Advanced Algorithm
Assignment 4
Center Selection Problem

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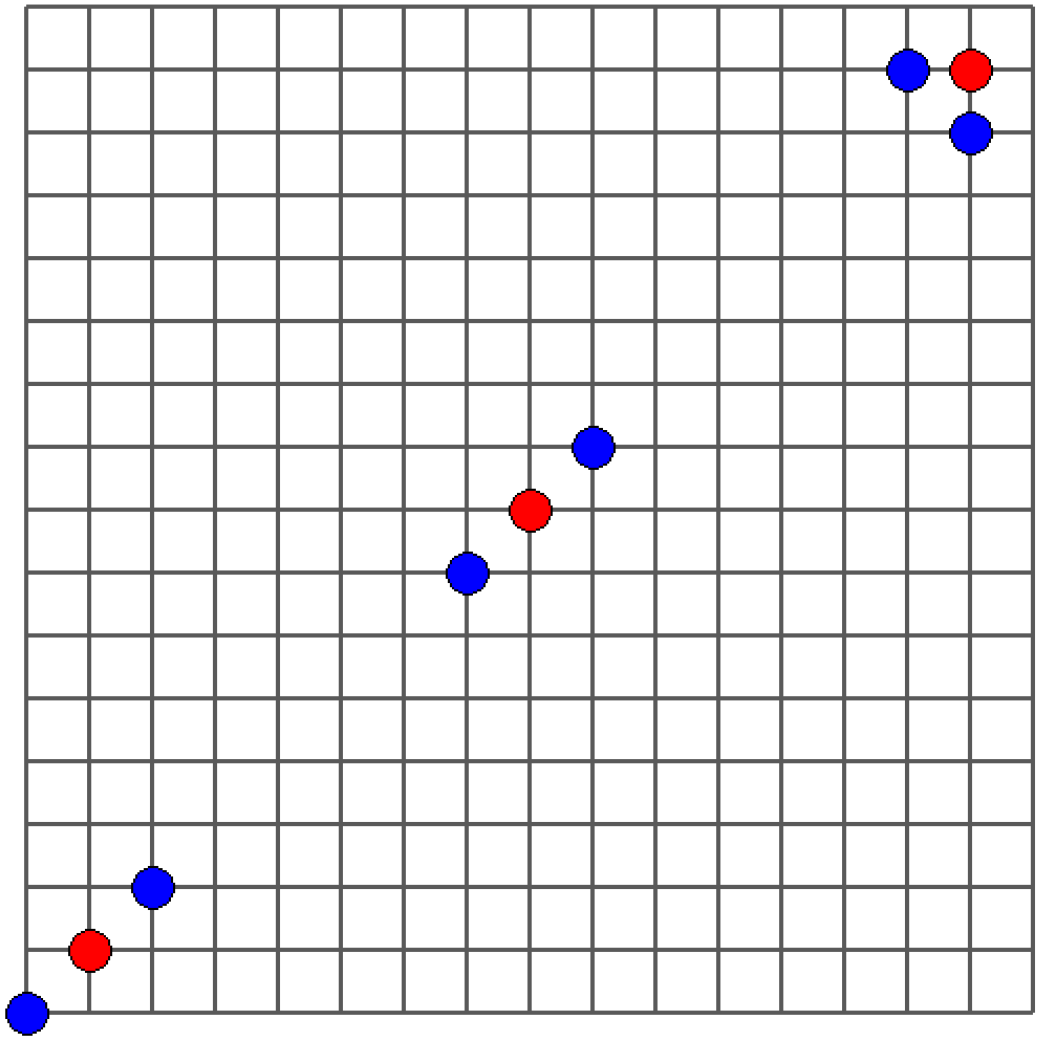
context

- **Exercise 3-1**
- **Exercise 3-2**

Exercise 3-1

Optimal condition:

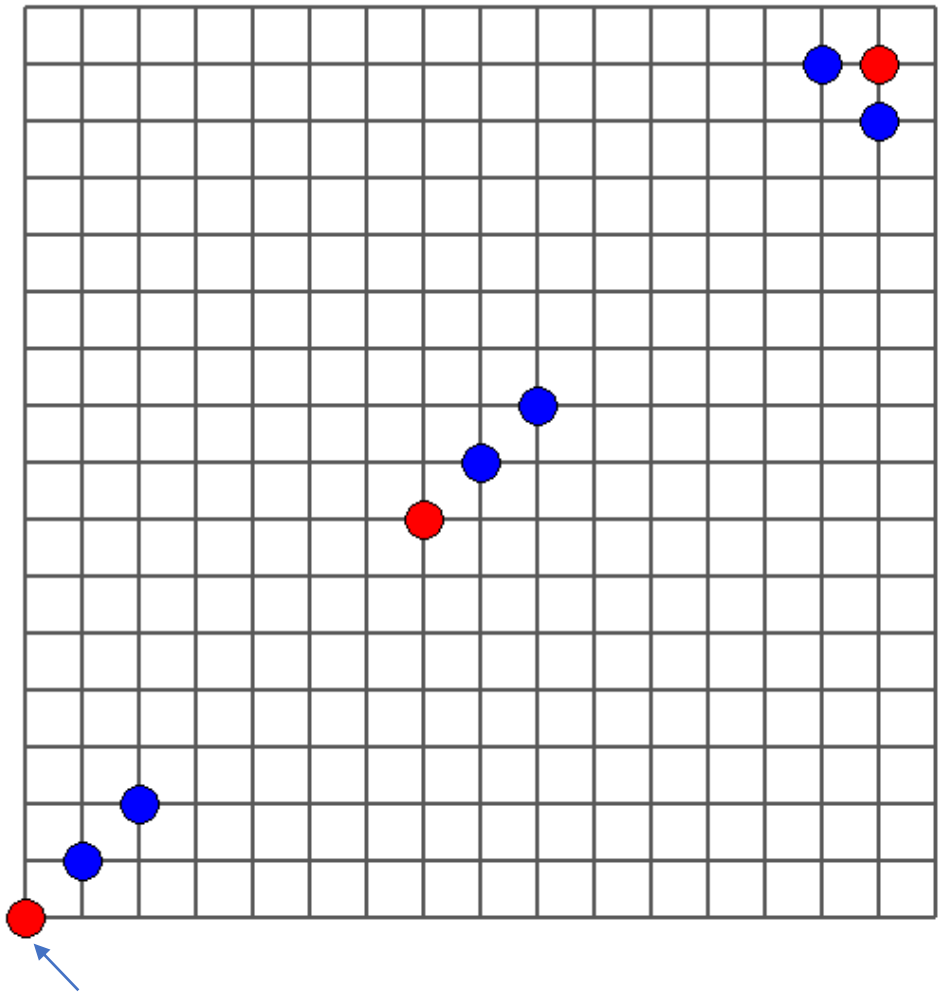


Create an example where the obtained value r(C) by the algorithm is close to 2r(C^*). Create another example where the obtain value r(C) by the algorithm is close r(C^*).

$$r(C^*) = \sqrt{2}$$

Exercise 3-1

Center Selection Algorithm:

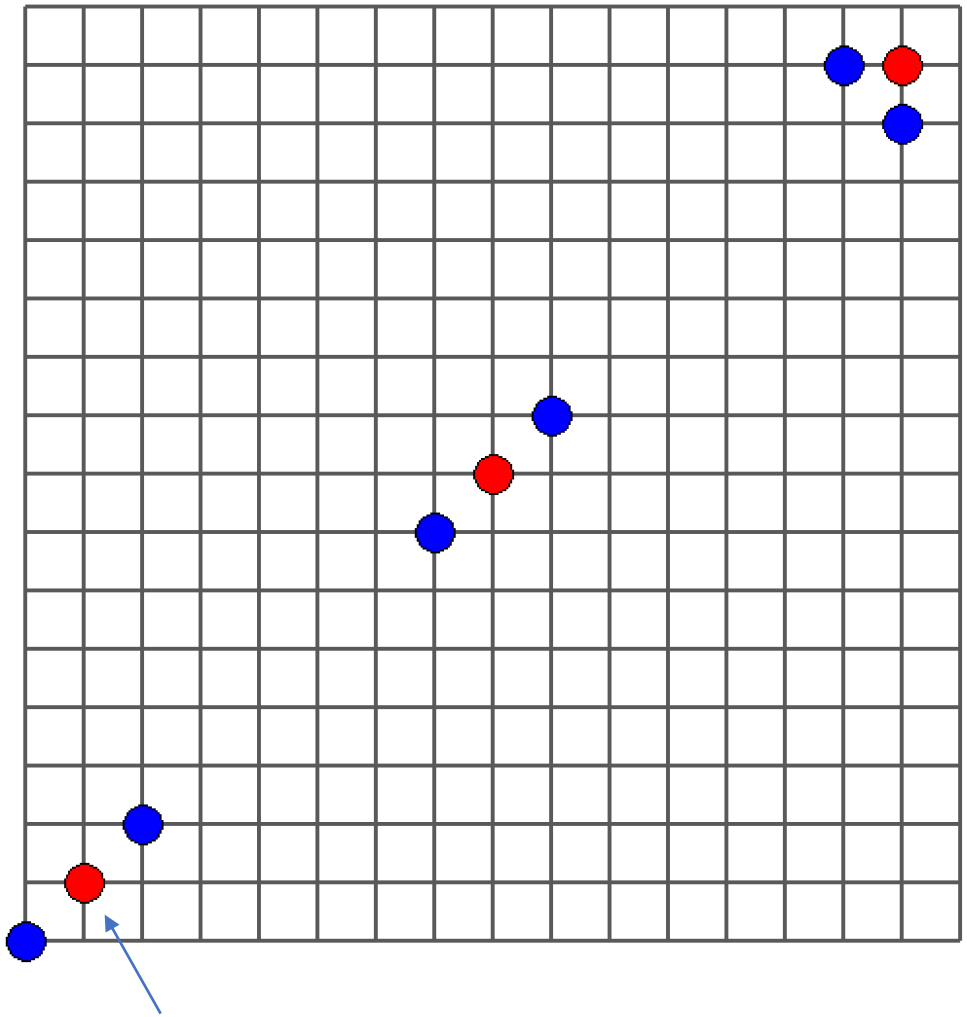


$$r(C) = 2\sqrt{2}$$

$$r(C) = 2r(C^*)$$

Exercise 3-1

Optimal condition:

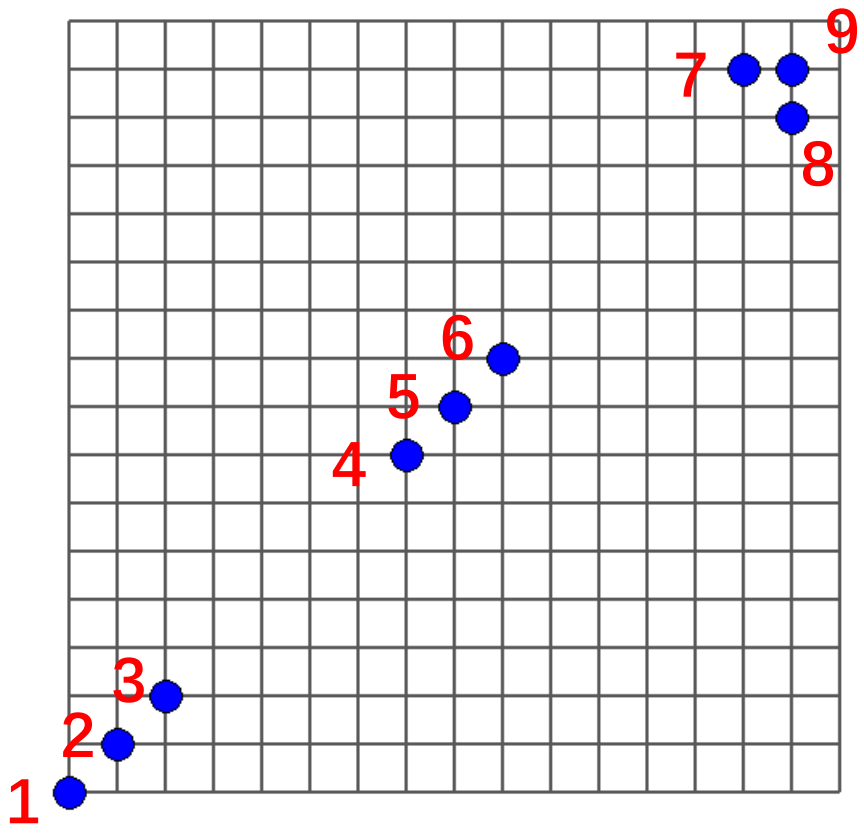


$$\boldsymbol{r(C) = \sqrt{2}}$$

$$\boldsymbol{r(C) = r(C^*)}$$

Exercise 3-2

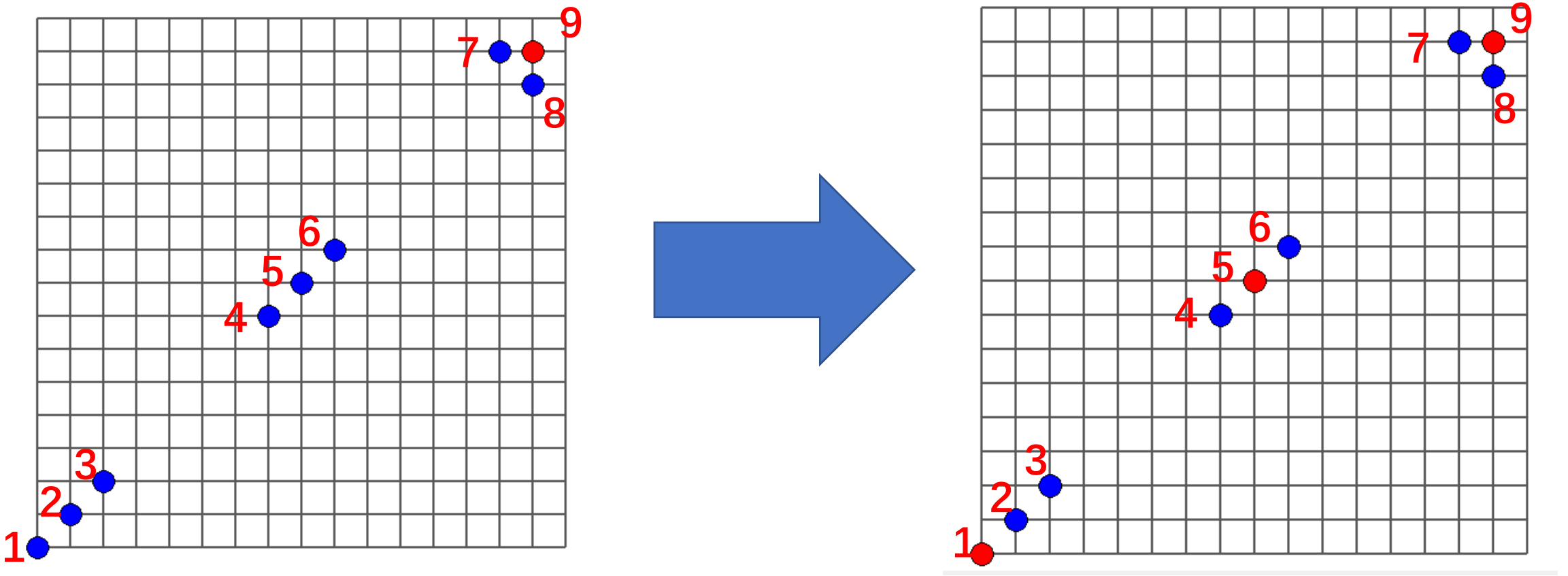
We assume that we have N points and we need to select K centers.
First, we caculate the distance between any two points, and then we calculate the sum of the distances from the nearest $\left\lceil \frac{N}{K} \right\rceil - 1$ points of each point. Finally, we choose the one with the smallest value as the first site.



$$\left\lceil \frac{N}{K} \right\rceil - 1 = 2$$

Point	Sum_distances	The nearest points
1	$3\sqrt{2}$	2、3
2	$2\sqrt{2}$	1、3
3	$3\sqrt{2}$	2、1
4	$3\sqrt{2}$	5、6
5	$2\sqrt{2}$	4、6
6	$3\sqrt{2}$	4、5
7	$1+\sqrt{2}$	8、9
8	$1+\sqrt{2}$	7、9
9	2	7、8

Exercise 3-2



Thank you