# **Flower**

**Kivy** 

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MapView is a Kivy widget specialized into tiles-based map rendering.

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**CHAPTER** 

ONE

## **GETTING STARTED**

### 1.1 Installation

## 1.1.1 Supported versions

• Python 3.5+

## 1.1.2 Dependencies

- 1. Kivy
- 2. concurrent.futures
- 3. requests

### 1.1.3 Installation

Install it from PyPI via:

```
python -m pip install kivy_garden.mapview
```

#### Or even shorter:

```
python -m pip install mapview
```

Alternatively, you can install mapview develop directly from github with:

```
python -m pip install https://github.com/kivy-garden/mapview/archive/master.zip
```

Look under the releases tab if you'd like to install a specific release or a pre-compiled wheel, if the flower has any. Then use the url with *pip*.

Or you can automatically install it using garden's pypi server with:

```
python -m pip install kivy_garden.mapview --extra-index-url https://kivy-garden.

→github.io/simple/
```

To permanently add our garden server to your pip configuration so that you don't have to specify it with *-extra-index-url*, add:

```
[global]
timeout = 60
index-url = https://kivy-garden.github.io/simple/
```

to your pip.conf.

Please see the garden docs for further installation instructions.

## 1.2 Usage

### 1.2.1 Basic Usage

If you use Kivy garden, you can import the widget like this:

```
from kivy.garden.mapview import MapView, MarkerMap
map = MapView()
```

You can customize the default zoom and center the view on Lille by:

```
map = MapView(zoom=9, lon=50.6394, lat=3.057)
```

Then, you can create marker and place them on the map. Normally, anything that goes on a map should go on a MapLayer. Hopefully, the MapView give an API for adding marker directly, and creates a MarkerMapLayer if you did'nt created one yet:

```
m1 = MapMarker(lon=50.6394, lat=3.057) # Lille
m2 = MapMarker(lon=-33.867, lat=151.206) # Sydney
map.add_marker(m1)
map.add_marker(m2)
```

You can also change the providers by:

1. using a provider key:

```
map.map_source = "mapquest-osm"
```

2. using a new MapSource object:

## 1.3 Examples

## 1.3.1 Basic Example

Add your examples here

### THE MAPVIEW API

## 2.1 Mapview

## 2.1.1 kivy\_garden.mapview

class mapview.Coordinate(lon, lat)

Named tuple that represent a geographic coordinate with latitude/longitude

#### **Parameters**

- **lon** (float) Longitude
- lat (float) Latitude

Class that represent a map source. All the transformations from X/Y/Z to longitude, latitude, zoom, and limitations of the providers goes are stored here.

#### **Parameters**

- url (str) Tile's url of the providers. Defaults to http://{s}.tile.openstreetmap.org/{z}/{x}/y}.png
- cache\_key (str) Key for storing the tiles. Must be unique and not colliding with another providers, otherwise tiles will not be downloaded again. Defaults to "osm"
- min\_zoom (int) Minimum zoom value acceptable for this provider. Defaults to 0.
- max\_zoom (int) Maximum zoom value acceptable for this provider. Defaults to 19.
- **tile\_size** (*int*) Size of a image tile returned by the provider. Defaults to 256.
- attribution (str) Attribution for this provider. Defaults to empty string
- **subdomains** (str) Domains substitutions for the {s} in the url. Defaults to "abc"

get\_x (zoom, lon)

Get the x position to the longitude in the map source's projection

### **Parameters**

- zoom (int) Zoom level to look at
- **lon** (float) Longitude

**Returns** X position

Return type float

```
get_y (zoom, lat)
```

Get the y position to the latitude in the map source's projection

#### **Parameters**

- zoom (int) Zoom level to look at
- lat (float) Latitude

**Returns** Y position

Return type float

#### get\_lon(zoom, x)

Get the longitude to the x position in the map source's projection

#### **Parameters**

- zoom (int) Zoom level to look at
- **x** (float) X position in the map

Returns Longitude

Return type float

#### get\_lat (zoom, y)

Get the latitude to the y position in the map source's projection

#### **Parameters**

- zoom (int) Zoom level to look at
- y(float) Y position in the map

Returns Latitude

Return type float

#### get\_col\_count (zoom)

Return the number of column for this provider at this zoom level.

Parameters zoom (int) – Zoom level to look at

Returns Number of column

Return type int

### get\_row\_count (zoom)

Return the number of row for this provider at this zoom level.

**Parameters** zoom (int) – Zoom level to look at

**Returns** Number of rows

Return type int

### get\_max\_zoom()

Return the maximum zoom of this source

Returns Maximum zoom

Return type int

#### get\_min\_zoom()

Return the minimum zoom of this source

**Returns** Minimum zoom

#### Return type int

#### class mapview.MapMarker

A marker on the map, that must be used on a <code>MapMarker</code>, or with <code>MapView.add\_marker()</code> or with <code>MapView.add\_widget()</code>

**Events** *on\_press*: Fired when the MapMarker is pressed *on\_release*: Fired when the MapMarker is release

#### anchor x

Anchor of the Marker on the X axis. Defaults to 0.5, means the anchor will be at the X center of the image

#### anchor\_y

Anchor of the marker on the Y axis. Defaults to 0, means the anchor will be at the Y bottom of the image

#### lat

Latitude of the marker

#### lon

Longitude of the marker

#### source

Image source of the marker, defaults to *marker.png* within the mapview package.

#### class mapview.MapView

MapView is a widget that control the map displaying, navigation and layers management.

**Available events** on\_map\_relocated: called everytime the MapView change location

#### lon

Longitude at the center of the widget, read-only.

#### lat

Latitude at the center of the widget, read-only.

#### zoom

Zoom of the MapView. Must be between  ${\it MapSource.get\_min\_zoom}$  () and  ${\it MapSource.get\_max\_zoom}$  (). Default to 0

#### map\_source

Provider of the map, default to an empty MapSource

#### double\_tap\_zoom

If True, this will activate the double-tap to zoom.

Defaults to False.

#### pause\_on\_action

Pause on any loading / tiles loading when an action is done. This allow better performance on mobile, but can be safely deactivated on desktop.

Defaults to True.

#### scale

Current scale of the internal scatter, read-only. This is usually not used in user-side unless you're hacking mapview.

#### snap\_to\_zoom

When the user initiate a zoom, it will snap to the closest zoom for better graphics. The map can be blur if the map is scaled between 2 zoom.

Defaults to True, even if it doesn't fully working yet.

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#### add layer (layer)

Add a new layer to update at the same time than the base tile layer

Parameters layer (MapLayer) - Map layer to add

#### add\_marker (marker, layer=None)

Add a marker into a *layer*. If *layer* is None, it will be added in the default marker layer. If there is no default marker layer, a new one will be automatically created.

#### **Parameters**

- marker (MapMarker) The marker to add
- layer (MarkerMapLayer) The layer to use

#### center\_on(lat, lon)

Center the map on the coordinate (lat, lon)

#### **Parameters**

- lat (float) Latitude
- **lon** (float) Longitude

#### get\_bbox (margin=0)

Returns the bounding box from the bottom-left to the top-right.

Parameters margin (float) - Optionnal margin to extend the Bbox bounds

**Returns** Bounding box

Return type Bbox

### get\_latlon\_at(x, y, zoom=None):

Return the current coordinate (lat, lon) at the (x, y) widget coordinate

#### **Parameters**

- **x** (float) X widget coordinate
- y (float) Y widget coordinate

Returns lat/lon Coordinate

Return type Coordinate

#### remove\_layer (layer)

Remove a previously added MapLayer

Parameters layer (MapLayer) - A map layer

#### remove marker(marker)

Remove a previously added MarkerMap

Parameters marker (MarkerMap) - The marker

#### set\_zoom\_at (zoom, x, y, scale=None)

Sets the zoom level, leaving the (x, y) at the exact same point in the view.

#### **Parameters**

- zoom (float) New zoom
- x (float) X coordinate to zoom at
- y (float) Y coordinate to zoom at
- scale (float) (internal) Scale to set on the scatter

#### unload()

Unload the view and all the layers. It also cancel all the remaining downloads. The map should not be used after this.

#### class mapview.MapLayer

A map layer. It is repositioned everytime the MapView is moved.

#### reposition()

Function called when the *MapView* is moved. You must recalculate the position of your children, and handle the visibility.

#### unload()

Called when the view want to completely unload the layer.

```
class mapview.MarkerMapLayer(MapLayer)
```

A map layer specialized for handling MapMarker.

```
class mapview.mbtsource.MBTilesMapSource(MapSource)
```

Use a Mbtiles as a source for a MapView

```
class mapview.geojson.GeoJsonMapLayer(MapLayer)
```

A Geojson MapLayer.

**Experimental**, only Polygon and LineString feature are supported. Marker are not yet implemented, due to lack of API for wiring Marker selection back to you.

#### source

A Geojson filename to load, defaults to None.

### geojson

A dictionary structured as a Geojson. This attribute contain the content of a source if passed.

```
class mapview.clustered_marker_layer.ClusteredMarkerLayer(MapLayer)
```

**Experimental** Layout that implement marker clustering. It implement its own version of Super Cluster, based itself on a KD-tree.

Aka you can load like 2000 markers without issues. The cluster index is immutable, so if you add a new marker, it will be rebuild from scratch.

Please note that the widget creation is done on the fly by the layer, not by you.

```
DONT use add_widget, use add_marker()
```

#### Example:

```
layer = ClusteredMarkerLayer()
for i in range(2000):
   lon = random() * 360 - 180
   lat = random() * 180 - 90
   layer.add_marker(lon=lon, lat=lat, cls=MapMarker)

# then you can add the layer to your mapview
mapview = MapView()
mapview.add_widget(layer)
```

#### cluster\_cls

Reference to the class widget for creating a cluster widget. Defaults to ClusterMapMarker

#### cluster\_min\_zoom

Minimum zoom level at which clusters are generated. Defaults to 0

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#### cluster\_max\_zoom

Maximum zoom level at which clusters are generated. Defaults to 16

#### cluster\_radius

Cluster radius, in pixels. Defaults to 40dp

#### cluster\_extent

Tile extent. Radius is calculated relative to this value. Defaults to 512.

#### cluster\_node\_size

Size of the KD-tree leaf node. Affects performance. Defaults to 64.

```
add_marker (lon, lat, cls=MapMarker, options=None)
```

Method to add a marker to the layer.

#### **Parameters**

- **lon** (*float*) Longitude
- lat (float) Latitude
- cls (object) Widget class to use for creating this marker. Defaults to MapMarker
- options (dict) Options to pass to the widget at instanciation. Defaults to an empty dict.

**Returns** The instance of a Marker (internal class, not the widget)

Method to call for building the cluster. It is done automatically at the first rendering. If you missed it, or need to rebuild after readding marker, just call this function.

class mapview.clustered\_marker\_layer.ClusterMapMarker(MapMarker)

Widget created for displaying a Cluster.

#### cluster

Reference to the Cluster used for this widget

#### num\_points

Number of marker that the cluster contain.

#### text color

Color used for the text, defaults to [.1, .1, .1, 1]. If you want others options, best is to do your own cluster widget including the label you want (font, size, etc) and customizing the background color.

**CHAPTER** 

## THREE

## **CURRENT LIMITATIONS**

- The API is still moving, it may contain errors.
- Some providers can be slow or timeout. This is not an issue from MapView.
- If a tile is not correctly downloaded or missing from the provider, the error will be showed on the console, but nothing happen on the map itself. This can lead to a defect user experience.
- When leaving, *concurrent.futures* are joining all the threads created. It can stuck the application at a maximum time of 5 seconds (requests timeout). More if the network is unstable. There is no way to force it yet.
- The cache is not controlable, if the user move the map a lot, it can fill the disk easily. More control will be given later.

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