A user-centric model of voting intention from Social Media

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\[
\min_{W, U, \beta} \sum_{p=1}^{n} \sum_{t=1}^{\tau} \left( u_p^T Q_t w_p + \beta_p - y_{tp} \right)^2 + \lambda_1 \sum_{j=1}^{m} \| w_j \|_2 + \lambda_2 \sum_{j=1}^{m} \| U_j \|_2
\]

\( u_p \)\( Q_t \)\( w_p \) bias

\( W = [w_1 \ldots w_p \ldots w_n] \in \mathbb{R}^{m \times n} \)
\( U = [u_1 \ldots u_p \ldots u_n] \in \mathbb{R}^{k \times n} \)
\( \beta, \lambda_1, \lambda_2 \in \mathbb{R}^{>0} \)
\( Q_t \in \mathbb{R}^{k \times m} \)
\( y \in \mathbb{R}^{m \times \tau} \)

Voting intention % for political party \( p \) during time interval \( t \)

Filtering out words & users

Bi-linear

\( \ell_2,1 \)-norm

1. Solve \( \min_{W, \beta} \cdot \)
2. Fix \( W \) and solve \( \min_{\beta} \cdot \)
3. Fix \( \beta \) and solve \( \min_{W} \cdot \)
4. Validate ? Go to Step 2 : END

Prediction performance

RMSE (%) | Method | Austria | UK
---|---|---|---
Training set benchmark mean(poll) | 1.851 | 1.69
Last poll | 1.47 | 1.723
Linear | 1.442 | 3.067
Bilinear | 1.699 | 1.573
Bilinear Multi-task | 1.439 | 1.478