Ryan Neumann
Artificial Intelligence
Professor Rivas
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1.

C.

```
# number of samples
N = 1000
```

D.

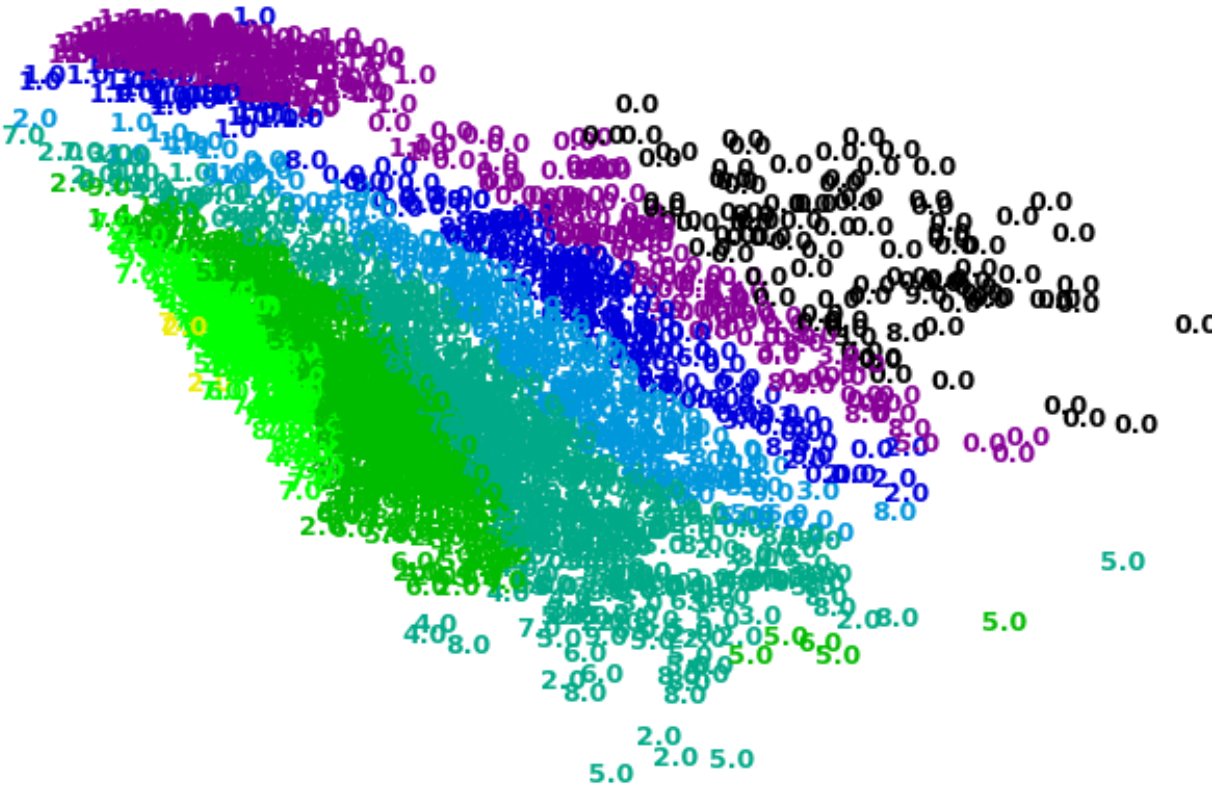
```
[MacBook-Pro-2:Box Sync RyanNeumann$ cd College/
[MacBook-Pro-2:College RyanNeumann$ ls
 Junior Year     Sophomore
[MacBook-Pro-2:College RyanNeumann$ cd Junior\ Year/
[MacBook-Pro-2:Junior Year RyanNeumann$ cd Artificial\ Intelligence/
[MacBook-Pro-2:Artificial Intelligence RyanNeumann$ cd Artificial_Intelligence/
[MacBook-Pro-2:Artificial_Intelligence RyanNeumann$ ls
 AI Textbook.pdf Neumann-02      Neumann-05      Neumann-Prj
 Neumann-00      Neumann-03      Neumann-Final   README.md
 Neumann-01      Neumann-04      Neumann-Midterm
[MacBook-Pro-2:Artificial_Intelligence RyanNeumann$ cd Neumann-Final
[MacBook-Pro-2:Neumann-Final RyanNeumann$ ls
 Final1.py               finalGenData.py
 final.pdf               finalGenData.pyc
[MacBook-Pro-2:Neumann-Final RyanNeumann$ python Final1.py
C 0.03125, epsilon 0.0, gamma 3.0517578125e-05. Testing set CV score: -0.296065
C 0.03125, epsilon 0.0, gamma 2.0. Testing set CV score: 0.090241
C 0.125, epsilon 0.0, gamma 2.0. Testing set CV score: 0.136567
C 0.5, epsilon 0.0, gamma 2.0. Testing set CV score: 0.141453
```

The hyper-parameters seem to be slowly increasing as the program runs. However, epsilon seems to stay static. It appears that there is no great penalty, although there is no room for errors. This leads me to believe that there is no relationship between C and ε. However, I did notice that as C increased, so did the CV score. That means that as the hyper-parameter increased, so did the error percentage.

2.

B.

After the program ran for approximately two hours, the training set score was marked at 0.343551, while the testing set score came out to be 0.325835. Looking at the plot, you can assume it tries to color code each number with it's associated group. However, many outliers were wrongly categorized.



C.

The hyper-parameters seemed to double each time ε was done iterating. It repeated this process through the powers of 2, from the 6th power to the 11th power. It does not appear that there is a great penalty when manipulating the hyper-parameter. In fact, there didn't seem to be much correlation at all between the variables. Although, there was some room for error, because even in the best result, there are some errors.