* ­不考虑人货优先级，只是人+货的CVRPTW问题
* 不考虑电池的充放电
* 站点需要copy
* 货物可以通过中转站点被接力运达，同一客户货物必须整体接力
* 同一辆车只能访问一次中转站点
* 允许车辆在站点等待（货物被早送到了/人还没有上车）需要写进模型里面吗？暗含了

|  |  |
| --- | --- |
| **Sets** | |
|  | Set of vehicles, |
|  | Set of nodes, |
|  | Set of requests for passengers |
|  | Set of requests for packages |
|  | Set of pickup stations, |
|  | Set of drop-off stations, |
|  | Vehicle depot |
|  | Packages transfer station |
| **Parameters** | |
|  | Maximum capacity of passengers of vehicle , |
|  | Maximum capacity of packages of vehicle , |
|  | Number of passengers requested at station , |
|  | Number of packages requested at station , |
|  | Number of passengers delivered at station , |
|  | Number of packages delivered at station , |
|  | Travel time from station to station , |
|  | Earliest/Latest time that client is willing to depart from his origin , |
|  | Earliest/Latest time that client is willing to arrive at his destination , |
|  | Profit generated by service request , |
|  | Travel cost from station to station for vehicle , |
|  | A large number that is used in the time window constraints |
| **Decision variables** | |
|  | Binary variable for arc utilization. It equals 1 if vehicle traverses from station to station , |
|  | Binary variable for package transfer. It equals 1 if vehicle picks up/drops off package at transfer station, |
| **Auxiliary variables** | |
|  | Arrival time at station , |
|  | Arrival/Departure time of package at transfer station for vehicle , |
|  | Capacity of passengers when vehicle arrives at station , |
|  | Capacity of packages when vehicle arrives at station , |

|  |  |
| --- | --- |
| 目标函数： 客货运收益-运输成本 | |
|  |  |
|  |  |
| 客户尽可能被访问（流平衡），且只能访问一次 | |
|  | F1 |
|  | F2 |
| 同一客户接送点被同一辆车服务（不接客户则不送，接了客户则一定送）,转运车辆继承 | |
|  | H1 |
|  | H2 |
|  | H3 |
| 容量约束 | |
|  | C1 |
|  | C2 |
|  | C3 |
|  | C4 |
|  | C5 |
|  | C6 |
| 时间窗约束 | |
|  | TW1 |
|  | TW2 |
|  | TW3 |
|  | TW4 |
|  | TW5 |
| 货物中转 | |
|  | T1 |
|  | T2 |
|  | T3 |
|  | T4 |
| 不到中转站一定不会S=1 | T5 |
|  | T6 |
|  | T7 |
|  | T8 |
|  | T9 |
|  | T10 |
| 不中转t+-就为0 | T11 |
| 防止出现先中转再取货导致S=1的情况 | T12 |
| 接送点顺序约束 | |
|  | PD1 |
| 车辆起终点约束 | |
|  | SS1 |
|  | SS2 |
|  | SS3 |

乘客不能通过换乘到达目的地；货物可以通过换乘到达目的地

乘客可以考虑绕行距离；货物不需要考虑绕行距离，那货物考虑什么呢？

乘客可以选择是否接受和货物同载一辆车

可以考虑多车型

乘客和货物的时间窗逻辑

不同分布密度下，划分多少空间给人/货，或者不同车型的配置

不同时段下，配置

货物种类，不同时间窗宽度，占比，紧急程度

分三种场景。固定人灵活货、固定货灵活人、灵活货灵活人