




Traveling Salesman Problem



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A game first !

- ❖ If we will have a trip contains 5 spots. What is the shortest route? (Assuming the distance of each two spots is known, and we have to return to the place of departure.)
- ❖ How about 10 spots?
- ❖ And how about n spots? ($n \geq 4$)



❖ Then we can conclude that if we have n spots to travel, we have

$$(n-1)!/2$$

ways, but if the n is large enough, it's a hard work to calculate the shortest route.



For example, if $n=33$, then

$32!/2=13156541846684676508$

3609006080000000 ,

it's horrible!

So, how to do it?

2nd Algorithm

❖ Nearest-neighbor algorithm

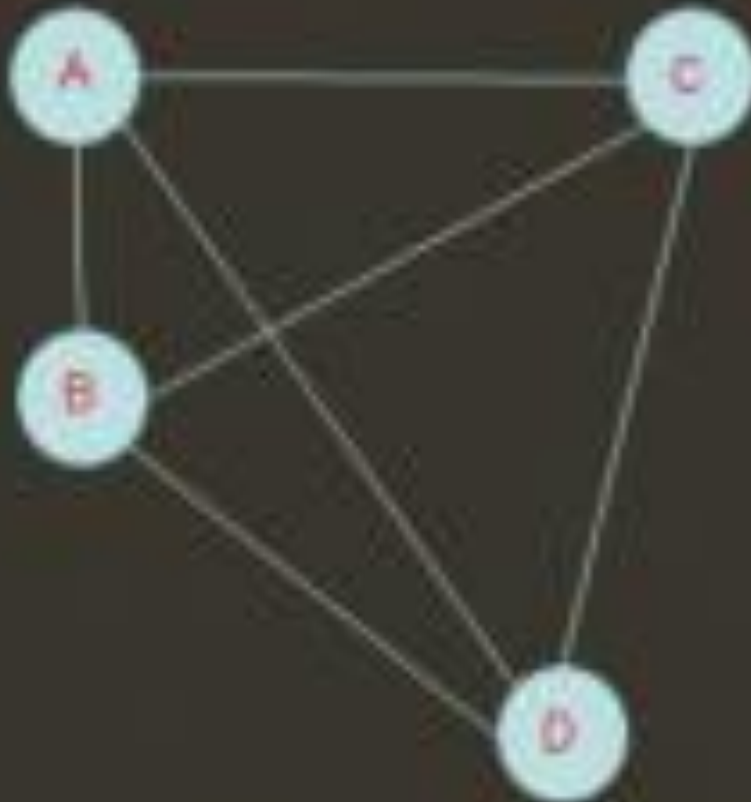
❖ Polynomial

❖ $P=NP?$

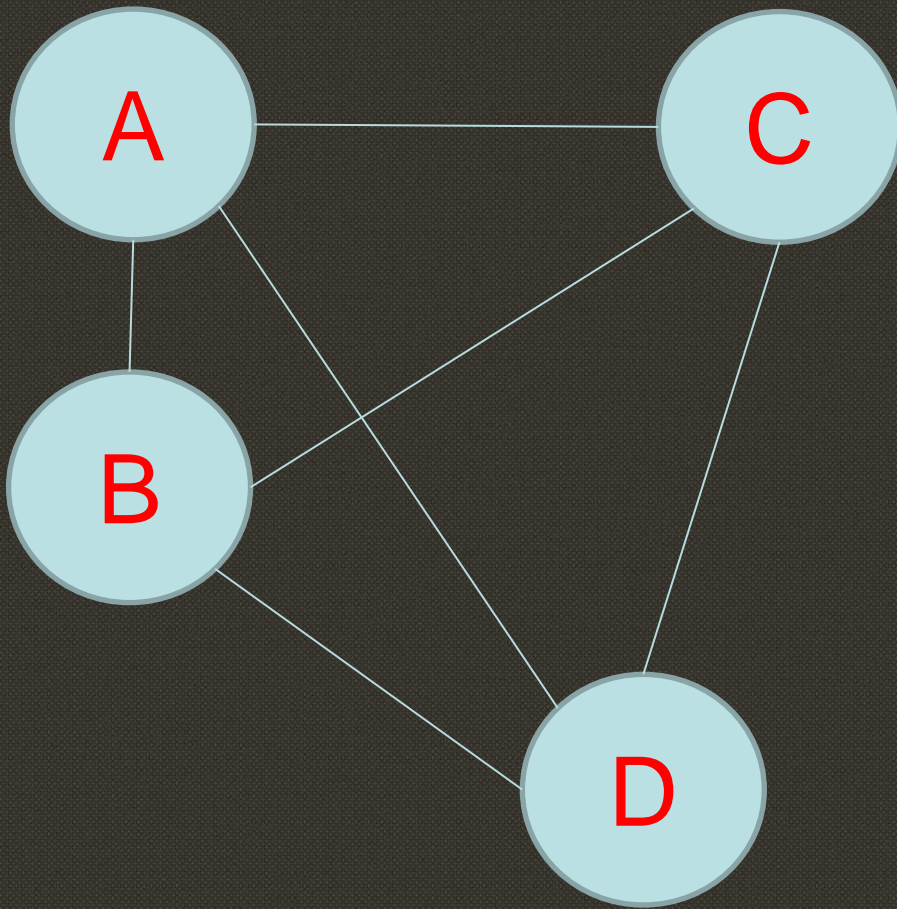
3rd.

A more difficult problem

If we will have a trip contains 4 cities. Using A B C D to represent 4 cities, there are two requests:
(1) the route is the shortest (2) using the least money



A—B :	100km	¥ 200
A—C :	200km	¥ 300
A—D :	300km	¥ 100
B—C :	250km	¥ 200
B—D :	200km	¥ 300
C—D :	200km	¥ 400



A—B :	100km	¥ 200
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Which is more important? Money or time ?



Give a weight and choose which one you prefer

There is no best way but there must be a better way

THANK YOU!

