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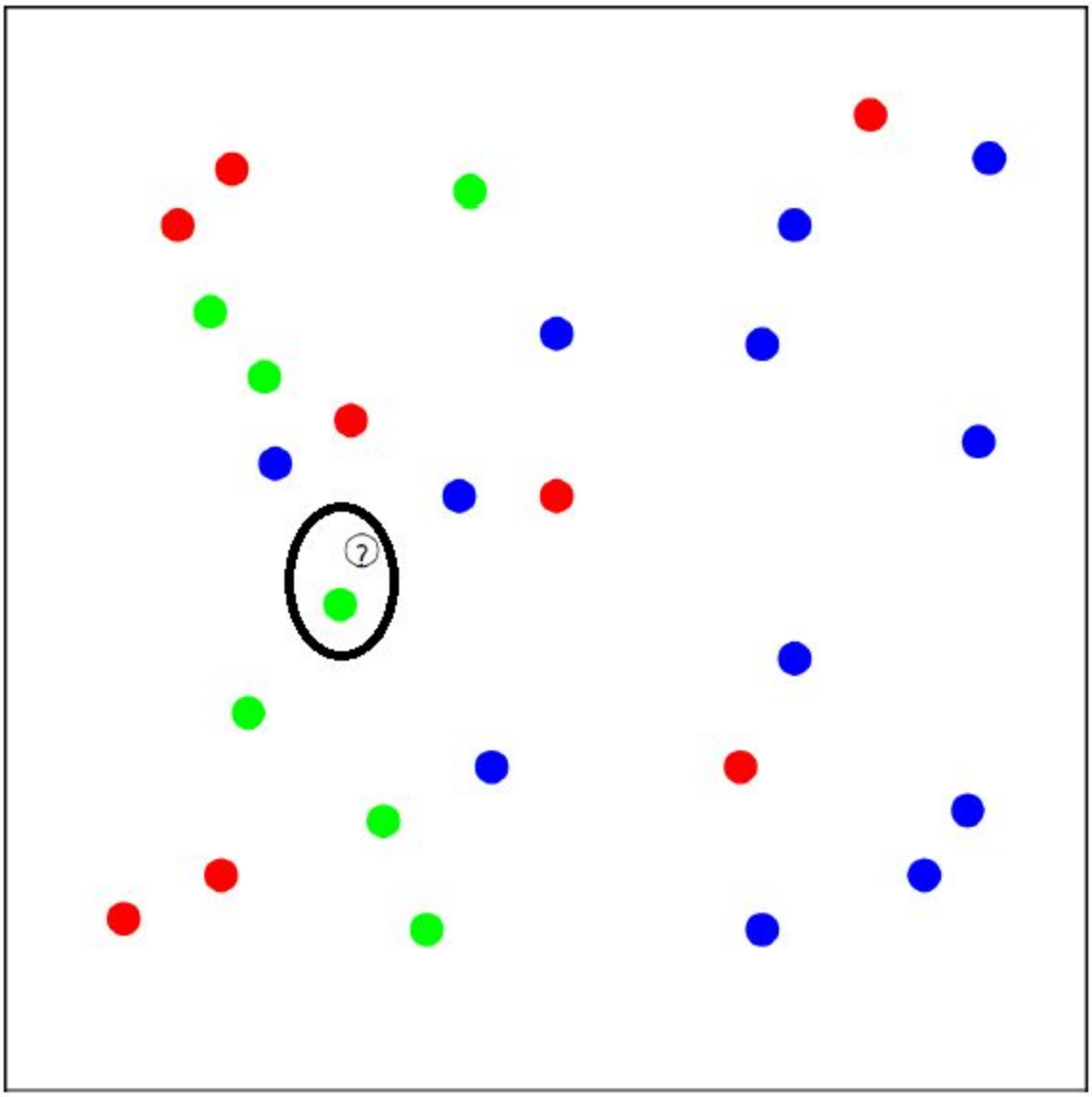
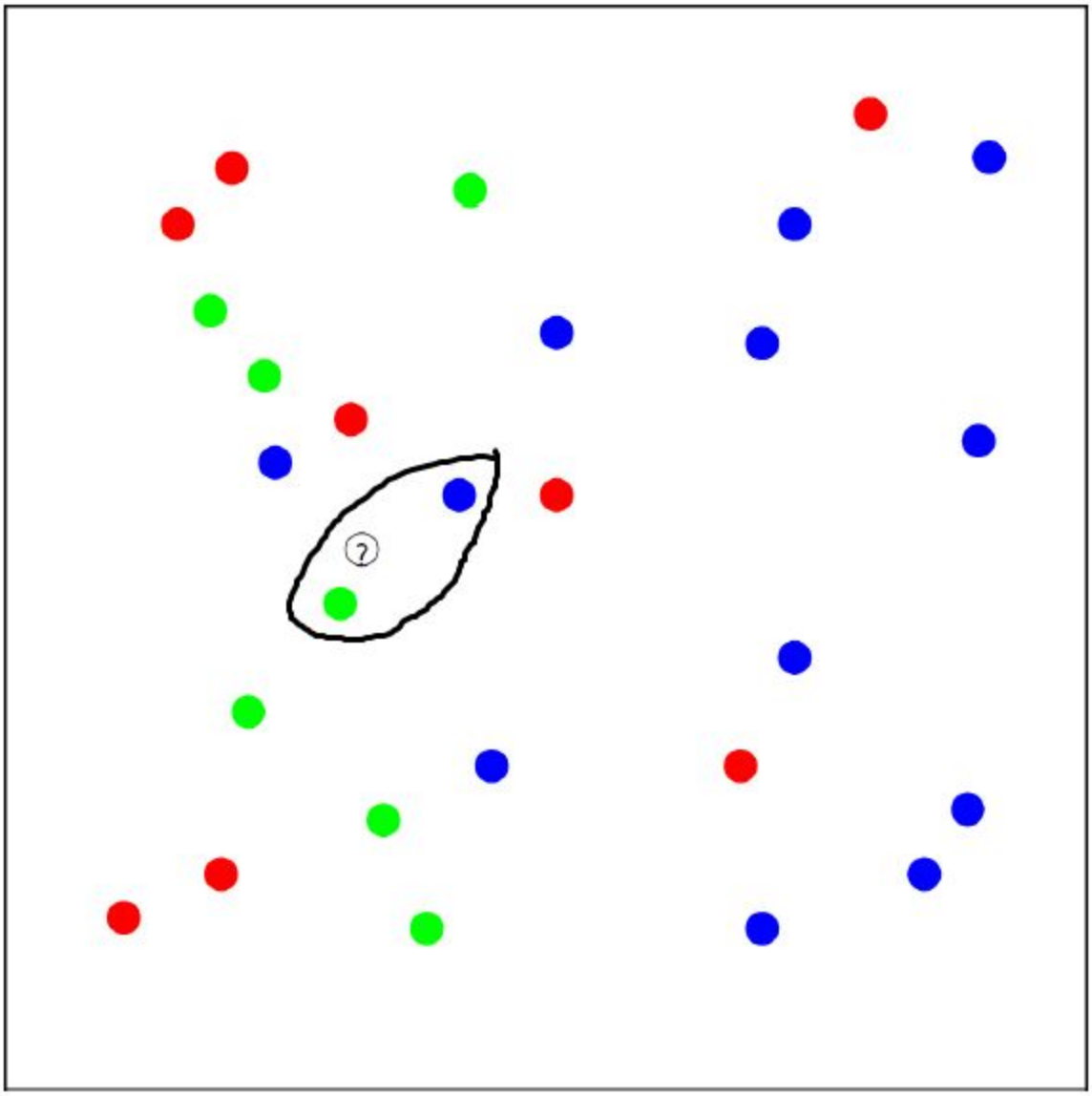
ISC 1057 Dr. Slice

Homework 7

1a.

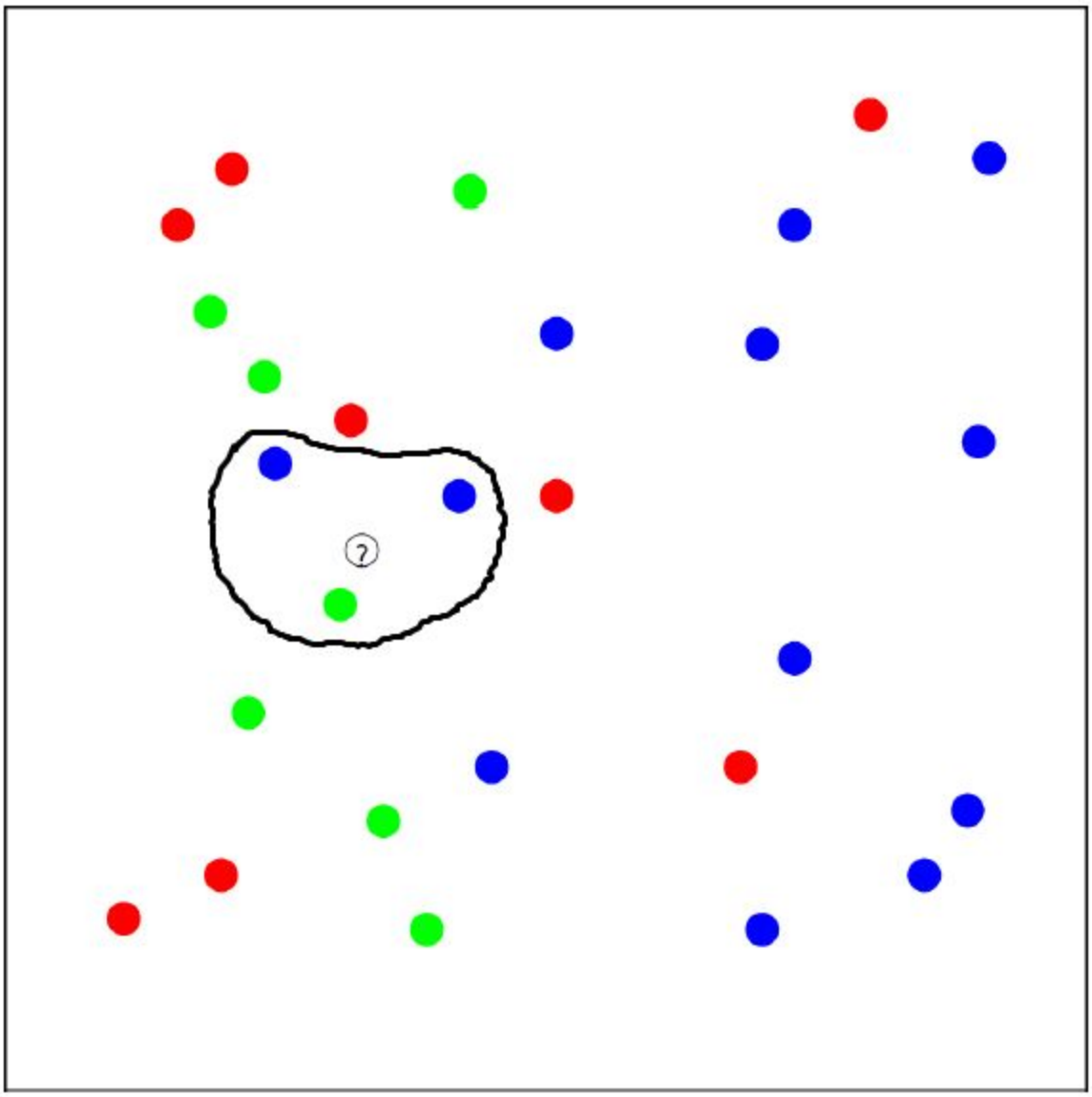


Using single nearest neighbor, the unknown dot would be classified as green because the closest dot to it is colored green.



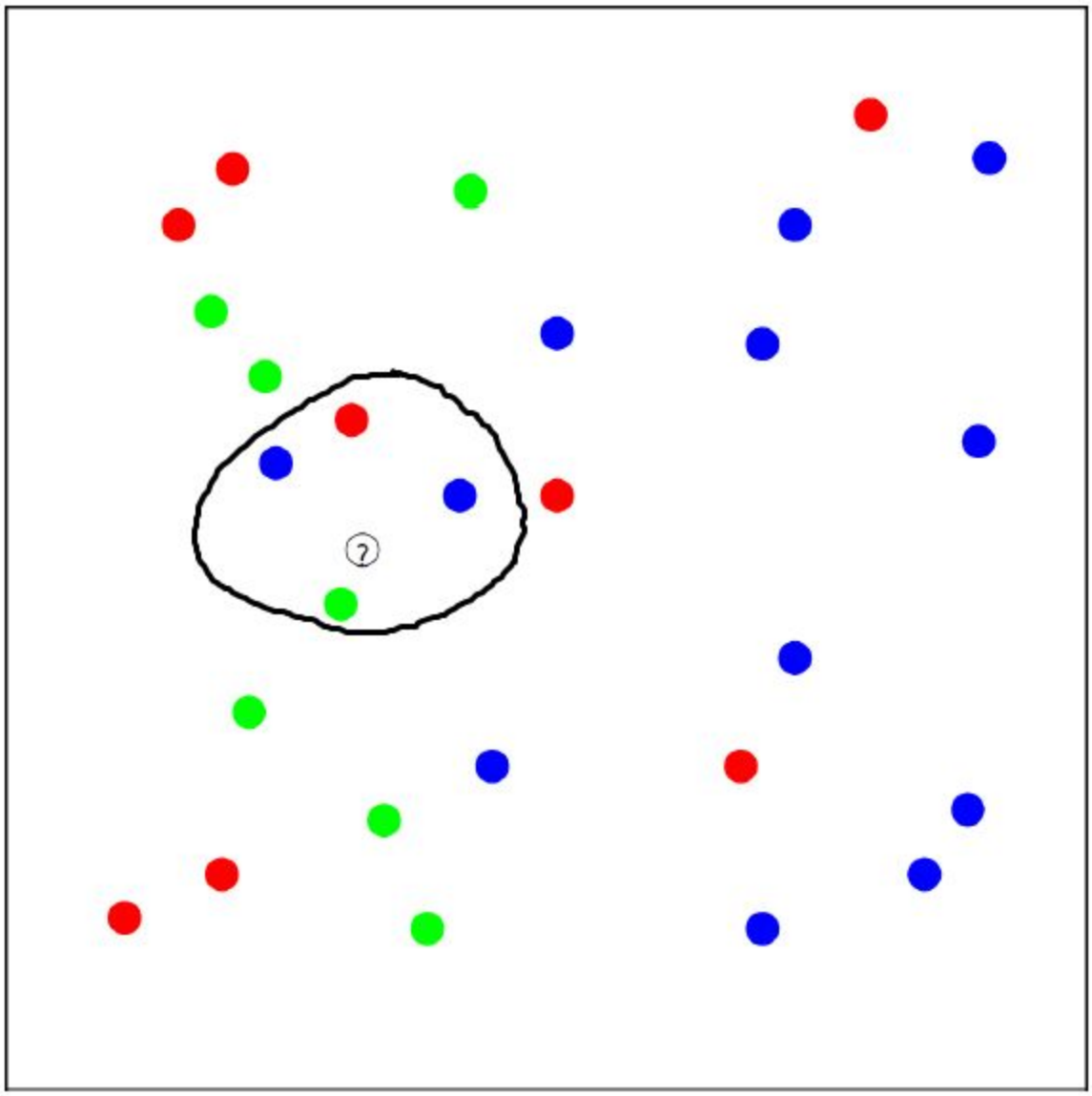
1b.

Using KNN with K =2, it's impossible to determine the color of the unknown dot as we do not have a definitive answer between green and blue.



1c.

Using KNN with K = 3, we can classify the unknown dot as blue because the majority of its nearest neighbors are blue.



1d.

Using KNN with K = 4, allows us to classify the unknown dot as blue because the majority of its nearest neighbors are blue.

2.

a.

T1: (-3,-2) $\sqrt{(-3-2)^2 + (-2+1)^2}$ $\sqrt{25 + 1} = \sqrt{26}$	T2: (3,3) $\sqrt{(3-2)^2 + (3+1)^2}$ $\sqrt{1 + 16} = \sqrt{17}$	T3: (0,3) $\sqrt{(0-2)^2 + (3+1)^2}$ $\sqrt{4 + 16} = \sqrt{20}$
C1: (3,2) $\sqrt{(3-2)^2 + (2+1)^2}$ $\sqrt{1 + 9} = \sqrt{10}$	C2: (-2,-1) $\sqrt{(-2-2)^2 + (-1+1)^2}$ $\sqrt{16 + 0} = \sqrt{16}$	
S1: (7,4) $\sqrt{(7-2)^2 + (4+1)^2}$ $\sqrt{25 + 25} = \sqrt{50}$	S2: (4,5) $\sqrt{(4-2)^2 + (5+1)^2}$ $\sqrt{4 + 36} = \sqrt{40}$	S3: (3,0) $\sqrt{(3-2)^2 + (0+1)^2}$ $\sqrt{1 + 1} = \sqrt{2}$

b. Using single nearest neighbor the classification of the object at (2, -1) is a square because the object with the smallest euclidean distance to the unknown (S3) is classified a a square.

c. Using KNN with K = 3, we can classify the unknown object as a circle because of the three objects with the smallest euclidean distance to the unknown (S3, C1, C2) the majority of them are classified as circles.

d. Using KNN with K = 5, it is impossible to classify the unknown object because, of the five objects with the smallest euclidean distance to the unknown (S3, C1, C2, T2, T3), there is no clear majority classification (circles are tied with triangles).

e. Using KNN = 6, we can classify the unknown object as a triangle because of the six objects with the smallest euclidean distance to the unknown (S3, C1, C2, T2, T3, T1), the majority of them are classified as triangles.

3.

From Chicago, we go to the city with the shortest non-zero distance to us (Lincoln).

From Lincoln, we go to the city with the shortest non-zero distance to us that isn't Lincoln (Blunt).
From Blunt, we go to the city with the shortest non-zero distance to us that isn't Lincoln or Blunt (Colorado Springs).
From Colorado Springs, we go to the city with the shortest non-zero distance to us that isn't Lincoln, Blunt or Colorado Springs (Amarillo).
From Amarillo we go back to our hometown of Chicago, having completed our trip.

I do not think it gave the shortest route because of the fact that we're traveling in two dimensions. I feel like this would be the most optimal route if we were on some sort of number line or if the cities were connected by a straight railroad, but traveling to the nearest neighbor might result in driving east 500 miles, and then having to drive west 1000 miles to reach to cities 500 miles apart from where you originally were. It would have been more optimal to use a KNN approach.