How to embed Matplotlib charts in Tkinter GUI?

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Prerequisite: Introduction to Tkinter | Introduction to Matplotlib

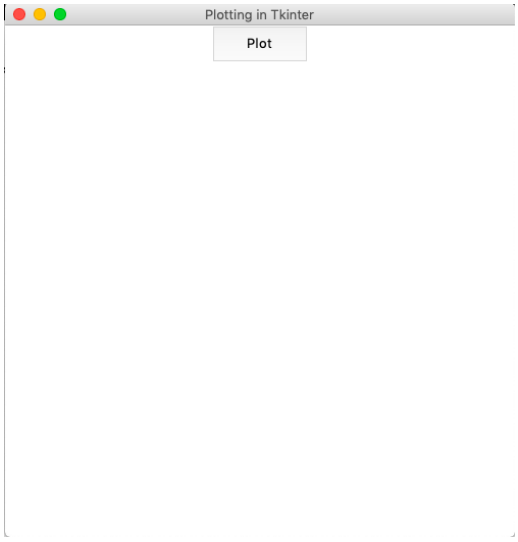
When Matplotlib is used from Python shell, the plots are displayed in a default window. The plots can be embedded in many graphical user interfaces like wxpython, pygtk, or Tkinter. These various options available as a target for the output plot are referred to as '*backends*'. There are various modules available in **matplotlib.backend** for choosing the backend. One such module is **backend_tkagg** which is useful for embedding plots in *Tkinter*.

Creating the Tkinter Application :
First, let us create a basic Tkinter application with the main window and one button which can be used to display the plot.

Python3

```
# import all classes/methods
# from the tkinter module
from tkinter import *

# The main tkinter window
window = Tk()

# setting the title and
window.title('Plotting in Tkinter')

# setting the dimensions of
# the main window
window.geometry("500x500")

# button that would displays the plot
plot_button = Button(master = window,
                     height = 2,
                     width = 10,
                    text = "Plot")
# place the button
# into the window
plot_button.pack()

# run the gui
window.mainloop()
```

Output :



Embedding the Plot:

First, we need to create the figure object using the **Figure()** class. Then, a *Tkinter* canvas(containing the figure) is created using **FigureCanvasTkAgg()** class. Matplotlib charts by default have a toolbar at the bottom. When working with *Tkinter*, however, this toolbar needs

to be embedded in the canvas separately using the **NavigationToolbar2Tk()** class.
In the implementation below, a simple graph for:

$$y = x^2$$

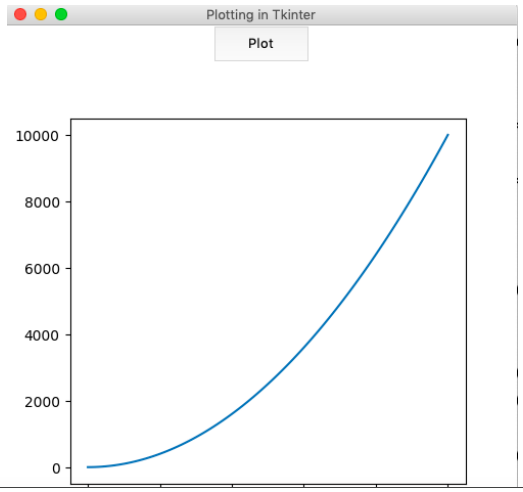
is plotted. The *plot* function is bound to a button that displays the figure when pressed.

Python3

```
from tkinter import *
from matplotlib.figure import Figure
from matplotlib.backends.backend_tkagg import (FigureCanvasTkAgg,
NavigationToolbar2Tk)

# plot function is created for
# plotting the graph in
# tkinter window
def plot():

    # the figure that will contain the plot
    fig = Figure(figsize = (5, 5),
                 dpi = 100)

    # list of squares
    y = [i**2 for i in range(101)]

    # adding the subplot
    plot1 = fig.add_subplot(111)

    # plotting the graph
    plot1.plot(y)

    # creating the Tkinter canvas
    # containing the Matplotlib figure
    canvas = FigureCanvasTkAgg(fig,
                               master = window)
    canvas.draw()

    # placing the canvas on the Tkinter window
    canvas.get_tk_widget().pack()

    # creating the Matplotlib toolbar
    toolbar = NavigationToolbar2Tk(canvas,
                                   window)
    toolbar.update()

    # placing the toolbar on the Tkinter window
    canvas.get_tk_widget().pack()

# the main Tkinter window
window = Tk()
```

```
# setting the title
window.title('Plotting in Tkinter')

# dimensions of the main window
window.geometry("500x500")

# button that displays the plot
plot_button = Button(master = window,
                     command = plot,
                     height = 2,
                     width = 10,
                     text = "Plot")

# place the button
# in main window
plot_button.pack()

# run the gui
window.mainloop()
```

Output :



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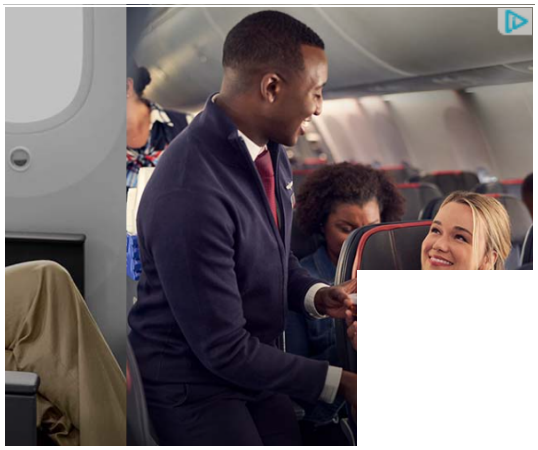

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