

```
1: import numpy as np
2: import pandas as pd
3: import week6
4: import matplotlib.pyplot as plt
5: import argparse
6: from mpl_toolkits.mplot3d import Axes3D
7:
8: ap = argparse.ArgumentParser()
9: ap.add_argument("--show", action="store_true")
10: args = ap.parse_args()
11:
12: # Global variables for extents
13: x_min, x_max = -100, 100
14: y_min, y_max = -100, 100
15:
16: def plot_wireframe_and_contour(f, T, resolution=100):
17:     global x_min, x_max, y_min, y_max
18:
19:     # Generate data for wireframe plot
20:     x_range = np.linspace(x_min, x_max, resolution)
21:     y_range = np.linspace(y_min, y_max, resolution)
22:     X, Y = np.meshgrid(x_range, y_range)
23:     Z = np.zeros_like(X)
24:     for i in range(resolution):
25:         for j in range(resolution):
26:             Z[i, j] = f([X[i, j], Y[i, j]], T)
27:
28:     # Plot wireframe
29:     fig = plt.figure(figsize=(12, 6))
30:
31:     ax_wireframe = fig.add_subplot(121, projection='3d')
32:     ax_wireframe.plot_wireframe(X, Y, Z, color='blue')
33:     ax_wireframe.set_xlabel('X')
34:     ax_wireframe.set_ylabel('Y')
35:     ax_wireframe.set_zlabel('$f_T(x)$')
36:     ax_wireframe.set_title('Wireframe Plot of $f_T(x)$')
37:
38:     # Generate data for contour plot
39:     Z_contour = np.zeros_like(X)
40:     for i in range(resolution):
41:         for j in range(resolution):
42:             Z_contour[i, j] = f([X[i, j], Y[i, j]], T)
43:
44:     # Plot contour
45:     ax_contour = fig.add_subplot(122)
46:     contour = ax_contour.contourf(X, Y, Z_contour, levels=20, cmap='viridis')
47:     plt.colorbar(contour, ax=ax_contour, label='$f_T(x)$')
48:     ax_contour.set_xlabel('X')
49:     ax_contour.set_ylabel('Y')
50:     ax_contour.set_title('Contour Plot of $f_T(x)$')
51:
52:     plt.tight_layout()
53:     if args.show:
54:         plt.show()
55:     else:
56:         plt.savefig(f"fig/wire-contour-{x_min}-{x_max}-{y_min}-{y_max}.pdf")
57:
58: if __name__ == "__main__":
59:     df = pd.read_csv("data/T.csv")
60:     T = df.values
61:     plot_wireframe_and_contour(week6.f, T) # Call the function to plot wireframe and contour
62:
```