webviz_site_generator Documentation

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equinor

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CHAPTER 1

webviz package

This package contains the core functionality for putting together different Page instances into a Webviz instance. Each Page is a collection of PageElement instances, which are rendered in the input order on the corresponding page when running Webviz.write_html().

```
from webviz import Webviz, Page

web = Webviz('Main title')
page = Page("Demo", icon='graph')
web.add(page)
web.write_html("./simple_webviz_example", overwrite=True, display=True)
```

This small example will create an instance web, add one empty page to it (in addition to the default index/front page), and write the output to a folder ./simple_webviz_example.

class webviz.HeaderElement

Bases: webviz._header_element.HeaderElement

A HeaderElement describes one action taken to include a header element to a Page.

Parameters

- tag The tag of the header element, such as 'script' or 'link'.
- **attributes** Dictinary of attributes of the tag, such as *{'src': 'jquery.js'}*. Value strings can include the template value *{root_folder}* which will be substituted with the path to the root of the site.
- **content** The content of the text (inner html).
- source_file If the header element refers to a file, then the absolute path to that file.
- target_file The relative path to the file, as it is referred to in the attributes.

Bases: object

An instance of Webviz is a collection of Page instances, and optionally also SubMenu instances. Webviz is used to build a collection of these, which can afterwards be rendered as html.

There is one special Page included as default, index, which is the front page in the html output.

```
add (menu item)
```

Adds an item to the top-level navigation bar of the Webviz instance.

Parameters menu_item - A Page or Submenu to add to the Webviz instance.

Raises ValueError, if menu item is neither Page nor a SubMenu.

pages

List of all Pages in the Webviz instance.

write_html (destination, display=False, overwrite=False)

Writes the html to the destination folder.

Parameters

- **destination** Directory to write the *html* output to.
- **overwrite** *Optional Parameter*. Whether to ignore if the given destination already exists. Content inside the folder may be deleted.
- **display** *Optional Parameter*. Whether to open browser to the index page.

Raises ValueError if overwrite is False and destination folder exists.

```
{\tt class \ webviz.Html} \ ({\it html}, {\it js\_deps=[]}, {\it css\_deps=[]})
```

Bases: webviz._page_element.PageElement

A page element for adding html.

Parameters

- html The *html* string to add to the page.
- **js_deps** A list of *js* files (absolute path) to be included in the html code.
- css_deps A list of css files (absolute path) to be included in the html code.

```
get_template()
```

Returns The corresponding jinja2 template for the plot, which can be rendered using:

```
html = self.get_template().render(element=self)
```

class webviz.Page(title, icon=None)

Bases: object

Container for PageElement instances. In order to be rendered the Page should be added to a Webviz instance.

Parameters

- title String. A title for the page.
- icon *Optional parameter*. Name of an icon provided by the webviz. Theme used in the Webviz instance this page will be added to.

add_content (content)

Add a PageElement to the page.

Parameters content - The PageElement to add.

Raises ValueError if content is not a PageElement.

header elements

Returns The set of *css* dependencies for all page elements in the page

resources

Returns The set of *css* dependencies for all page elements in the page

```
class webviz.SubMenu (title, icon=None)
```

Bases: object

A submenu is a collection of pages with its own title and icon. The pages in a submenu are grouped together in the naviagation of the Webviz.

Parameters

- title The title of the submenu.
- icon *Optional parameter*. Name of an icon provided by the webviz. Theme used in the Webviz instance this submenu will be added to.

add_page (page)

Adds a Page to the submenu.

Parameters page – A Page to add to the submenu.

Raises ValueError if page is not a Page.

location

Returns The location of the first page, or *None* if the submenu is empty.

class webviz.Markdown(md)

Bases: webviz._page_element.PageElement

A page element for adding markdown.

```
get_template()
```

Returns The corresponding jinja2 template for the plot, which can be rendered using:

```
html = self.get_template().render(element=self)
```

class webviz.PageElement

Bases: object

A page element with data and a template which renders to html.

Each element also has a unique containerId in order to make unique DOM IDs in the template.

```
get_template()
```

Returns The corresponding jinja2 template for the plot, which can be rendered using:

```
html = self.get_template().render(element=self)
```

class webviz. Theme

Bases: webviz. theme. Theme

A theme contains the templates and files related to building Webviz instance.

There is one entry template, main.html, which is rendered for each page.

Webviz exposes a set of jinja2 macros that set up includes the content. A minimal example of a theme is as follows:

```
{% import macros as webviz with context %}
<html>
<head>
{{ webviz.header() }}
</head>
<body>
{% call(banner) webviz.banner() %}
<img src='{{banner}}'></img>
{% endcall %}
<u1>
 {% call(loc, title, current, icon, sub) webviz.iter_menu() %}
   <a href='{{loc}}'> {{icon}} {{title}}</a>
     {% if sub %}
     <u1>
         {% call(sub_loc, sub_title) webviz.iter_sub_menu(sub) %}
             <a href='{{sub_loc}}'> {{icon}} {{sub_title}}</a>
         {% endcall %}
       {% endif %}
 {% endcall %}
</111>
{{ webviz.content() }}
{% if copyright_notice %}
 {{ copyright_notice }}
{% endif%}
</body>
</html>
```

See the webviz_default_theme plugin for a more advanced example.

Parameters

- template_loader A loader where the main.html, and all the templates it references, can be found.
- **css_files** List of additional *css* files to be included on each page.
- js_files List of additional *js* files to be included on each page.
- resources Dictionary of additional files to be included by the template. The key is the relative location where this resource should be found. For instance, if resources['images'] = ['/absolute/path/to/my_image.jpg'], the image can be included in the template by the resources macro as webviz. resources('images/my_image.jpg').
- icons A dictionary of icons provided by the theme.

class webviz. JSONPageElement

Bases: webviz. page element.PageElement

A JSONPageElement is a PageElement which stores some json-data. The data is either assigned to some key in the json store object or otherwise can be accessed as a json-string.

```
>>> json_page_element['my_json_data'] = {'key': 3}
>>> json_page_element['my_json_data']
{'key': 3}
```

```
>>> json_page_element.get_json_dump('my_json_data')
'{"key": 3}'
```

The json data can be "dumped", i.e. stored in a key of the json store object.

```
>>> json_page_element.dump_all_jsons('/my/dir')
{'my_json_data': (json_store['123-567-8910'] = {"key": 3};')}
```

Asking for the json dump will then instead return a lookup in the json-store:

```
>>> json_page_element.get_json_dump('my_json_data')
'json_store["123-567-8910"]'
```

get_js_dep is overriden including js files with assignments to the json store.

```
dump_all_jsons()
```

Returns A map from all json-keys to assignments to the json_store.

```
>>> json_page_element.dump_all_jsons()
{'my_json_data' : 'json_store["123-567-8910"] = {"data": 3};'}
```

$dump_json_key(key)$

Dumps the given json-key.

Raises KeyError, if there is no value for the given json-key.

```
get_json_dump(key)
```

Returns Dumped value for the given key. Either lookup in store or a json string.

is_dumped(key)

Returns Whether the json-value with the given key has been dumped.

CHAPTER 2

webviz visualizations

Bases: webviz_plotly.Plotly

Page Element for adding filtering controls to Plotly plots that take a dataframe. Values are grouped by labels, for instance:

```
index, value, labels
01-01-2020, 3, A
02-01-2020, 4, B
```

If 'labels' is chosen as a dropdown_column, then the value 4 will be chosen if the dropdown menu is set to the label B, and the value 3 will be chosen if the dropdown is set to A.

The FilteredPlotly.process_data() handles the generation of the plot data. For the example above, it is given the following dataframes:

```
index, value 01-01-2020, 3
```

and

```
index, value, 02-01-2020, 4
```

Layout and config is then generated that insert the required controls.

Parameters

• data – A dataframe, or list of dataframes, that can be processed by *process_data*. Each dataframe will be grouped based on check_box_columns and given as a parameter list to process data. A special label, FilteredPlotly.wildcard ('*' by default), signifies that the data should be present in all groups. If a dataframe does not contain a column it is treated as if all rows have the wildcard label.

- check_box_columns Columns in the dataframes that contain labels to be filtered on by check boxes.
- slider_columns Columns in the dataframe that contain labels to be filtered on by a slider.
- **dropdown_columns** Columns in the dataframe that contain labels to be filtered on by a dropdown menu.

```
get_template()
    overrides webviz.PageElement.get_template().

names_match (filters, names1, names2)

process_data(*datas)

Returns List of traces to be used a data for the Plotly Page Element.
wildcard = '*'
```

```
class webviz_plotly.Plotly(data, layout={}, config={}, **kwargs)
    Bases: webviz._json_page_element.JSONPageElement
```

Plotly page element. Arguments are the same as plotly.plot() from *plotly.js*. See https://plot.ly/javascript/for usage.

Parameters

- **xaxis** Will create a label for the x-axis.
- yaxis Will create a label for the y-axis.
- logx boolean value to toggle x-axis logarithmic scale.
- logy boolean value to toggle y-axis logarithmic scale.
- **xrange** list of minimum and maximum value. Ex: [3, 15].
- yrange list of minimum and maximum value. Ex: [3, 15].

Note: Plotly will not allow the modebarbuttons in DISALLOWED_BUTTONS, as these are not useful for the visualizations implemented in webviz.

```
DISALLOWED_BUTTONS = ['sendDataToCloud', 'resetScale2d']
   add_annotation(**kwargs)

get_template()
      Overrides webviz.PageElement.get_template().

handle_args(title=None, xrange=None, yrange=None, xaxis=None, yaxis=None, logx=False, logy=False)

class webviz_bar_chart.BarChart(data, barmode='group', logy=False, *args, **kwargs)
   Bases: webviz_plotly.FilteredPlotly

Bar chart page element.
```

Parameters

• data – Either a file path to a *csv* file or a pandas. DataFrame. If a dataframe is given, each column is one set of bars in the chart. The dataframe index is used for the horizontal values. Similarly for the *csv* file, where a special column named index will be used for the horizontal values.

• barmode - Either 'group', 'stack', 'relative' or 'overlay'. Defines how multiple bars per index-value are combined. See plotly is layout-barmode.

process_data(data)

Returns List of traces to be used a data for the Plotly Page Element.

```
class webviz_heat_map.HeatMap(data, *args, **kwargs)
    Bases: webviz_plotly.FilteredPlotly
```

Line chart page element.

Parameters data – Either a file path to a *csv* file or a pandas. DataFrame. Each column of the dataframe becomes one line in the chart. Similarly for the *csv* file, but a special column index will be used as the horizontal value.

```
process_data(data)
```

Returns List of traces to be used a data for the Plotly Page Element.

Bases: webviz_plotly.FilteredPlotly

Histogram page element.

Parameters

- data Either a file path to a *csv* file or a pandas.DataFrame. If a dataframe is given, each column is one set of bars in the chart. The dataframe index is used for the horizontal values. Similarly for the *csv* file, where a special column named index will be used for the horizontal values.
- barmode Either 'group', 'stack', 'relative' or 'overlay'. Defines how multiple bars per index-value are combined. See plotly.js layout-barmode.
- histnorm Either '', 'percent', 'probability', 'density' or 'probability density'. Spesifies type of normalization used. See plotly.js histogram-histnorm.
- nbinsx Maximum number of desired bins. Default value 0 will generate optimal number of bins.

```
process_data(data)
```

Returns List of traces to be used a data for the Plotly Page Element.

```
class webviz_line_chart.LineChart (data, logy=False, *args, **kwargs)
    Bases: webviz_plotly.FilteredPlotly
```

Line chart page element.

Parameters data – Either a file path to a *csv* file or a pandas.DataFrame. If a dataframe is given, each column is one line in the chart. The dataframe index is used for the horizontal values. Similarly for the *csv* file, where a special column named index will be used for the horizontal values.

```
process data(data)
```

Returns List of traces to be used a data for the Plotly Page Element.

```
class webviz_pie_chart.PieChart (data, num_per_row=4)
    Bases: webviz_plotly.Plotly
```

Pie chart page element.

Parameters

- data Value for each sector, or csv file (one column for each sector). Each row (line) becomes a separate pie chart. If there is a column with the name 'pie_chart_label' it is used for the name of each pie chart.
- num_per_row If more than one pie chart, number per row.

```
class webviz_scatter_plot.ScatterPlot (data, logy=False, *args, **kwargs)
    Bases: webviz_plotly.FilteredPlotly
```

Scatter plot page element.

Parameters data – Either a file path to a *csv* file or a pandas. DataFrame. If a dataframe is given, each column is one set of points in the chart. The dataframe index is used for the horizontal values. Similarly for the *csv* file, where a special column named index will be used for the horizontal values.

```
process_data(data)
```

Returns List of traces to be used a data for the Plotly Page Element.

```
class webviz_tornado_plot.TornadoPlot(*args, **kwargs)
    Bases: webviz plotly.FilteredPlotly
```

Tornado plot page element.

Parameters

- data Either a file path to a *csv* file or a pandas. DataFrame. There are two columns: 'low' and 'high' describing.
- high_text Optional text

```
process_data(data)
```

Returns List of traces to be used a data for the Plotly Page Element.

CHAPTER 3

Examples

The different webviz visualization plugins can, when installed, be imported using e.g.

```
from webviz.page_elements import BarChart, LineChart, PieChart, ScatterPlotMatrix
```

3.1 Bar chart

```
from webviz import Webviz, Page
from webviz.page_elements import BarChart
import pandas as pd

web = Webviz('Bar Chart Example')

page = Page('Bar Chart')

bars1 = [10, 15, 13, 17]

bars2 = [16, 5, 11, 9]

bars = pd.DataFrame({'bars1': bars1, 'bars2': bars2})

page.add_content(BarChart(bars))
web.add(page)
web.write_html("./webviz_example", overwrite=True, display=False)
```

3.2 Fan chart

```
from webviz import Webviz, Page
from webviz.page_elements import FanChart
import pandas as pd
```

```
web = Webviz('Fan Chart Example')
page = Page('Fan Chart')
index = ['2012-01-01', '2012-01-02', '2012-01-03', '2012-01-04']
name = ['line-1', 'line-1', 'line-1']
mean = [10, 15, 13, 17]
p10 = [11, 16, 13, 18]
p90 = [9, 14, 12, 16]
areaMax = [16, 17, 16, 19]
areaMin = [4, 1, 9, 8]
lines = pd.DataFrame({
  'index': index,
  'name': name,
 'mean': mean,
 'p10': p10,
 'p90': p90,
 'max': areaMax,
 'min': areaMin
})
observations = pd.DataFrame({
 'name': ['line-2', 'line-3'],
 'value': [4, 3],
 'error': 2
})
page.add_content(FanChart(lines, observations))
web.add(page)
web.write_html("./webviz_example", overwrite=True, display=False)
```

3.3 Heat map

```
from webviz import Webviz, Page
from webviz.page_elements import HeatMap
import pandas as pd

web = Webviz('Heat Map Example')

page = Page('Heat Map')

lines = pd.DataFrame(
        [[1, 20, 30, 50, 1], [20, 1, 60, 80, 30], [30, 60, 1, -10, 20]],
        columns=['Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday'],
        index=['Morning', 'Afternoon', 'Evening']
        )
```

```
page.add_content(HeatMap(lines))
web.add(page)
web.write_html("./webviz_example", overwrite=True, display=False)
```

3.4 Histogram

3.5 Line chart

```
from webviz import Webviz, Page
from webviz.page_elements import LineChart
import pandas as pd
web = Webviz('Line Chart Example')
page = Page('Line Chart')
line1 = [10, 15, 13, 17]
line2 = [16, 5, 11, 9]
lines = pd.DataFrame({
    'line 1': line1,
    'line 2': line2,
    'line 3': line2,
    'line 4': line2,
    'line 5': line2,
    'line 6': line2,
    })
page.add_content(LineChart(lines))
```

(continues on next page)

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```
web.add(page)
web.write_html("./webviz_example", overwrite=True, display=False)
```

3.6 Pie chart

```
from webviz import Webviz, Page
import pandas as pd
from webviz.page_elements import PieChart

web = Webviz('Pie Chart Example')

page = Page('Pie Chart')

frame = pd.DataFrame(
    [[19, 26, 55], [33, 14, 55]],
    columns=['sector 1', 'sector 2', 'sector 3'])

page.add_content(PieChart(frame))
web.add(page)
web.write_html("./webviz_example", overwrite=True, display=False)
```

3.7 Scatter plot

```
from webviz import Webviz, Page
from webviz_scatter_plot import ScatterPlot
import pandas as pd
web = Webviz('Scatter Plot Example')
page = Page('Scatter Plot')
index = ['2012-01-01', '2012-01-02', '2012-01-03', '2012-01-04']
point1 = [10, 15, 13, 17]
point2 = [16, 5, 11, 9]
points = pd.DataFrame({
   'index': index,
    'points 1': point1,
    'points 2': point2
points.set_index('index', inplace=True)
page.add_content(ScatterPlot(points))
web.add(page)
web.write_html("./webviz_example", overwrite=True, display=False)
```

3.8 Scatter plot matrix

```
from webviz import Webviz, Page
from webviz.page_elements import ScatterPlotMatrix
import pandas as pd
web = Webviz('Scatter Plot Matrix Example')
page = Page('Scatter Plot Matrix')
point1 = [10.6, 15, 13.4, 17]
point2 = [16, 5, 11, 9.7]
point3 = [51, 25.6, 51, 23]
point4 = [19, 75.1, 23, 49]
name = ['name1', 'name1', 'name2', 'name2']
points = pd.DataFrame({
   'point1': point1,
    'point2': point2,
    'point3': point3,
    'point4': point4,
    'name': name
})
page.add_content(ScatterPlotMatrix(points))
web.add(page)
web.write_html("./webviz_example", overwrite=True, display=False)
```

3.9 Tornado plot

```
from webviz import Webviz, Page
from webviz.page_elements import TornadoPlot
import pandas as pd
web = Webviz('Tornado Plot Example')
page = Page('Tornado Plot')
high = [0.8, 1, 0.3, 0.4]
low = [0.5, -0.7, -.5, -0.1]
index = ['A', 'B', 'C', 'D']
bars = pd.DataFrame(
   {'low': low, 'high': high},
    index=index
plot = TornadoPlot(bars)
plot.add_annotation(
        x=low[1],
        y=index[1],
        ay=0,
```

```
ax=-20,
    text='label')
page.add_content(plot)
web.add(page)
web.write_html("./webviz_example", overwrite=True, display=False)
```

CHAPTER 4

Introduction

Welcome! You are now browsing the documentation for webviz - a static site generator, optionally including different kind of interactive visualizations. webviz facilitates automatic visualization using the popular open source libraries d3.js and plotly.js.

webviz creates *html* output such that the report can be viewed through a web browser. The site generator can be used in two different ways: using yaml and markdown, or the webviz Python API.

4.1 Using folder structure and markdown files

Webviz can be executed using

```
python -m webviz site_folder
```

where site_folder is a folder containing markdown files. See the github repository for an example. In the site_folder, there are two special files: index.md and config.yaml.index.md is the landing page for the site and config.yaml contains configuration info, such as which theme to use.

In markdown files, page elements (such as visualizations) can be added using:

```
{{ page_element(
    name,
    *args,
    *kwargs
}}
```

name *string*: name of page element. Page elements are the following: Html, FilteredPlotly, Plotly, LineChart, BarChart, PieChart, TornadoPlot, FanChart, ScatterPlotMatrix, Map, Histogram, ScatterPlot, HeatMap

*args args: args of page elements method

**kwargs kwargs: kwargs of page elements method

4.2 API example

The example below creates several (currently empty) pages, linked together through a navigation menu. Further below you will see examples on how to add content to the different pages.

```
from webviz import Webviz, Page, SubMenu, Markdown
web = Webviz('Main title', theme='minimal')
ex1 = Page('Example 1')
ex2 = Page('Example 2')
ex3 = Page('Markdown example')
some_content = (r"""
# Markdown support
> __You can pass markdown wihin a triple-quotes__<br>
> _Also known as multiline comments_
|First Header | Second Header | Third Header |
|:----:|
|Content Cell | `Content Cell` | Content
#!python
   def hello():
       print('Hello World')
If you want to use math formulas, you have several different options. You can
use double dollar signs:
\ \left(\frac{\sqrt x}{y^3}\right) $$
Result: $$ \left(\frac{\sqrt x}{y^3}\right) $$
Or you can wrap it between special commands like this:
\begin{equation}
\cos (2\theta) = \cos^2 \theta - \sin^2 \theta \.
\end{equation}
Result:
\begin{equation}
\cos (2\theta) = \cos^2 \theta - \sin^2 \theta \left[ \sup_{x \in \mathbb{R}^2} \frac{1}{x} \right]
\end{equation}
All equations with labels can easily be referred to in the text as
```\eqref{my_cos_equation}```, resulting in something like
\eqref{my_cos_equation}.
```

```
If you want an equation without numbering add "notag":
\begin{equation}
\lim_{x \to \infty} x \to \inf y \to (-x) = 0.
\end{equation}
Result:
\begin{equation}
\lim_{x \to \infty} x \to \inf (-x) = 0.
\end{equation}
If you want to write multi-line equations aligned on e.g. the equal sign, you
can also do that:
\begin{align}
\&= x^2 + (a+b)x + ab
\end{align}
Result:
\begin{align}
\&= x^2 + (a+b)x + ab
\end{align}
The & operator indicates what to align on. You can also write in-line equations
or symbols inbetween, like ```\(\alpha \)``` (\(\alpha \)) and
```\(\gamma\)``` (\(\gamma\)).
To prevent build failing because of backslashes, use a rawstring format by
adding `r` in front of the string.
You can read more about the input format
[here] (http://docs.mathjax.org/en/latest/tex.html#).
Example:
formula = Markdown(r'$$x_{1,2} = \frac{b \pm {b^2-4ac}}{2b}.$$')
Renders out to this:
$x_{1,2} = \frac{b^2-4ac}{2b}.$
ex3.add_content(Markdown(some_content))
submenu1 = SubMenu('Menu 1')
submenu2 = SubMenu('Menu 2')
submenu3 = SubMenu('Menu 3')
```

(continues on next page)

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```
submenu1.add_page(ex1)
submenu2.add_page(ex2)
submenu3.add_page(ex3)

web.add(submenu1)
web.add(submenu2)
web.add(submenu3)

web.write_html("./webviz_example", overwrite=True, display=False)
```

When the site is created by running webviz. Webviz. write_html(), the output is a folder containing all the files needed for opening and running the site in a browser.

For information about how to use the webviz Python API, see the webviz package.

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