Lab of Intelligence Computation

IST

2024/2025

Plot Class Probability and 3D Plot

Guide Extra 4

2024

(Week 2)

1 – Objectives

With this work the student should be able plot the class probability for a specific algorithm and plot in 3D graphics some functions.

2- Plot class probability

The objective of this part of the Lab is to be able to plot a class probability for a given algorithm. We present two examples to perform this:

https://scikit-learn.org/stable/auto_examples/classification/plot_classifier_comparison.html

https://scikit-learn.org/stable/auto_examples/neural_networks/plot_mlp_alpha.html

Explore the examples and change them to use the datasets used in the previous lab. Discover the functions that are used to find the probability of each class for a certain value.

3 – 3D plot with Matplotlib

In order to see better how the evolutionary algorithms work (later in the semester), we need to be able to plot in 3D. The following example plots a 3D figure of a function. You can also use the function ax.scatter(x, y, f1i, c='red', marker='x') to plot a point in the figure. You control the transparency of the figure with the alpha parameter in the plot_surface function.

```
def plotFigure():
    fig = plt.figure()
    ax = fig.gca(projection='3d')

    # Make data.
    X = np.arange(-5, 5, 0.05)
    Y = np.arange(-5, 5, 0.05)
    X, Y = np.meshgrid(X, Y)

    Z1=np.sqrt((X**2)+(Y**2))
    Z2=np.sqrt(((X-1)**2)+((Y+1)**2))

    f1=(np.sin(4*Z1)/Z1)+(np.sin(2.5*Z2)/Z2)
    f2=1-(np.sin(5*Z1)/Z1)
    xlen = len(X)
    ylen = len(Y)
    # Create an empty array of strings with the same shape as the meshgrid, and
    # populate it with two colors in a checkerboard pattern.
    colortuple = ('y', 'b')
    colors = np.empty(X.shape, dtype=str)
    for y in range(ylen):
        for x in range(xlen):
            colors[x, y] = colortuple[(x + y) % len(colortuple)]

    # Plot the surface with face colors taken from the array we made.
    surf = ax.plot_surface(X, Y, f1, facecolors=colors, alpha=0.75, linewidth=0)

    plt.show()
    return fig, ax
```

4 – New function Optimization

Print the shape of the function and plot some points in the surface for the following function $f1(x1, x2)$: and $f2(x1, x2)$

$$Z1 = \sqrt{X1^2 + X2^2}$$

$$Z2 = \sqrt{(X1 - 1)^2 + (X2 + 1)^2}$$

$$f1 = (\sin(4 * Z1)\ /Z1) + (\sin\ (2.5 * Z2)/Z2)$$

$$f2 = (1 - \sin(5 * Z1)\ /Z1)$$

Find other functions to plot the surface and some points.