Nov21

2022-11-19

Recap 1

- Setup:
  - Let y_t be the daily case count at day t
  - Then $y_t \sim Pois(r_t * w_t)$, where $w_t = \sum_a y_{t-a} w_a$
- Objective function:
  - $argmin_r \frac{1}{n}(\sum_{i=1} w_i r_i - y_i log(w_i r_i)) + \lambda ||Dr||_1$
- Scaled Augmented Lagrangian:
  - Let $Dr = z$, adding penalty for being not equal
  - $L(r, u, z) = \frac{1}{n}(\sum_{i=1} w_i r_i - y_i log(w_i r_i)) + \lambda ||z||_1 + \frac{\rho}{2}||Dr - z + u||_2^2 + \frac{\rho}{2}||u||_2^2$
- Update step for r
  - $r \leftarrow argmin_r \frac{1}{n}(\sum_{i=1} w_i r_i - y_i log(w_i r_i)) + \frac{\rho}{2}||Dr - z + u||_2^2$

Recap 2

- Linearize the update step of r
- If penalizing Dr: $r \leftarrow argmin_r \frac{1}{n}(\sum_{i=1} -w_i r_i + y_i log(w_i r_i)) + \rho r^T(D^T D r^o - D^T z + D^T u) + \frac{\mu}{2}||r - r^o||_2^2$
- If penalizing $Dlog(r)$: $r \leftarrow argmin_r \frac{1}{n}(\sum_{i=1} -w_i r_i + y_i log(w_i r_i)) + \rho r^T(D^T D r^o - D^T z + D^T u)(r^o)^{-1} + \frac{\mu}{2}||r - r^o||_2^2$

Finalizing r update

- KKT stationarity condition: