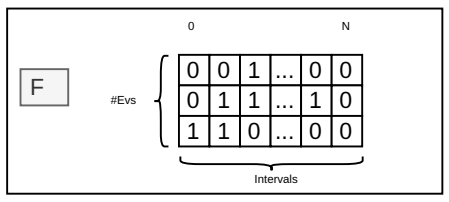
Most important data structure

Global Optimization (Benchmark Only)
- v_x
- v_x_Matrix
- v_energy_variation

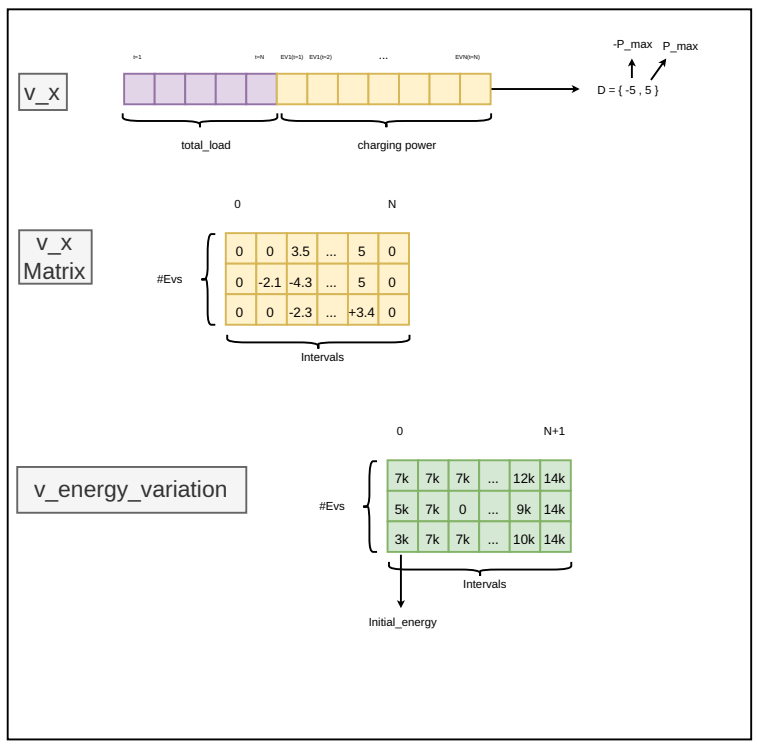
Local / MPC Optimization (Actual Simulation)
- Rate_Matrix
- energy_variation
- EV_Matrix
- EV_Mapping
- E_Charged

Support Structures
- F

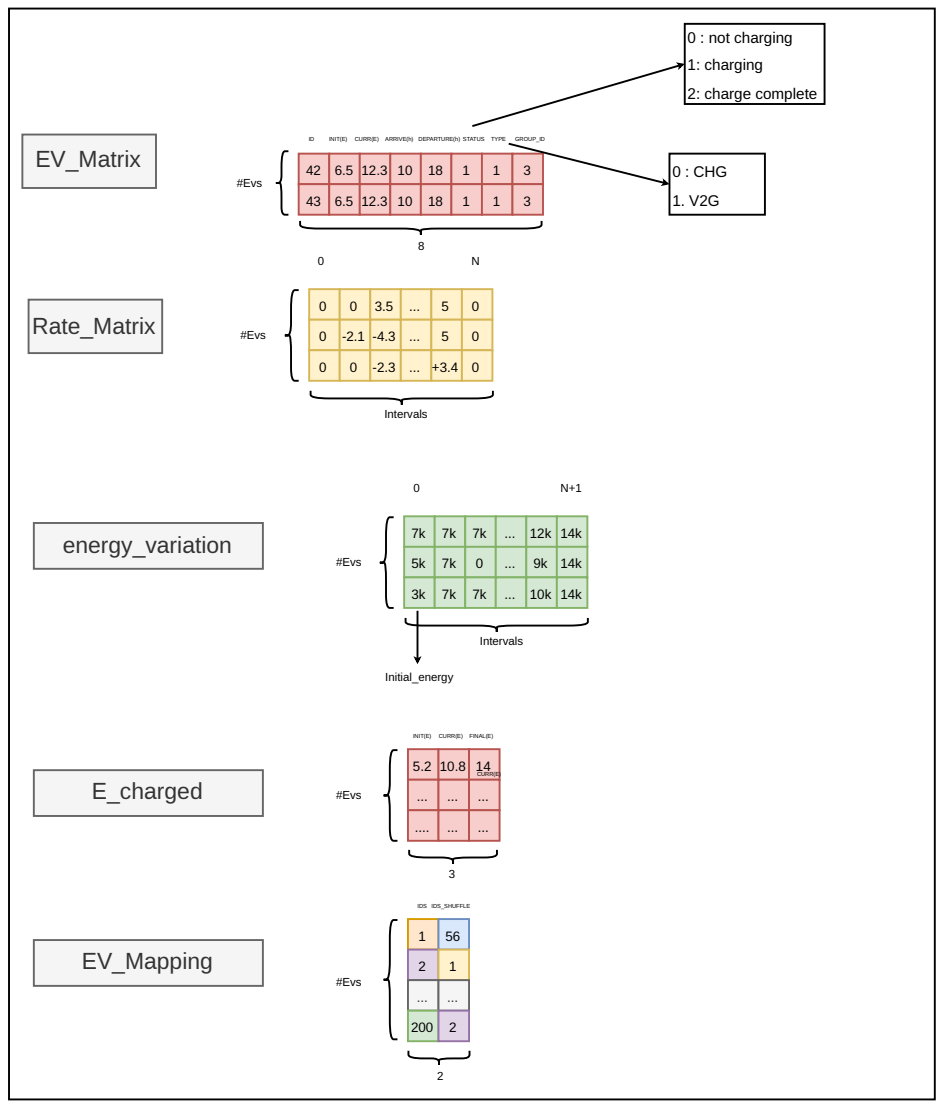
Support structures



Global optimization

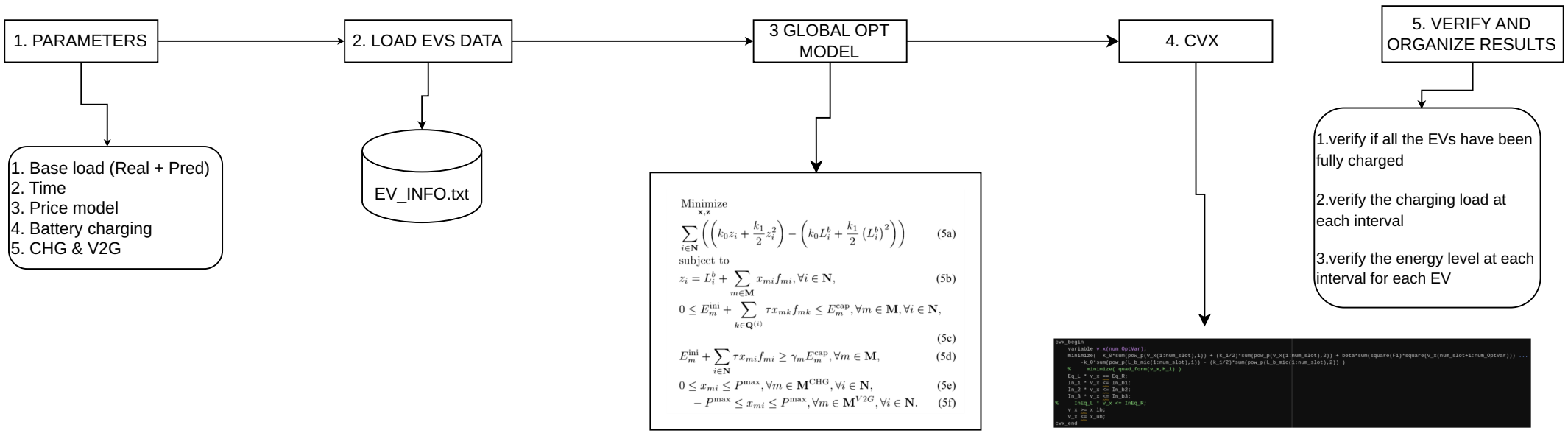


Local optimization



Code explanation

GLOBAL



$$\underset{\mathbf{x},\mathbf{z}}{\text{Minimize}} \quad \sum_{i\in\mathbf{N}}\left(\left(k_0 z_i + \frac{k_1}{2} z_i^2\right) - \left(k_0 L_i^b + \frac{k_1}{2}\left(L_i^b\right)^2\right)\right) \tag{5a}$$

$$\text{subject to}$$

$$z_i = L_i^b + \sum_{m\in\mathbf{M}} x_{mi} f_{mi}, \forall i \in \mathbf{N}, \tag{5b}$$

$$0 \le E_m^{\text{ini}} + \sum_{k\in\mathbf{Q}^{(i)}} \tau x_{mk} f_{mk} \le E_m^{\text{cap}}, \forall m \in \mathbf{M}, \forall i \in \mathbf{N}, \tag{5c}$$

$$E_m^{\text{ini}} + \sum_{i\in\mathbf{N}} \tau x_{mi} f_{mi} \ge \gamma_m E_m^{\text{cap}}, \forall m \in \mathbf{M}, \tag{5d}$$

$$0 \le x_{mi} \le P^{\max}, \forall m \in \mathbf{M}^{\text{CHG}}, \forall i \in \mathbf{N}, \tag{5e}$$

$$-P^{\max} \le x_{mi} \le P^{\max}, \forall m \in \mathbf{M}^{V2G}, \forall i \in \mathbf{N}. \tag{5f}$$

```
cvx_begin
    variable v_x(num_OptVar);
    minimize(  k_0*sum(pow_p(v_x(1:num_slot),1)) + (k_1/2)*sum(pow_p(v_x(1:num_slot),2)) + beta*sum(square(F1)*square(v_x(num_slot+1:num_OptVar))) ...
        -k_0*sum(pow_p(L_b_mic(1:num_slot),1)) - (k_1/2)*sum(pow_p(L_b_mic(1:num_slot),2)) )
    %     minimize( quad_form(v_x,H_1) )
    Eq_L * v_x == Eq_R;
    In_1 * v_x <= In_b1;
    In_2 * v_x <= In_b2;
    In_3 * v_x <= In_b3;
%   InEq_L * v_x <= InEq_R;
    v_x >= x_lb;
    v_x <= x_ub;
cvx_end
```

LOCAL