Fleet Volume Assignment – Briefing

What is the optimal assignment of parcels across the fleet portfolio subject to the datasets provided?

In your next interview round, we will ask you to present your results, i.e. the optimal assignment, your approach and your challenges. You are free to choose how you want to present your results (Jupyter notebook, excel-sheet, …) but be ready for detailed questions on your approach and source code.

The Fleet Volume Assignment (FVA) problem is the problem of assigning a static portfolio of partner fleets to a fixed number of orders per delivery area, usually postal codes. On the one hand, the parcel to be delivered (demand) in each area of a city, usually postal codes, is assumed to be given. On the other hand, a portfolio of partner fleets is assumed to be given which is static. Static means that no new fleets can be introduced. How should the fleets be assigned best?

Cost

First of all cost depend on the Cost per Parcel (CPP agreed on with each fleet. This cost is fixed until the next negotiation with the fleet during which we and the fleet agree on another, usually lower, CPP. Other than the CPP cost also depends on a fleet's productivity. If for a given fleet with a fixed CPP the productivity of the fleet increases (more parcels per hour) this means that the fleet's margin increases. In this case, we renegotiate parcel rates with the fleet settling at a lower CPP.

Service

High service quality is constituted by a high Delivery Success Rate (DSR) and low percentage of delayed orders (%delayed). Additionally to service quality, a high share of green deliveries constitute good service.

Risk

Risk comes in the three dimensions Fleet Diversification, Fleet Volume Constraints and Fleet Area Constraints. Fleet Diversification means that no fleet should receive more volume than a certain percentage of the total volume, usually 25%, to prevent dependency on individual fleets. Regarding Fleet Volume Constraints, each fleet has a certain capacity to deliver orders which is limited by the number of vehicles each fleet has. Fleet Area Constraints emerge with fleets that do not serve certain sub-areas in the delivery area. For example some fleets only serve the north of a city while other only serve the West.

- Delayed.csv - Historical % of delayed order deliveries per fleet per postcode
- Demand.csv - Volume of parcels needing to be delivered per postcode
- DSR.csv - Historical delivery success rate (overall completed deliveries) per fleet per postcode
- Fleets.csv - Fleet parameters and constraints
- FleetAreaConstraints.csv - Boolean indicator of fleet coverage areas
- ParcelsPerH.csv - Productivity of the fleet per postcode, deliveries per hour