



fc tools Matlab toolbox, User's Guide*

version 0.0.34

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Abstract

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

*L^AT_EX manual, revision 0.0.34.a, compiled with Matlab 2022a, and toolbox `fc-tools[0.0.34]`.

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1 graphics module

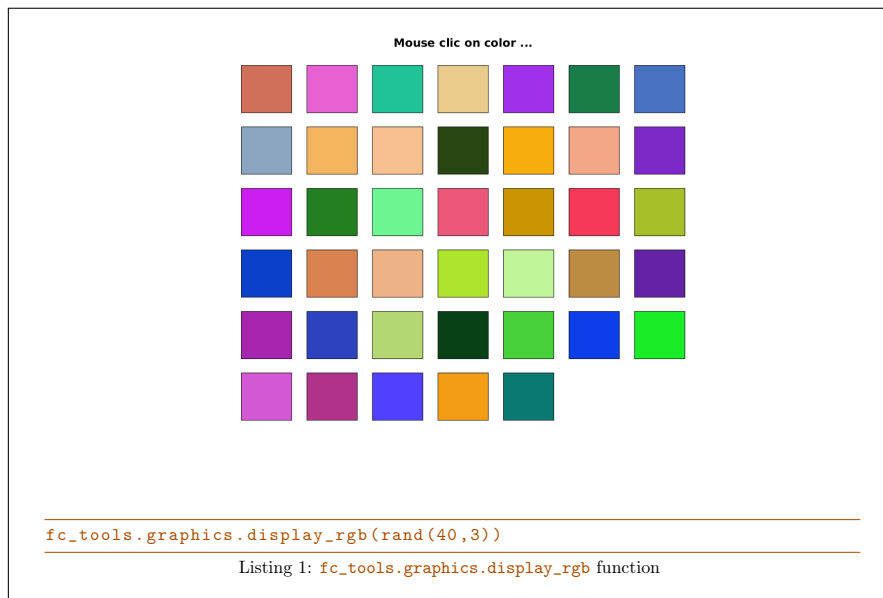
1.1 main functions

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

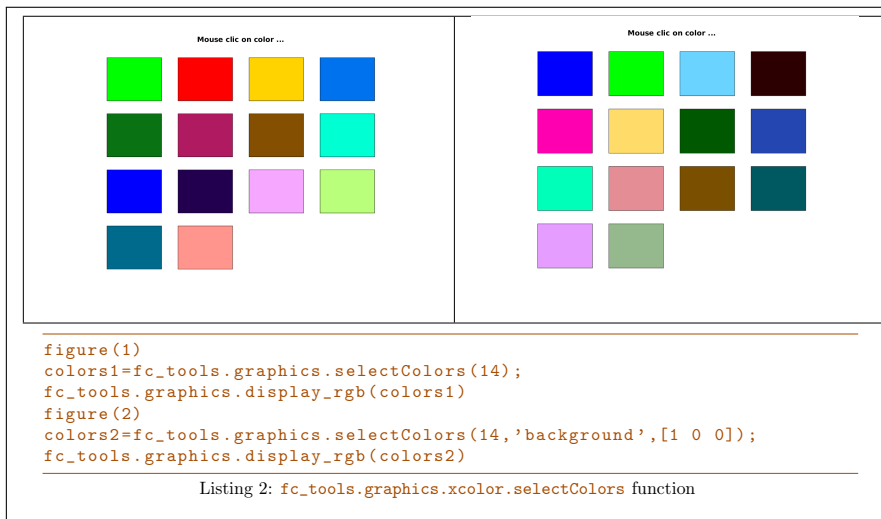
```
colors=fc_tools.graphics.selectColors(N)
colors=fc_tools.graphics.selectColors(N, ...
    key, value)
```

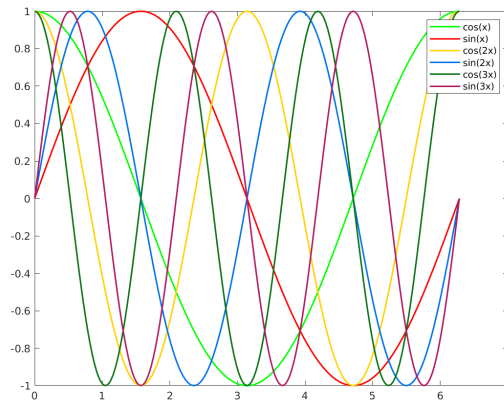
Description

`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.





```

colors=fc_tools.graphics.selectColors(6);
x=0:pi/100:2*pi;
figure(1)
plot(x,cos(x),'color',colors(1,:),'Linewidth',1.5)
hold on
plot(x,sin(x),'color',colors(2,:),'Linewidth',1.5)
plot(x,cos(2*x),'color',colors(3,:),'Linewidth',1.5)
plot(x,sin(2*x),'color',colors(4,:),'Linewidth',1.5)
plot(x,cos(3*x),'color',colors(5,:),'Linewidth',1.5)
plot(x,sin(3*x),'color',colors(6,:),'Linewidth',1.5)
legend('cos(x)','sin(x)','cos(2x)','sin(2x)','cos(3x)','sin(3x)')

```

Listing 3: `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.get_themes` function

The `fc_tools.graphics.xcolor.get_themes` function returns available color themes.

Listing 4: : example using `fc_tools.graphics.xcolor.get_themes` functions

```
themes=fc_tools.graphics.xcolor.get_themes()
```

Output

```
themes =
1x5 cell array
{'matlab'} {'svg'} {'X11'} {'fullX11'} {'wiki'}
```

1.2.2 `fc_tools.graphics.xcolor.get_from_theme` function

The `fc_tools.graphics.xcolor.get_from_theme` function returns names and RGB values of an available theme colors.

Listing 5: : example using `fc_tools.graphics.xcolor.get_from_theme` functions

```
[name,rgb]=fc_tools.graphics.xcolor.get_from_theme('X11');
whos name rgb
k=15;
fprintf('color_name: %s',name{k},'\n',rgb(k,1),rgb(k,2),rgb(k,3))
```

Output

Name	Size	Bytes	Class	Attributes
name	1x317	38932	cell	
rgb	317x3	7608	double	

color name : 'Bisque3', rgb=[0.804000,0.716000,0.620000]

1.2.3 `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.

1.2.4 `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.

1.2.5 `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.

1.3 monitors submodule

This module is **experimental** ...

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, ...)
```

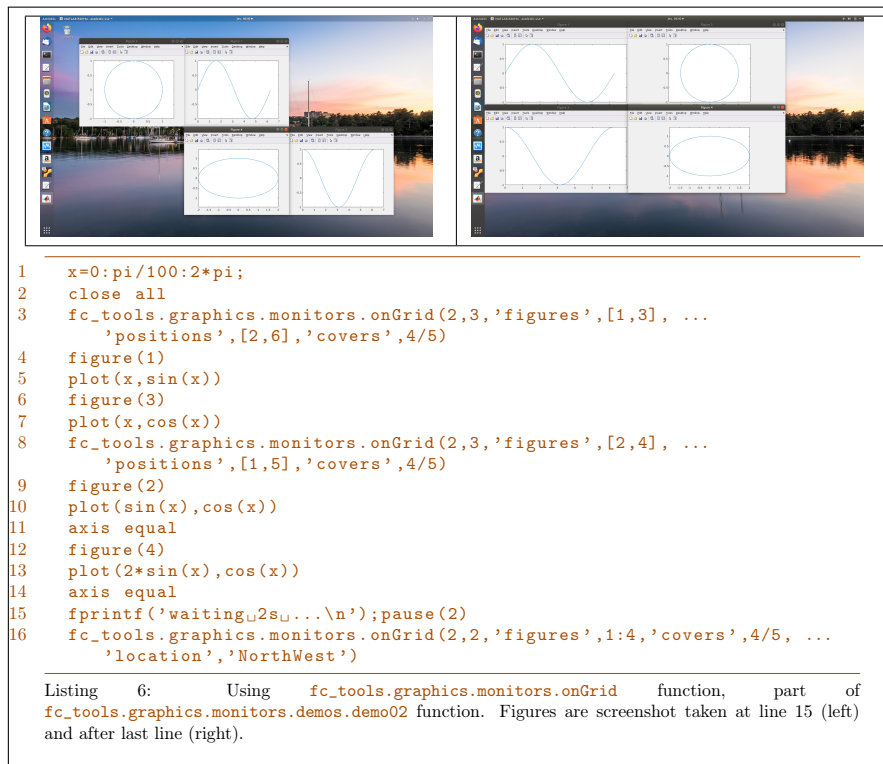
Description

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

A virtual `m`-by-`n` grid is created on the first monitor and the figures numbered 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`.



1.3.2 `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()`

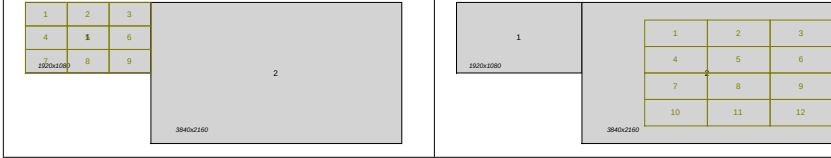
Displays monitors with their resolution, position and number on a figure.

`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.

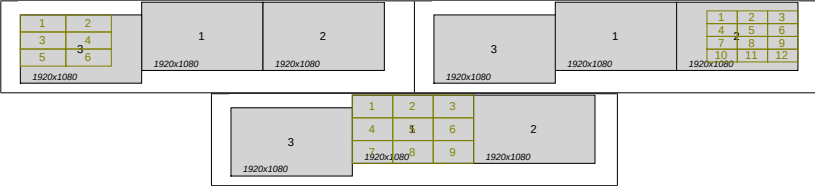


```

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 7: 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 8: 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 9, some examples are provided.

Listing 9: : 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 : 13.60 GB  
  
CPU =  
  
    struct with fields:  
  
        name: 'AMD Ryzen 5 3500U with Radeon Vega Mobile Gfx'  
        nthreadspercore: 2  
        ncoreperproc: 4  
        nprocs: 1  
  
OS =  
  
    struct with fields:  
  
        distributor: 'Ubuntu'  
        description: 'Ubuntu 22.04.1 LTS'  
        release: '22.04'  
        codename: 'jammy'  
        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 : 0.0.34  
commit : 625f31d5dd97131d3f3a96ef415f810c008c19c6  
date : 2023-01-04  
time : 12-59-08  
status : 0  
-----
```

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

```
-----  
name : fctools  
tag :  
commit : c9a33ce7b4dacf90f66e5e49856e69afadac0a3  
date : 2022-12-17  
time : 07:57:20  
status : 1  
-----
```

Using the remote configuration repository:

```
url      ssh://lagagit/MCS/Cuvelier/Matlab/fc-config  
commit   268d29786e42ee37b3531aed5a97635dfc1d9ada
```