**SOM CODE :**

# Import necessary libraries

import pandas as pd

import numpy as np

from sklearn.preprocessing import MinMaxScaler

from minisom import MiniSom

import matplotlib.pyplot as plt

from pylab import bone, pcolor, colorbar, plot, show

# Load dataset

data = pd.read\_csv('water\_potability.csv')

# Drop rows with missing values for simplicity

data.dropna(inplace=True)

# Extract features

features = data.drop('Potability', axis=1).values

# Standardize the data

scaler = MinMaxScaler()

features\_scaled = scaler.fit\_transform(features)

# Define the size of the SOM grid

som\_size = (10, 10)

# Initialize SOM

som = MiniSom(x=som\_size[0], y=som\_size[1], input\_len=features\_scaled.shape[1], sigma=1.0, learning\_rate=0.5)

# Train the SOM

som.random\_weights\_init(features\_scaled)

som.train\_random(data=features\_scaled, num\_iteration=1000)

# Visualize the results

bone() # use black and white colors

pcolor(som.distance\_map().T) # plot the distance map as background

colorbar() # add color bar to map

# Plot markers for each sample

markers = ['o', 's']

colors = ['r', 'g']

for i, x in enumerate(features\_scaled):

w = som.winner(x) # get the winning node for each sample

plot(w[0] + 0.5, w[1] + 0.5, markers[data['Potability'].iloc[i]], markerfacecolor='None',

markeredgecolor=colors[data['Potability'].iloc[i]], markersize=12, markeredgewidth=2)

show()