Short-Term REConsumption (STREC) Behaviors

- Recomsume items which have recently been consumed by a same user.
- Altemated now and then with novel consumption behaviors.

Motivations

- A switch problem to narrow down the problem domains.
- Broad applications, e.g. intelligent marketing, recommender systems, web revisitation, information re-finding.
- Challenges: 1) high dynamics of short-term behaviors; 2) multiple influential factors; 3) No representative features.

Feature Extraction

A. Item Popularity

- Average normalized frequencies of items.

B. Item Recomsumption Ratio

- Average normalized reconsumption probability of items.

C. User Recomsumption Ratio

- Recomsumption probability of users.

D. Window Recomsumption Ratio

- Fraction of recomsumptions in the current window.

Fast Prediction Methods

1. Linear Method

$$Pr_L(u, t) = \mathbf{w}^T \mathbf{x}_{u,t}$$

$$\arg \min_{\mathbf{w}} \mathcal{L}(\mathbf{w}) = \sum_{u \in U} \sum_{t \in T_u} \left( \mathbf{w}^T \mathbf{x}_{u,t} - I_{t \in W_k} \right)^2$$

2. Quadratic Method

$$Pr_Q(u, t) = \sqrt{\mathbf{w}^T \mathbf{d}ag(\mathbf{x}_{u,t})^2 \mathbf{w}}$$

$$\arg \min_{\mathbf{w}} \mathcal{Q}(\mathbf{w}) = \sum_{u \in U} \sum_{t \in T_u} \left( \sqrt{\mathbf{w}^T \mathbf{d}ag(\mathbf{x}_{u,t})^2 \mathbf{w}} - I_{t \in W_k} \right)^2$$

Experiments

- Collected a new App using data set, ManicTime.
- LastFM, BrightKite, Gowalla data sets.
- On average, 80% prediction accuracy on 4 real-world datasets.
- SVM method is prone to be overfitted.
- The linear and the quadratic methods do not have much difference in prediction accuracy.