

模版·分支定界法(旅行商问题)

```
class TSPSolver{
    private final int n;
    private final double[][] dist;
    private double bestCost;
    private List<Integer> bestTour;

    public TSPSolver(double[][] dist){
        this.n=dist.length;
        this.dist=dist;
        this.bestCost=Double.MAX_VALUE;
        this.bestTour=new ArrayList<>();
    }

    private double computeCost(List<Integer> tour){
        double cost=0.0;
        for(int i=0;i<tour.size()-1;i++){
            cost+=dist[tour.get(i)][tour.get(i+1)];
        }
        cost+=dist[tour.get(tour.size()-1)][tour.get(0)];
        return cost;
    }

    private void branchAndBound(List<Integer> tour,boolean[] visited,double currentCost){
        if(tour.size()==n){
            currentCost+=dist[tour.get(tour.size()-1)][tour.get(0)];
            if(currentCost<bestCost){
                bestCost=currentCost;
                bestTour=new ArrayList<>(tour);
            }
            return;
        }

        for(int i=1;i<n;i++){
            if(!visited[i]){
                visited[i]=true;
                tour.add(i);
            }
        }
    }
}
```

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        double newCost=currentCost+dist[tour.get(tour.size()-2)][i];
        if(newCost<bestCost){
            branchAndBound(tour,visited,newCost);
        }
        tour.remove(tour.size()-1);
        visited[i]=false;
    }
}
}

```

```

public void solve(){
    List<Integer> initialTour=new ArrayList<>();
    initialTour.add(0);
    boolean[] visited=new boolean[n];
    visited[0]=true;
    branchAndBound(initialTour,visited,0.0);
}

```

```

public double getBestCost(){
    return bestCost;
}

```

```

public List<Integer> getBestTour(){
    return bestTour;
}

```

```

public static void main(String[] args){
    double[][] distanceMatrix={
        {0,10,15,20},
        {10,0,35,25},
        {15,35,0,30},
        {20,25,30,0}
    };
}

```

```

TSPSolver solver=new TSPSolver(distanceMatrix);
solver.solve();
System.out.println("最佳成本:"+solver.getBestCost());
System.out.println("最佳路线:"+solver.getBestTour());

```

}