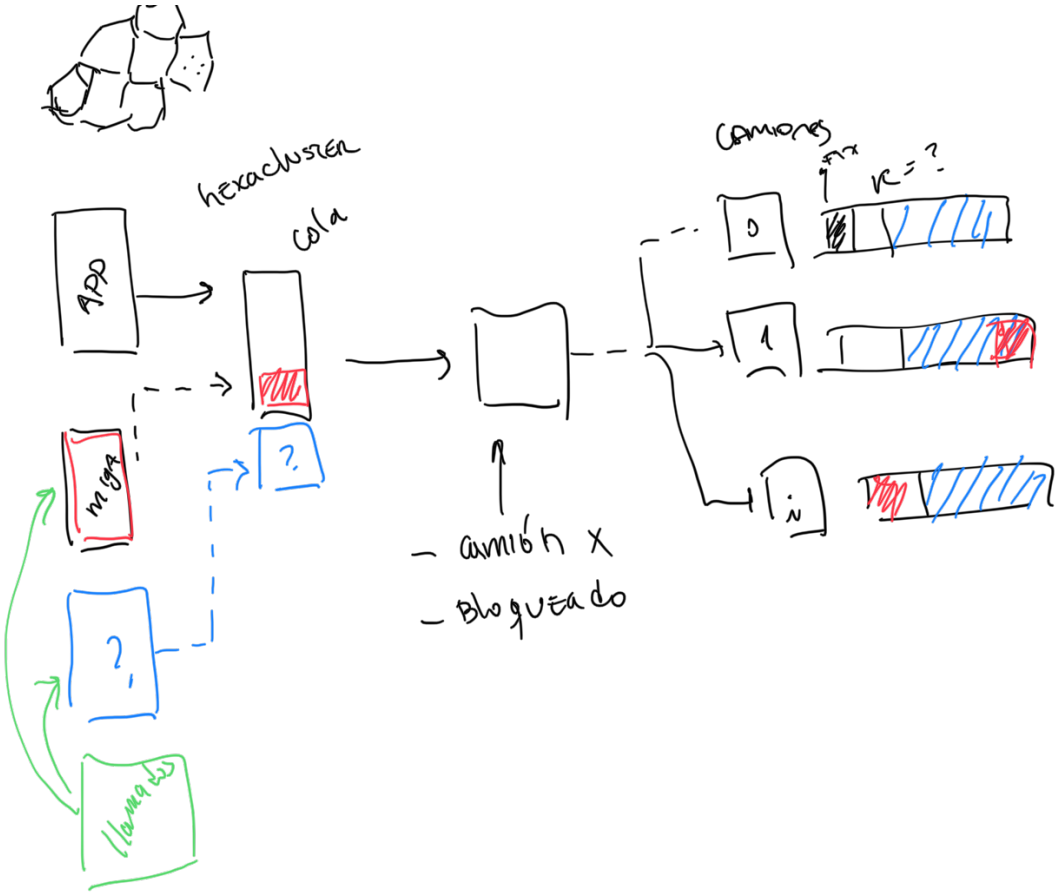
Modelo VRP



$i \in O$ (nodo orden)

$k \in C$ (camiones)

$\partial_{ij} \in \mathbb{R}^+$ tiempo entre nodo i y j

$i \in O$, $S \subseteq O$ (miga ordenes)

$SK \subseteq K$ (miga camiones)

variables x_{ijk} : { 1 si el camión k hace el camino ij ; 0 no

y_{ik} : { 1 si el camión sirve al nodo i ; 0 no

$y_{ik} := \sum^{j} x_{jik}$ $y \in \mathbb{R}$

(not binary)

$$\min \sum_{ijk} d_{ij} x_{ijk}$$

Fulfillment $\sum_{k} y_{ik} = 1 \quad (SOS1)$

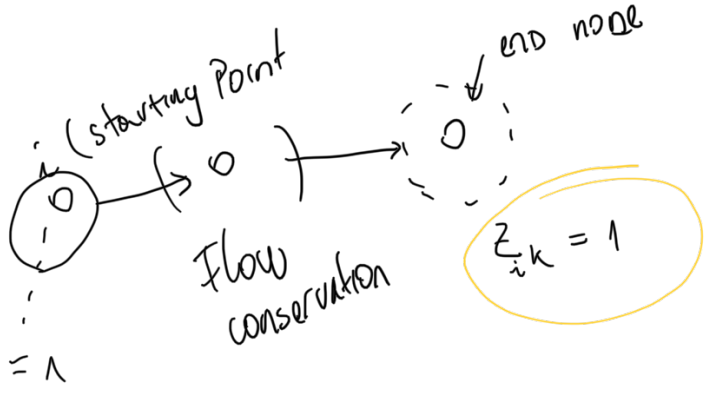
rejected orders $\left(y_{ik} = 0 \quad \forall i \text{ en block} \right)$

head cola $y_{ik} = 1 \quad \forall i \in Q(k)$

starting point $\sum_{j} x_{ijk} = 1 \quad \forall k,\ i = origin(k)$

Flow conservation $\sum_{j \neq i} x_{ijk} = \sum_{v \neq i} x_{vik} - z_{ik} \quad \forall k, i$

$i \neq origin(k)$



CODIFICATION z_{ik}

$$\sum_{i} z_{ik} = 1 \quad \forall k,\ i \neq origin(k)$$

Sub tour constraint (MTZ formulation ($|V| \leq 50$)

$u_{ik} \in \mathbb{Z}^+$,

(1) $u_{ik} - u_{jk} + 1 \leq |V| \cdot (1 - x_{ijk}) \quad \forall i,j,k : i,j \neq \text{origin}(k)$

(2) $u_{ik} = 1 \quad \forall i,k, \; i = \text{origin}(k)$

(3) $|V| \geq u_{ik} \geq 2 \quad \forall i,k : \; i \neq \text{origin}(k)$