc_tools.graphics.monitors.show(n,m, ...

```

```
key,value, ...)
```

Description

```
fc_tools.graphics.monitors.show()
```

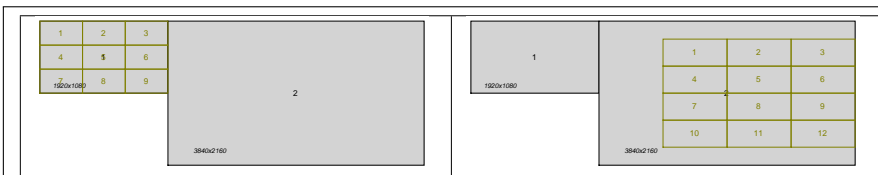
Displays monitors with their resolution, position and number on a figure.

```
fc_tools.graphics.monitors.show(n,m)
```

Add the m -by- n grid on the figure created by the `fc_tools.graphics.monitors.show()` command to to preview positions of figures created or moved by the `fc_tools.graphics.monitors.onGrid(n,m)` command.

```
fc_tools.graphics.monitors.show(n,m, key,value)
```

specifies function options using one or more `key,value` pair arguments. Options are those of the `fc_tools.graphics.monitors.onGrid` function.



```
1 close all
2 nM=fc_tools.graphics.monitors.number();
3 figure(1)
4 fc_tools.graphics.monitors.show(3,3,'monitor',1,'covers',1)
5 if nM>=2
6     figure(2)
7     fc_tools.graphics.monitors.show(4,3,'monitor',2, ...
8         'location','east','covers',3/4)
9 end
10 if nM>=3
11     figure(3)
12     fc_tools.graphics.monitors.show(3,2,'monitor',3, ...
13         'location','topleft','covers',3/4)
14 end
```

Listing 6: Using `fc_tools.graphics.monitors.show` function, part of `fc_tools.graphics.monitors.demos.demo03` function on a computer with two monitors.

```

1  close all
2  nM=fc_tools.graphics.monitors.number();
3  figure(1)
4  fc_tools.graphics.monitors.show(3,3,'monitor',1,'covers',1)
5  if nM>=2
6      figure(2)
7      fc_tools.graphics.monitors.show(4,3,'monitor',2, ...
8          'location','east','covers',3/4)
9  end
10 if nM>=3
11     figure(3)
12     fc_tools.graphics.monitors.show(3,2,'monitor',3, ...
13         'location','topleft','covers',3/4)
14 end

```

Listing 7: Using `fc_tools.graphics.monitors.show` function, part of `fc_tools.graphics.monitors.demos.demo03` function on a computer with three monitors.

1.4 gptoolbox submodule

This submodule contains some files of the **gptoolbox** from *Alec Jacobson* (see <https://github.com/alecjacobson/gptoolbox>)

1.5 crop submodule

This submodule contains the function `crop` from *Andrew Bliss*.

1.6 vfield3 submodule

This submodule contains the function `vfield3` from *M MA* (see <https://www.mathworks.com/matlabcentral/fileexchange/8653-vfield3>)

2 utils module

- `fc_tools.utils.deleteCellOptions` deletes specified key/value pairs in a cell array of key/value pairs.
- `fc_tools.utils.isfunHandle` test if the input argument is a function handle.
- `fc_tools.utils.funHandleName` test if the input argument is a function handle.
- `fc_tools.utils.fun2str` ...

3 sys module

- `fc_tools.sys.getComputerName()` returns the name of the computer as a string.
- `fc_tools.sys.getUserName()` returns the name (login) of the current user as a string.
- `fc_tools.sys.getRAM()` returns available memory (RAM) in GB of the computer.
- `fc_tools.sys.getCPUinfo()` returns CPU(s) informations as a structure.
- `fc_tools.sys.getOSinfo()` returns OS informations as a structure.
- `fc_tools.sys.isfolder()` return true if a folder exists.
- `fc_tools.sys.isfileexists()` return true if a file exists.

In Listing 8, some examples are provided.

Listing 8: : example using `fc_tools.sys` functions

```
fprintf('RAM: %.2fGB\n', fc_tools.sys.getRAM())
CPU= fc_tools.sys.getCPUinfo()
OS=fc_tools.sys.getOSinfo()
```

Output

```
RAM : 31.30 GB
CPU =
  struct with fields:
    name: 'Intel(R) Core(TM) i7-4800MQ CPU @ 2.70GHz'
    nthreadspercore: 2
    ncoreperproc: 4
    nprocs: 1
OS =
  struct with fields:
    distributor: 'Ubuntu'
    description: 'Ubuntu 18.04.3 LTS'
    release: '18.04'
    codename: 'bionic'
    arch: 'x86_64'
    shortname: 'Ubuntu'
```

Informations for git maintainers of the Matlab toolbox

git informations on the toolboxes used to build this manual

```
-----  
name : fc-tools  
tag : 0.0.30  
commit : c52ece3e8bd194f40c73618091dbf2f5cba03f8f  
date : 2020-02-13  
time : 07-30-07  
status : 0  
-----
```

git informations on the L^AT_EX package used to build this manual

```
-----  
name : fctools  
tag :  
commit : 57968c4a96c2593cccc9da9efd3e52b2ff012cb5  
date : 2020-02-07  
time : 06:41:09  
status : 1  
-----
```

Using the remote configuration repository:

```
url      ssh://lagagit/MCS/Cuvelier/Matlab/fc-config  
commit  7f209b19403547158c6e78f203514c59a0130bae
```