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Python (/python) > 3D Charts (/python/3d-charts) > 3D Scatter Plots

Suggest an edit to this page (https://github.com/plotly/plotly.py/edit/doc-prod/doc/python/3d-scatter-plots.md)

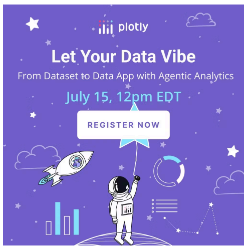
3D Scatter Plots in Python

How to make 3D scatter plots in Python with Plotly.

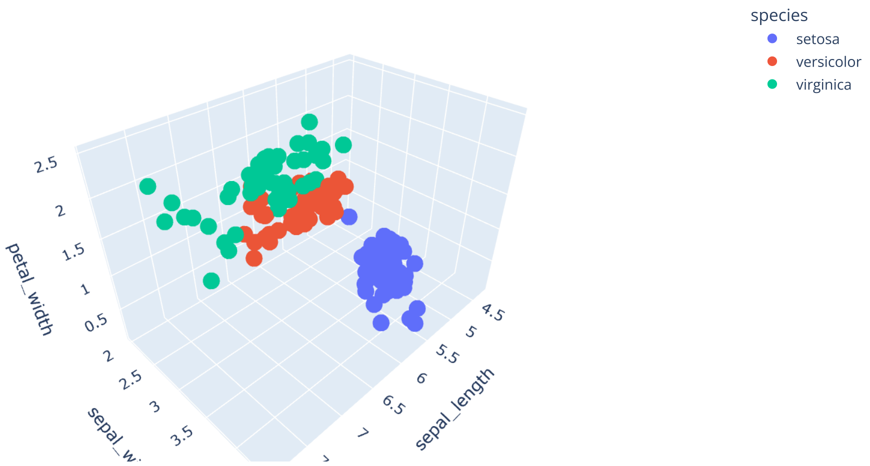
3D scatter plot with Plotly Express

Plotly Express (/python/plotly-express/) is the easy-to-use, high-level interface to Plotly, which operates on a variety of types of data (/python/px-arguments/) and produces easy-to-style figures (/python/styling-plotly-express/).

Like the 2D scatter plot (https://plotly.com/python/line-and-scatter/) `px.scatter`, the 3D function `px.scatter_3d` plots individual data in three-dimensional space.

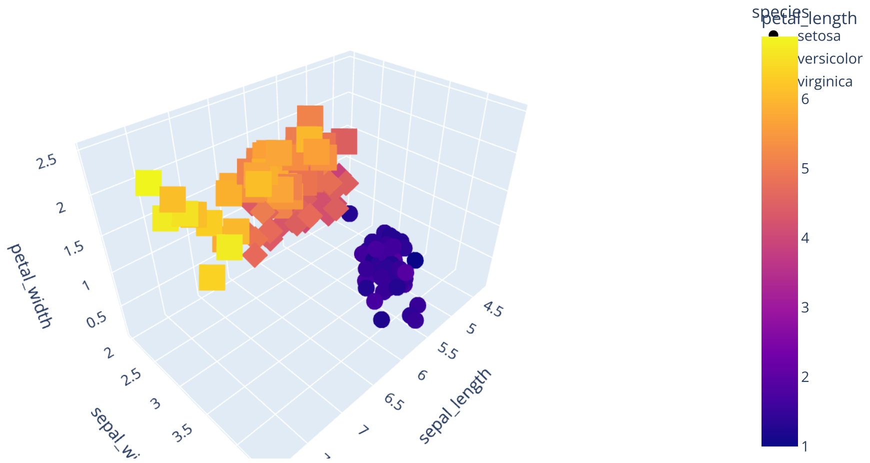


```
import plotly.express as px
df = px.data.iris()
fig = px.scatter_3d(df, x='sepal_length', y='sepal_width', z='petal_width',
              color='species')
fig.show()
```



A 4th dimension of the data can be represented thanks to the color of the markers. Also, values from the species column are used below to assign symbols to markers.

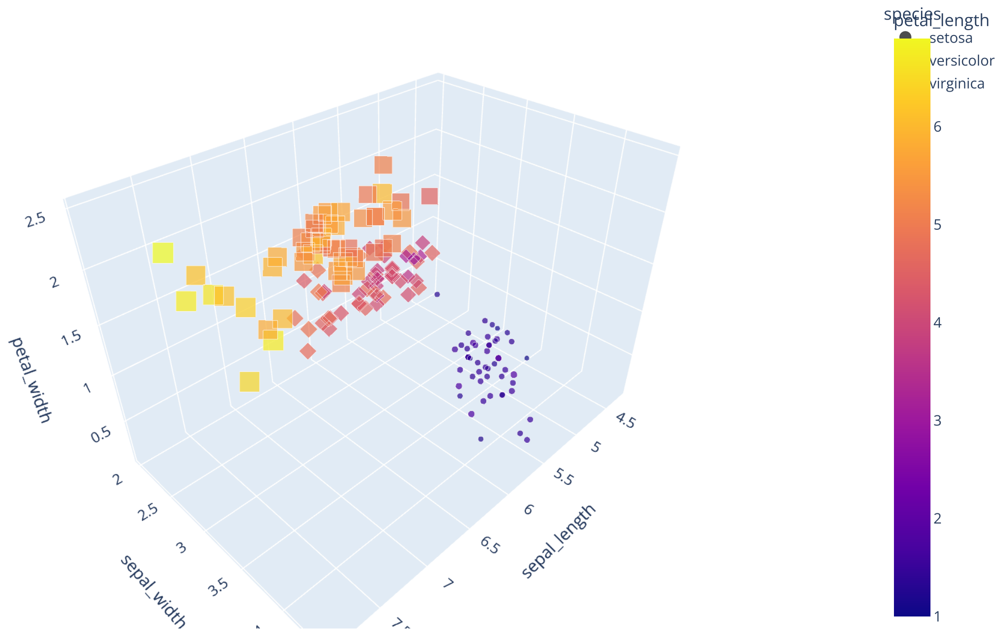
```
import plotly.express as px
df = px.data.iris()
fig = px.scatter_3d(df, x='sepal_length', y='sepal_width', z='petal_width',
                    color='petal_length', symbol='species')
fig.show()
```



Style 3d scatter plot

It is possible to customize the style of the figure through the parameters of px.scatter_3d for some options, or by updating the traces or the layout of the figure through fig.update.

```
import plotly.express as px
df = px.data.iris()
fig = px.scatter_3d(df, x='sepal_length', y='sepal_width', z='petal_width',
              color='petal_length', size='petal_length', size_max=18,
              symbol='species', opacity=0.7)

# tight layout
fig.update_layout(margin=dict(l=0, r=0, b=0, t=0))
fig.show()
```



3d scatter plots in Dash

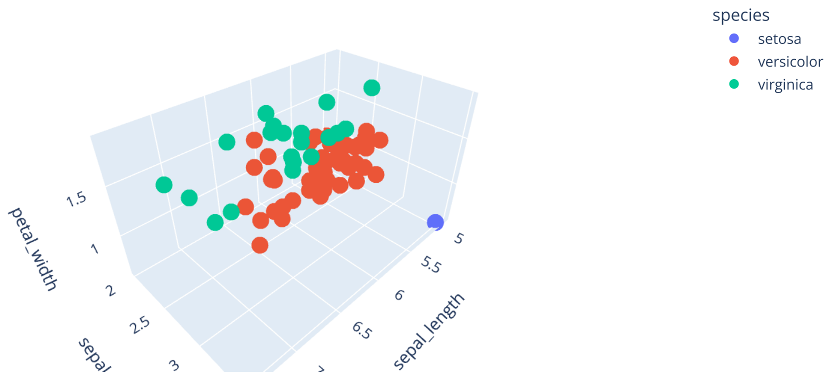
Dash (https://plotly.com/dash/) is the best way to build analytical apps in Python using Plotly figures. To run the app below, run pip install dash, click "Download" to get the code and run python app.py.

Get started with the official Dash docs (https://dash.plotly.com/installation) and **learn how to effortlessly** style (https://plotly.com/dash/design-kit/) **&** deploy (https://plotly.com/dash/app-manager/) **apps like this with** Dash Enterprise (https://plotly.com/dash/)**.**

```
from dash import Dash, dcc, html, Input, Output
import plotly.express as px

app = Dash(__name__)

app.layout = html.Div([
    html.H4('Iris samples filtered by petal width'),
    dcc.Graph(id="graph"),
    html.P("Petal Width:"),
    dcc.RangeSlider(
        id='range-slider',
        min=0, max=2.5, step=0.1,
        marks={0: '0', 2.5: '2.5'},
        value=[0.5, 2]
    ),
])

@app.callback(
    Output("graph", "figure"),
    Input("range-slider", "value"))
def update_bar_chart(slider_range):
    df = px.data.iris() # replace with your own data source
    low, high = slider_range
    mask = (df.petal_width > low) & (df.petal_width < high)
```

DOWNLOAD

Iris samples filtered by petal width



Petal Width:

0 2.5

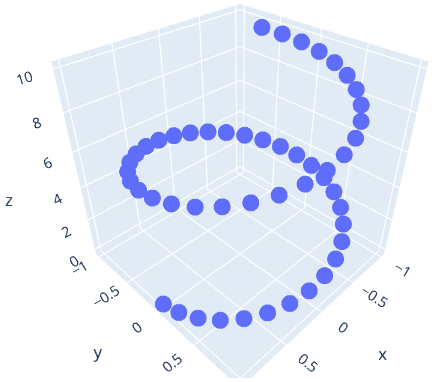
Sign up for Dash Club → Free cheat sheets plus updates from Chris Parmer and Adam Schroeder delivered to your inbox every two months. Includes tips and tricks, community apps, and deep dives into the Dash architecture. Join now (https://go.plotly.com/dash-club?utm_source=Dash+Club+2022&utm_medium=graphing_libraries&utm_content=inline).

3D Scatter Plot with go.Scatter3d

Basic 3D Scatter Plot

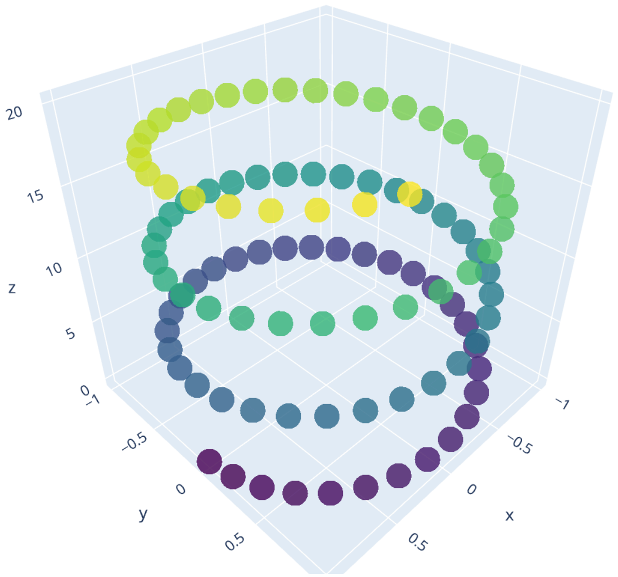
If Plotly Express does not provide a good starting point, it is also possible to use the more generic go.Scatter3D class from plotly.graph_objects (/python/graph-objects/). Like the 2D scatter plot (https://plotly.com/python/line-and-scatter/) go.Scatter, go.Scatter3d plots individual data in three-dimensional space.

```
import plotly.graph_objects as go
import numpy as np

# Helix equation
t = np.linspace(0, 10, 50)
x, y, z = np.cos(t), np.sin(t), t

fig = go.Figure(data=[go.Scatter3d(x=x, y=y, z=z,
                                   mode='markers')])
fig.show()
```



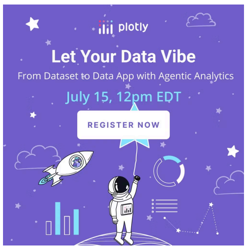
3D Scatter Plot with Colorscaling and Marker Styling

```
import plotly.graph_objects as go
import numpy as np

# Helix equation
t = np.linspace(0, 20, 100)
x, y, z = np.cos(t), np.sin(t), t

fig = go.Figure(data=[go.Scatter3d(
    x=x,
    y=y,
    z=z,
    mode='markers',
    marker=dict(
        size=12,
        color=z,                # set color to an array/list of desired values
        colorscale='Viridis',   # choose a colorscale
        opacity=0.8
    )
)])

# tight layout
fig.update_layout(margin=dict(l=0, r=0, b=0, t=0))
fig.show()
```



Reference

See function reference for px.scatter_3d() (https://plotly.com/python-api-reference/generated/plotly.express.scatter_3d) or https://plotly.com/python/reference/scatter3d/ (https://plotly.com/python/reference/scatter3d/) for more information and chart attribute options!



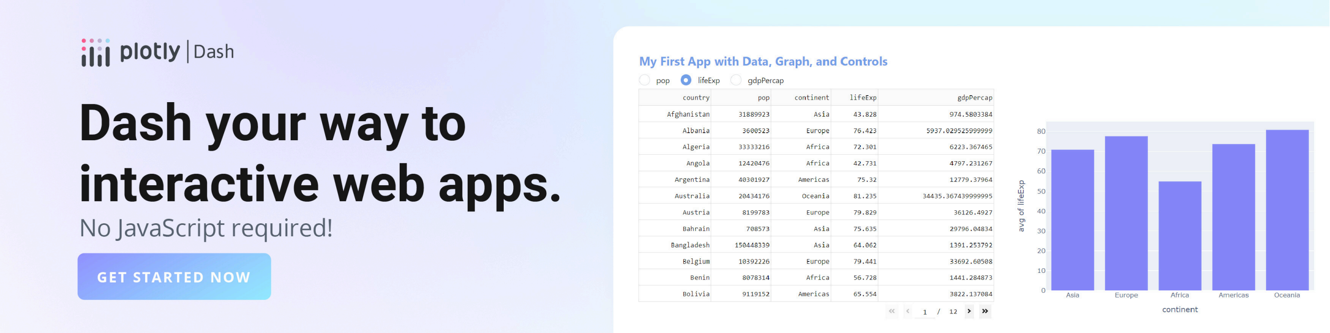
What About Dash?

Dash (https://dash.plot.ly/) is an open-source framework for building analytical applications, with no Javascript required, and it is tightly integrated with the Plotly graphing library.

Learn about how to install Dash at https://dash.plot.ly/installation (https://dash.plot.ly/installation).

Everywhere in this page that you see fig.show(), you can display the same figure in a Dash application by passing it to the figure argument of the Graph component (https://dash.plot.ly/dash-core-components/graph) from the built-in dash_core_components package like this:

```
import plotly.graph_objects as go # or plotly.express as px
fig = go.Figure() # or any Plotly Express function e.g. px.bar(...)
# fig.add_trace( ... )
# fig.update_layout( ... )

from dash import Dash, dcc, html

app = Dash()
app.layout = html.Div([
    dcc.Graph(figure=fig)
])

app.run(debug=True, use_reloader=False)  # Turn off reloader if inside Jupyter
```



My First App with Data, Graph, and Controls

○ pop ● lifeExp ○ gdpPercap

country	pop	continent	lifeExp	gdpPercap
Afghanistan	31889923	Asia	43.828	974.5803384
Albania	3600523	Europe	76.423	5937.029525999999
Algeria	33333216	Africa	72.301	6223.367465
Angola	12420476	Africa	42.731	4797.231267
Argentina	40301927	Americas	75.32	12779.37964
Australia	20434176	Oceania	81.235	34435.367439999995
Austria	8199783	Europe	79.829	36126.4927
Bahrain	708573	Asia	75.635	29796.04834
Bangladesh	150448339	Asia	64.062	1391.253792
Belgium	10392226	Europe	79.441	33692.60508
Benin	8078314	Africa	56.728	1441.284873
Bolivia	9119152	Americas	65.554	3822.137084

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(https://dash.plotly.com/tutorial?utm_medium=graphing_libraries&utm_content=python_footer)

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