

# Optimizing Search Engines using Clickthrough Data

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- Minimizing the number of mis-ordered pairs

$y_1 > y_2, y_2 > y_3, y_1 > y_4$ 
 $y_1 > y_2$ 
linear combination of features
 $f(q, d) = w^T X_{q,d}$

minimize:  $V(\vec{w}, \vec{\xi}) = \frac{1}{2} \vec{w} \cdot \vec{w} + C \sum \xi_{i,j,k}$

subject to:

$\forall (d_i, d_j) \in r_1^* : \vec{w}\Phi(q_1, d_i) \geq \vec{w}\Phi(q_1, d_j) + 1 - \xi_{i,j,1}$

...

$\forall (d_i, d_j) \in r_n^* : \vec{w}\Phi(q_n, d_i) \geq \vec{w}\Phi(q_n, d_j) + 1 - \xi_{i,j,1}$

$\forall i \forall j \forall k : \xi_{i,j,k} \geq 0$

Keep the relative orders

RankingSVM

